Personal willingness to receive a Covid-19 vaccine and its relationship with intergroup psychology:

Evidence from the Philippines and Pakistan

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Abstract

High levels of vaccine hesitancy are an obstacle to the successful management of the Covid-19 pandemic. In this research, we identify psychological correlates of reluctance to personally receive a Covid-19 vaccine, with a focus on intergroup relations. Insights are based on two survey studies conducted in traditionally under-researched settings, the Philippines (N = 289) and Pakistan (N = 275). Results show that trust in vaccines, both concerning the vaccine's efficacy and the vaccine's safety, were associated with willingness to use the vaccine. Perceptions of trust were related to intergroup psychology, such that vaccine donations from political opponents rather than allies were trusted less. This meant that in the Philippines there was a preference to use vaccines from the USA over those from China, although the pattern was less clear in Pakistan. Having said this, the highest levels of trust and willingness to use vaccines in both countries was for vaccines offered by the World Health Organisation (WHO). Last but not least, a perception of global common fate of all humans in the face of the pandemic was positively associated with willingness to get vaccinated, even when controlling for concerns about the vaccine's efficacy and safety. Implications are discussed in relation to intergroup psychology and public health management.

Keywords: intergroup helping, intergroup processes, Covid-19, vaccine hesitancy, vaccination, donations, international political relations, political relations, outgroup helping, intergroup prosociality

Personal willingness to receive a Covid-19 vaccine and its relationship with intergroup psychology: Evidence from the Philippines and Pakistan

To overcome the Covid-19 pandemic, a global vaccine roll-out is essential (Gavi, 2021). For the global roll-out to succeed, two things need to be in place: vaccines need to be available, and people need to be willing to use them. At present, both these factors are not given: support by the rich nations in terms of contributions to the WHO-supported COVAX initiative have not lived up to initial promises (Guardian, 2021; World Health Organisation, 2021), and in many countries a significant proportion of the population is sceptical about being vaccinated (see e.g. Figueiredo et al., 2020; OctaResearch, 2021). This investigation was concerned with finding predictors of willingness to personally receive a Covid-19 vaccine. To better understand how willingness to take a vaccine can be encouraged, it is vital that we have a good understanding of the concerns that prevent people from wanting to participate in the global vaccine effort. There are many potential barriers to vaccine uptake, and first and formost are lay theories that vaccines do not work or – worse – that vaccines are dangerous to the recipients' health and interests. The present investigation charts the effect of such beliefs, but crucially investigates them in a context that considers intergroup psychology. Specifically, it was tested in how far intergroup psychology would be associated with trust in vaccines, and willingness to get vaccinated, and in how far these effects might vary depending on who offers vaccine donations. There are good reasons to assume that vaccine origin is an important factor: The literature on intergroup helping clearly demonstrates that offers of assistance by outgroups are sometimes met with suspicion (Nadler & Halabi, 2006). This present research will test the association of perceived international political relations with willingness to personally use a Covid-19 vaccine offered by various different outgroup sources. Moreover, we tested whether a belief in global common fate of all humans in our ability to overcome the virus would be associated

with an increased willingness to get vaccinated. These questions were pursued in two understudied settings: the Philippines and Pakistan.

Barriers to vaccine use

Preparedness to use a Covid-19 vaccine can be hampered by concerns about the soundness of the product. Specifically, those concerns can focus on two aspects: whether the vaccine is believed to work, and whether the vaccine is perceived to be safe.

Vaccine efficacy. The first group of concerns comprises worries that the vaccine might simply not work. Indeed, varying levels of protection have been published for different vaccine products. Moreover, protection is never 100% but it is measured in terms of probabilities, with efficacy of the same product varying in relation to time lagged since vaccination, in relation to different virus mutations, depending on whether an individual has received one or more vaccines, and whether these are with the same product or different products. Depending on this complex set of circumstances, the level of protection is sometimes reported to not be very high (see e.g., BBC, 2021). This level of complexity might lead to some people, possibly more likely those with lower education and/or a dislike of cognitive complexity (Webster & Kruglanski, 1997), concluding that there is simply no clear evidence that vaccines even work.

Vaccine safety. Another potential barrier to vaccine use are concerns about vaccines being unsafe. Worries here range from concerns about rare side effects (e.g., blood clots) that might be merited for some people but whose psychological risk might be vastly exaggerated compared to the objective risk, to rather outlandish conspiracy theories (Biddlestone et al., 2020) such as those about the vaccine being a pretext for having microchips inserted into citizens. Clearly, both a belief that vaccines do not work and a belief that vaccines are unsafe and threaten the recipients' health will reduce willingness to use the vaccine.

Intergroup psychology as a driver of vaccine hesitancy

Some studies have started looking at ways to overcoming vaccine hesitancy, for example by altering the messaging on getting vaccinated (Trueblood et al., 2021). These rapidly produced studies have yielded promising results. They draw on existing insights into barriers to vaccine uptake, such as lack of confidence, inconvenience, calculation of pros and cons, and complacency among members of the public (Betsch et al., 2015; Schmid et al., 2017). However, this work has not, to date, tapped into the potential of intergroup psychology for increasing vaccine take-up.

Issues of social identity, group belonging, and group processes have been considered in the context of Covid, but *not* in relation to vaccine hesitancy. Those studies have largely focussed on how group identities can be harnessed to encourage adhesion to social distancing guidance within one country and within one social group, for example by encouraging a sense of responsibility for other members of the community (e.g., Abrams et al., 2021; Jetten et al., 2020; Stevenson et al., 2021; Vignoles et al., 2021; Wakefield & Khauser, 2021). The current state of the art, then, is that group identities and group processes have been studied in relation to Covid but not in relation to vaccine hesitancy, and those studies that have tried to address vaccine hesitancy have not considered group variables. The present investigation aimed to close that gap. This was considered to be of pivotal importance because intergroup psychology can be expected to be hugely influential in the context of reactions to the global vaccine programme, as will be outlined in the following.

Reactions to intergroup help offered by outgroup members to the ingroup. A large body of work has demonstrated that group identities can be important when reacting to help offered in interethnic or international contexts (van Leeuwen & Zagefka, 2017). As argued in the theoretical account that conceptualises intergroup helping in terms of status relations (Nadler & Halabi, 2006; see also Halabi et al., 2016; Halabi et al., 2021;), recipients of lower status groups often react negatively in emotional terms, rather than with positive emotions and gratitude, to help offered by higher status groups. This is because help offered by those who are at an advantage is often interpreted as an attempt by the superior group to cement their advantage over the lower status group

(see also van Leeuwen, 2007). If recipients perceive offers of help as an assertion of dominance, it is hardly surprising that their psychological reactions to the help offered are often rather negative.

In line with these broad predictions from Nadler and Halabi's (2006) work, in the present context too offers of intergroup help were expected to not always be met with enthusiasm in the context of Covid-19 vaccine donations from high-income countries to low-income countries. It seems plausible that strained political relations between certain countries make it more likely that citizens of recipient countries will be suspicious about Covid-19 vaccine donations by higher income countries that are perceived to be political enemies or with whom relations are at least not free of conflict.

The fact that intergroup attitudes and stereotypes are shaped by political international relations is also illustrated by work based on Image Theory (Alexander et al., 1999). This approach argues, for example, that whether two countries' goals are perceived to be conflicting or aligned will impact on whether outgroup nationals will be stereotyped or not (see e.g., Alexander et al., 2005). The fact that international political relations indeed impact on attitudes related to intergroup helping, and specifically also to donations, has previously been demonstrated in an Asian context (Sun et al., 2013). In the present context, then, it is expected that vaccine donations will be trusted more, and that they will be assumed to work better and be safer, when they are offered by outgroup nations with whom political relations are not conflictual.

Global common fate. While conflictual political relations were clearly hypothesized to pose a barrier to the acceptance of vaccines offered by perceived political antagonists, a further aim of the present investigation was to also identify intergroup variables that might have a positive, rather than negative, effect on vaccine uptake. In other words, a direct main effect of perceived global common fate on vaccine hesitancy was tested. There is clear evidence that suffering from the same adversity can create new shared identities with others who share the same fate, which can lead to increased solidarity and a new sense of we-ness (Bowe et al., 2021; Ntontis et al., 2020). As shown by Schmid and Muldoon (2015), a perceived shared threat increases identification with others exposed to this

threat. Moreover, as seen above, studies have shown that increased identification with others within a shared category leads to greater willingness to act in ways that benefit other members of that category, e.g. – in the context of SARS-CoV-2 - by adhering to social distancing guidelines that protect potentially vulernable other group members from being infected with Covid (e.g., Abrams et al., 2021). Previous work has also demonstrated that perceived global common fate increases willingness to offer help to national outgroups in the context of Covid-19 (Zagefka, 2021b). The present work looked at the flip side of the coin, and focussed on willingness not to *offer* but to *accept* help and use donated vaccines. Taken together, it was expected that a perception that all humans are united in a global common fate in overcoming the pandemic would be positively associated with willingness to contribute to the global fight with a very personal contribution: accepting a vaccine to be administered to one's own personal body.

The context of the studies

The research comprised two studies, one conducted among respondents in the Philippines and the other with respondents from Pakistan. Given that Covid is a global pandemic, in theory any country worldwide would have presented a theoretically interesting setting for the current investigation, but in order to speedily set up the work within a rapidly evolving situation we capitalised on existing collaborations to inform the scope of the study. The present research focussed on acceptance of donations from five potential sources: 1) China, 2) the USA, 3) the World Health Organisation (WHO) who support COVAX, the initiative that aims to advance the fair and equitable distribution of Covid-19 vaccines around the globe, 4) the UN, and 5) the international community. This mix was selected for various reasons. China and the USA were selected because it was of interest how respondents in the Philippines and Pakistan would react to donations from those countries, in light of political relations with those nations (more on this below). Indeed, Chinese donations have prominently featured in the Filipino vaccine programme (Reuters, 2021), and healthcare-related equipment needed to combat the virus has been donated by the USA to Pakistan

(VoaNews, 2021). The WHO was included because it is the leading international organisation involved in the actual global vaccine roll-out at present. The UN and a reference to the 'international community' were included because although those groupings are not currently actively involved in public health management, it was nonetheless deemed interesting to include them to allow us to juxtaposition levels of trust in international assistance with that in bilaterally offered assistance, i.e. donations made directly by one country to another. To provide a rationale for the patterns of trust that was expected to emerge, it is necessary to briefly review the political situation in the two participating countries, the Philippines and Pakistan, in relation to the potential vaccine donors China and the USA.

Political context in the Philippines. Public distrust of China can be assumed to be quite high in the Philippines, on the basis of ongoing tension in relation to China's expanding influence in South East Asia. There is concern about Chinese claims of ownership over certain Filipino maritime territories (Lee, 2017; Lee-Brago, 2021), leading to China being described as a military bully who disregards international law in some Filipino public media (Montiel & Dela Paz, 2019), and leading to public protest against Chinese actions which were ruled against by an international arbitration court (Lalu, 2019). Correspondingly, Filipino trust towards China by and large can be expected to be rather low (Social Weather Station, 2020).

In contrast, public opinion about the USA is rather more favourable in the Philippines (Social Weather Station, 2020). The USA ruled over the Philippines for about 50 years until 1946, and this has left notable US cultural traces. The two countries today are close strategic and military allies (Amador III, 2014; Andrade, 2021; Baviera, 2014; Santos, 2021). Correspondingly, Filipino public opinion vis-à-vis the USA can be expected to be characterised by high levels of trust.

In light of this context, it was expected that in the Philippines trust in vaccines offered by the USA, and willingness to personally use vaccines from the USA, would be much higher than trust in and willingness to use products from China. It was explored whether trust in and willingness to use

products offered by the WHO would be highest of all, given the high esteem the WHO can be expected to have in many parts of the world. Likewise, it was explored whether other international potential sources of vaccines, i.e., the UN and the international community, would also be highly trusted.

Political context in Pakistan. There has been long-standing political tension between Pakistan and the USA (Haqqani, 2013). Some of the animosity is connected to the US's approach to their war against terrorism in the region (Nguyen, 2020), to violations of Pakistan's territorial sovereignity, and to post 9/11 US policies towards the larger Muslim world (Asif & Muhammad, 2017). Contributed to the unpopularity of the US amongst many Pakistanis have US drone attacks inside the borders of Pakistan which have resulted in civilian casualties (Nguyen, 2020). A further reason to distrust vaccines offered by the USA is connected to a CIA initiative which launched a fake vaccine drive in Pakistan in order to identify Pakistani citizens genetically connected to Bin Laden (BBC, 2011).

In contrast, political relations between Pakistan and China are rather friendly (Allaudin et al., 2020; Hussain et al., 2020). The two countries are currently collaborating to achieve mutual economic, political, and security objectives (see e.g., the CPEC, China Pakistan Economic Corridor, a framework of regional connectivity and an ambitious initiative designed to benefit both China and Pakistan, Javed, 2016).

In this context, it was therefore expected that in Pakistan trust in vaccines offered by China, and willingness to use vaccines from China, would be greater than trust and willingness to use vaccines offered by the USA. Again, we also explored trust and use proclivity for products sourced from the WHO, the UN, and the international community, with the expectation that attitudes towards internationally supported assistance would potentially be more favourable than attitudes towards assistance offered by a single country.

Summary of hypotheses, and the present research

In sum, then, the following patterns were expected. Broadly speaking, trust in vaccines were expected to be related to willingness to use them. Perceptions of trust were expected to be related to intergroup psychology, such that vaccines donated by outgroups that have a conflictual relationship with the ingroup would be trusted less, and that people would be less willing to use such products. Concretely, this means that it was expected that in the Philippines vaccines from the USA would be more favourably received than vaccines from China, whereas the reverse was expected to be true in Pakistan. It was expected that trust and attitudes towards using vaccines from the WHO and potentially other international sources would be highest of all. Intergroup variables were not only expected to negatively affect vaccine attitudes, but also positively: a perception of global common fate of all humans in the face of the pandemic was expected to be associated with an increased willingness to personally get vaccinated, even when controlling for concerns about the vaccines' efficacy and safety. These broad predictions can be translated into the following concrete hypotheses:

In the Philippines, it was expected that trust in vaccines, and willingness to use vaccines, would be higher for products coming from the USA compared to China (Hypothesis 1, H1). The opposite was expected in Pakistan. Here, it was predicted that trust in vaccines, and willingness to use vaccines, would be higher for products coming from China compared to the USA (Hypothesis 2, H2). Moreover, in both countries it was expected that trust in, and willingness to use, products from the WHO and potentially other international entities such as the UN and the international community would be highest of all (Hypothesis 3, H3). In both cultural settings, it was expected that trust in a vaccine from a different source would be strongly related to willingness to use the vaccine (Hypothesis 4, H4). Finally, it was expected that perceived global common fate in overcoming the virus would be positively associated with willingness to receive a vaccine, even when controlling for concerns around vaccine efficacy and vaccine safety (Hypothesis 5, H5). These predictions were tested in two cross-sectional survey studies, one in the Philippines and one in Pakistan.

Study 1 - Philippines

Method

Participants

Two hundred eighty nine Filipinos participated in an online survey conducted in May and June 2021 (mean age = 31.53, sd = 14.96, 138 women, 144 men, 3 non-binary persons, missing data on the gender variable from 4). The survey was in English, and the vast majority of participants (99%) reported speaking English well or very well. The sample was relatively affluent, with 92% of participants describing themselves as middle or upper class. 99% had completed a High School degree or even higher qualification. In line with typical demographics in the Philippines, a large proportion of the sample (88%) identified themselves as Roman Catholic. At the time of the survey, 83% of participants reported not yet having received a Covid-19 vaccine.[1]

Facebook, the most widely used social media platform in the Philippines (Lalu, 2020), was used to advertise the study. A brief description of the study was posted, so that participants were fully aware that this was a study about the Covid-19 pandemic. A link to the online survey was then presented. Invitations were posted to various Filipino Facebook groups. Participants were also invited to share the survey with others. A raffle for a cash prize was offered to incentivise participation.

We aimed to recruit at least N = 250 because this sample size has generated sufficient power in previous work on intergroup helping in the context of COVID-19 (Zagefka, 2021a), and effect sizes were assumed to be comparable. A priori power analysis with G*Power (Faul et al., 2007), assuming a slope of .16 and α = .05 and aiming for a power of .80, recommended N = 237, also suggesting that conservatively recruiting at least N = 250 would yield sufficient statistical power.

Measures

Trust in Covid vaccines from different sources. Participants indicated whether they would trust Covid-19 vaccines coming from different sources. The sources were: China, the USA, the WHO, the UN, and the international community. For each source three items were used, tapping into general trust, perceptions of safety, and perceptions of efficiency of the vaccine. Items were adapted from those used

in the OCTAResearch (2021) survey, and they were: "I think vaccines can be trusted when they come from…", "I think a vaccine might not be safe if it comes from…", and "I think a vaccine might not work and not protect me from the virus if it comes from…". Items were measured on 3-point Likert scales with 1 indicating distrust, 2 indicating an undecided position, and 3 indicating trust (scale points: definitely can't be trusted, maybe can be trusted, definitely can be trusted; definitely not safe, maybe safe, definitely safe; definitely doesn't work, maybe works, definitely works). The reliabilities were α = .82 for the Chinese source, .81 for the US American source, .80 for the international community, .83 for the WHO, and .85 for the UN.

Personal willingness to receive a vaccine dependent on the source. Next, willingness to use a Covid-19 vaccines coming from different sources was assessed. The sources were as before: China, the USA, the WHO, the UN, and the international community. For each source two items were used: "I would be happy to personally receive a vaccine coming from…", and "I would sign up to be vaccinated using a vaccine donated by…". Items were measured on 3-point Likert scales with 1 indicating refusal to be vaccinated, 2 indicating an indecisiveness, and 3 indicating acceptance of the vaccine (scale end points: no, maybe, yes). The reliabilities were α = .91 for the Chinese source, .91 for the US American source, .91 for the international community, .93 for the WHO, and .89 for the UN.

Overall personal willingness to receive a vaccine irrespective of source. While the measures described above reflect personal willingness to accept a vaccine dependent on the source, it was also of theoretical interest to measure how great each participants' overall willingness was to receive a vaccine irrespective of source. After all, it is possible that vaccine acceptance varies dependent on the source of the vaccine, but vaccine acceptance can also vary between people, with some people being more sceptical than others. To capture overall willingness to receive a vaccine, the measures above capturing willingness per source were averaged into an index of overall willingness, α = .72.

Overall perceived safety and efficacy of the vaccine. Perceptions of overall perceived safety of Covid-19 vaccines, and their perceived efficacy, as a generalized attitude and irrespective of source were measured with two 1-item measures, again based on items used by OCTAResearch (2021): "I think Covid vaccines might not be safe for my health", and "I think Covid vaccines might not work as protection against the virus" (1 = strongly disagree to 5 = strongly agree).

Perceived global common fate. Participants' perceptions that there is global interdependence between our success in fighting the pandemic was measured with four items, adapted from Zagefka (2021b): "All countries need to address the coronavirus problem together", "We need to address coronavirus as a global community", "To beat coronavirus, we need global cooperation", and "Our success in fighting the pandemic is interlinked with the success of other countries" (1 = strongly disagree to 5 = strongly agree), α = .88.[2]

Both studies in this paper received ethics clearance from the home institution of the lead author. The research was in line with British Psychological Society ethics guidelines. Missing values on individual items were not treated. For scales with more than one item tapping into the construct, those items were averaged to generate one overall index to measure the construct. There were no exclusion criteria; all participants who responded to the survey were included in the analysis. The data for both studies can be found here:

https://osf.io/r2mws/?view_only=56be39f3ab3c45d3ab908795fb8808d9.

<div align="center">Results and Discussion</div>

To test whether there would be variations in trust in vaccines depending on the source of the vaccine, and willingness to use the vaccine depending on the source of the vaccine, two repeated measures ANOVAS were conducted.

The first ANOVA used 'trust' in vaccines coming from the five different sources as levels of a repeated measures factor, with all targets being included: China, the USA, the WHO, the UN, and the international community. The repeated measures ANOVA was significant, $F(4, 1152) = 160.45$,

$p < .001$, $\eta^2_p = .36$. Means are displayed in Table 1. Bonferroni adjusted pairwise comparisons were used to test differences between the different sources.

The second ANOVA used personal 'willingness to use' a vaccine coming from different sources as levels of a repeated measures factor, with all targets being included: China, the USA, the international community, the WHO, and the UN. Again, the repeated measures ANOVA was significant, $F(4, 1152) = 180.82$, $p < .001$, $\eta^2_p = .38$. Means are displayed in Table 1. Bonferroni adjusted pairwise comparisons were again used to test differences between the different sources.

As is evident in the table, as predicted by H1 trust in and willingness to use products from the USA were higher than for products from China. In line with H3, trust and willingness to use products from the WHO (and other international sources) was highest of all.

In line with the idea that trust the safety and efficacy of vaccines provided by different outgroups crucially informs willingness to use that vaccine, there was also evidence that trust in a vaccine from a certain source was highly correlated with willingness to use that specific vaccine. The bi-variate correlations of the two measures for each source were $r = .71$, $p < .001$ for China, $r = .72$, $p < .001$ for the USA, $r = .72$, $p < .001$ for the international community, $r = .77$, $p < .001$ for the WHO, and $r = .78$, $p < .001$ for the UN. This pattern of results clearly supported H4.

Next, a regression was conducted to test whether overall personal willingness to get vaccinated (irrespective of source) would be associated with perceived global common fate. In this analysis, overall personal willingness to receive a vaccine was predicted by three variables: Overall perceived safety of vaccines, overall perceived efficacy of vaccines, and perceived global common fate. In line with the hypotheses, all three predictors were significant. Results are displayed in Table 2. Unsurprisingly, a perception that vaccines are not safe was negatively associated with willingness to get vaccinated, as was a perception that vaccines do not work. Importantly, even when controlling for concerns about vaccine safety and efficacy, intergroup variables still remained a significant predictor of personal willingness to get vaccinated: a perception that there is global common fate in

our ability to overcome the pandemic was positively associated with willingness to get vaccinated. The results of the regression analysis clearly supported H5.

Study 2 – Pakistan

The survey was repeated in Pakistan. Again, it was expected that intergroup variables would impact on personal willingness to get vaccinated, so that trusting the outgroup offering the vaccine would lead to greater willingness to personally use it, and that global common fate would still be a significant predictor of willingness to get vaccinated even after controlling for concerns about the vaccine's safety and efficacy. Hence, the general psychological processes were expected to pan out in the same way in this different cultural context. However, what was expected to differ was the specific outgroup targets that would be trusted versus distrusted: this time, it was expected that there would be more trust and willingness to use products coming from China compared to the USA, whereas the reverse had been true for the Filipino study.

Method

Participants

Two hundred seventy five Pakistanis participated in this online survey in May and June 2021 (mean age = 26.37, sd = 6.56, 81 men, 187 women, 2 non-binary persons, missing data on the gender variable from 5). The study language was English, and 95% of participants indicated that they had good or excellent proficiency in this language. The sample was again comparatively affluent, with 92% categorising themselves as middle class or higher, and 98% reporting to have enjoyed 12 years of education or more. The vast majority (98%) indicated their religion as Islam. At the time of the study, 77% of participants reported not yet having received a Covid-19 vaccine.

In this setting, too, the study was advertised through social media (WhatsApp and Facebook). Again, the survey was advertised as a study on the Covid-19 pandemic, and a link to the study was posted in different Facebook and WhatsApp groups. Once more, a request was included to also

forward the link to others to achieve a snowballing effect. In line with the rationale outlined for the previous study, again we aimed for a sample size exceeding N = 250.

Measures

The same measures were used as in the Filipino survey, but of course now for all references to the ingroup we substituted 'Pakistan' for 'the Philippines'.

The reliabilities for *trust in Covid vaccines from different sources* were as follows: α = .67 for the Chinese source, .70 for the US American source, .59 for the international community, .73 for the WHO, and .66 for the UN.

The reliabilities for *personal willingness to receive a vaccine dependent on the source* were as follows: α = .61 for the Chinese source, .66 for the US American source, .75 for the international community, .93 for the WHO, and .66 for the UN.

An index of *overall personal willingness to receive a vaccine irrespective of source* was again calculated by averaging across willingness to use vaccines from different sources, α = .68.

Overall perceived safety and efficacy of the vaccine were again both measured by 1-item measures, and *perceived global common fate* was measured with the same scale as in the previous study, α = .87.

Results and Discussion

Again, two repeated measures ANOVAs were conducted, one with the 'trust' indices for different sources, and one with the 'willingness to use' products coming from different sources, to test whether there would be variations in trust in vaccines depending on the source of the vaccine, and variations in willingness to use the vaccine depending on the source of the vaccine.

The first ANOVA testing differences in trust in vaccines coming from different sources again included all targets: China, the USA, the international community, the WHO, and the UN. The analysis was significant, $F(4, 1096) = 6.32$, $p < .001$, $\eta^2_p = .02$. Means are displayed in Table 1.

Bonferroni adjusted pairwise comparisons were used to test differences between the different sources.

The second ANOVA used personal willingness to use a vaccine coming from different sources as levels of a repeated measures factor, again with all targets being included. The analysis was also significant, $F (4, 1096) = 7.67$, $p < .001$, $\eta^2_p = .03$. Means are displayed in Table 1. Bonferroni adjusted pairwise comparisons were again used to test differences between the different sources.

Overall, the highest levels of trust and willingness to use vaccines was detected for products from the WHO, and least trust and willingness to use vaccines was evident for products coming from the USA. These patterns was in line with H2, that trust in and willingness to use products from China were higher than for products from the USA, although the pairwise comparisons between the two countries did not reach significance in this sample. Results were in line with H3, in that once again trust and willingness to use products from the WHO were highest of all. The difference between the WHO on the one hand and China and the USA on the other hand was significant on the 'trust' measure, although the advantage of willingness to use products from the WHO only reached significance vis-à-vis products from the USA, but not vis-à-vis products from China.

In line with the idea that trust in the safety and efficacy of vaccines provided by different outgroups crucially informs willingness to use that vaccine, there was again evidence that trust in a vaccine from a certain source was highly correlated with willingness to use that specific product: the bi-variate correlations of the two measures for each source were $r = .62$, $p < .001$ for China, $r = .62$, $p < .001$ for the USA, $r = .56$, $p < .001$ for the international community, $r = .62$, $p < .001$ for the WHO, and $r = .62$, $p < .001$ for the UN. Again, these results clearly supported H4.

Next, a regression was conducted to test whether overall personal willingness to get vaccinated (irrespective of source) would not only be associated with concerns about vaccine efficacy and safety, but also with concerns related to the psychology of intergroup psychology, in the form of

perceived global common fate. In this analysis, overall personal willingness to receive a vaccine was predicted by three variables: Overall perceived safety of vaccines, overall perceived efficacy of vaccines, and perceived global common fate. In line with the hypotheses, all three predictors were significant. Results are displayed in Table 2.

Unsurprisingly, a perception that vaccines are not safe was negatively associated with willingness to get vaccinated, as was a perception that vaccines do not work. Importantly, even when controlling for concerns about vaccine safety and efficacy, intergroup variables still remained a significant predictor of personal willingness to get vaccinated: a perception that there is global common fate in our ability to overcome the pandemic was positively associated with willingness to get vaccinated. These results clearly supported H5.

Overall discussion

Taken together, there was clear evidence for the hypotheses. Trust in vaccines, both concerning the vaccine's efficacy and safety, were associated with willingness to use them. Perceptions of trust were related to intergroup psychology, such that vaccine donations from political opponents rather than allies were trusted less. This meant that in the Philippines there was a preference to use vaccines from the USA over those from China, while the reverse was true in Pakistan. But, while in the Filipino data trust and willingness to use donations was significantly higher for the WHO target than for the USA target, and significantly higher for the USA target than the Chinese target, for the Pakistani data the difference only reached significance for the WHO target against both China and the USA, but not between China and the USA against each other. Therefore the hypothesised pattern was stronger in the Filipino data, although all effects were in the expected direction. Importantly, the highest levels of trust and willingness to personally use vaccines was detected for vaccines from the WHO, for both settings. Last but not least, a perception of global common fate of all humans in the face of the pandemic was positively associated with willingness to get vaccinated, even when controlling for concerns about the vaccine's efficacy and safety.

The current work clearly links intergroup processes to vaccine hesitancy. As has been outlined above, previous studies have focussed on group identities in relation to Covid with regards to what happens *within* one social group (e.g., Abrams et al., 2021), but not in relation to *intergroup* processes and vaccine hesitancy. Moreover, studies that have tried to address vaccine hesitancy have not considered group variables (e.g., Trueblood et al., 2021). The present study therefore joins others (Schwarzinger et al., 2021) that attempt to close this important gap.

An important theoretical contribution of this investigation lies in linking intergroup variables to a deeply personal choice, i.e. the choice of personally injecting one's own body with a medical substance. Previous work that has focussed on intergroup helping and status relations has tended to investigate outcome variables that are still rather remote from the individual and that are important at a group level, such as ingroup favouritism, evaluations of the outgroup, and perceived group homogeneity (Nadler & Halabi, 2006). The present contribution shows that intergroup processes also have traceable effects at the individual level. There are fewer issues that are as personal as choices about what people do with their own bodies, and the fact that the present investigation links international politics to extremely intimate issues is, in our view, an important strength of this work.

A further strength of this work is that it contributes insights into the psychology of intergroup helping from two settings that are severely understudied in psychology. Most work to date has focussed on samples that are Western, educated, industralised, rich, and democratic (i.e., WEIRD samples, Henrich et al., 2010). The need for more work on the Global South is pressing: assuming that the psychological models generated from Western samples are applicable to all humans is a marker of egocentrism of the West, and the current investigation makes a small step towards correcting this research bias.

Having said this, the present work also has some important practical implications. In order to overcome the pandemic, it is important that sufficient numbers of people around the globe are persuaded to take the vaccine. To achieve this, it is important that vaccines are seen as safe and

efficient. This, of course, has been demonstrated by others also (e.g., OCTAResearch, 2021). What has not been demonstrated to date is the extent to which trust in vaccines is driven by intergroup variables. People care about where vaccines come from. If China really wants to maximise the utility of their vaccine donations, it would be well advised to contribute these to the WHO-supported COVAX initiative, rather than to bilaterally donate them to the Philippines directly. If the USA really want to achieve maximum impact on public health of their health-related aid activities in Pakistan, they would be well advised to also go through the WHO rather than to donate equipment directly.

From an applied point of view, in order to increase vaccine uptake, in terms of practical steps it would be useful to employ vaccines from those providers that are most trusted in each country. In the Philippines and Pakistan, this was the WHO (and, practically, this means the WHO-supported COVAX initiative). Moreover, it would be useful to have interventions/education campaigns that stress that vaccines work, that they are safe, and – importantly - that the whole world is interdependent in the fight against the pandemic and everyone needs to do their part and be vaccinated.

As any research, there are limitations to this work that should be acknowledged. The present hypotheses were not pre-registered. This was a rapidly conducted piece of work in response to a pressing public health crisis, and results can only be seen as exploratory. Follow-up work could improve on this by pre-registering ideas. The present data are correlational and cannot provide evidence about the causal direction of statistical associations. It seems plausible that, in line with our predictions, trust in a vaccine would causally influence willingness to use it. However, it might also be possible that someone makes a decision to want to use a vaccine, and then adjusts their trust perceptions as a post-hoc rationalisation in order to avoid cognitive dissonance (Festinger, 1957). Limitations can often point to interesting avenues for future exploration. Regarding the limitation of the correlational nature of the data, as a next step it would be interesting to design an experimental study that could speak to causal effects. Such a study could manipulated perceived intergroup

relations, to chart the effects of this on trust and vaccine use. Given the rapidly unfolding nature of the pandemic and the pressing importance of the issues raised, rapidly conducting such experimental follow-up investigations would seem of the essence.

Another limitation concerns the fact that some of our Likert scales only had 3, rather than the more conventionally used 5 or 7, scale points. This was done to avoid participant fatigue. However, while some scholars have argued that using three point response scale does not affect reliability and validity of measures (Jacoby & Matell, 1971), others suggest that it can reduce reliability (Krosnick, 2018). Therefore, future research should aim for testing if the results might emerge as stronger with potentially more reliable, longer scales.

Some variations, which were compatible with the hypotheses but nonetheless unexpected, could also be followed up by future research. Effect sizes were generally stronger in the Filipino data compared to the Pakistani data, which was unexpected. Moreover, as was evident when eyeballing the results of the regression analyses, a perception of global common fate had stronger effects in Pakistan than the Philippines, safety concerns had stronger effects in Pakistan than the Philippines, and concerns about vaccine efficacy had stronger effects in the Philippines than in Pakistan. Future research could probe whether these are random variations, or whether in fact there are reasons for why vaccine hesitancy among Filipinos is more strongly driven by concerns about vaccine efficacy while vaccine hesitancy among Pakistanis is more strongly driven by concerns about vaccine safety. For example, it is possible that in the Philippines efficacy concerns are driven by general scepticism about the quality of Chinese-made products. In contrast, in Pakistan safety concerns might be driven by general concerns about hygiene and soundness of medical equipment and standards in a poorly resourced and underfunded healthcare system in one of the world's most populous countries. If these variations are systematic, then this would be useful to consider in the design of any interventions aimed at reducing vaccine hesitancy.

Another interesting issue for future exploration is to look in a more fine-grained way at the effects of the source of a vaccine. In the present studies, participants responded to vaccines offered by different outgroups. However, realistically this conflates two issues: the question of who *produced* the vaccine, and the issue of who *makes it available* and tries to gift it. For example, a vaccine donated by COVAX to Pakistan may or may not have been produced in the USA. It is possible that a US-produced vaccine would be accepted by the Pakistani public if it is distributed via COVAX, because the 'seal of approval' of the WHO might be persuasive about the vaccine being kosher. In contrast, it is possible that a US-produced vaccine would still be rejected by Pakistanis even if it is offered via an international organisation, because mistrust of the USA is simply too deep-seated. The same two possibilities exist, of course, regarding Filipinos' attitudes towards Chinese vaccines. Future research that aims to identify how vaccine hesitancy can best be reduced could tease these effects apart further.

Last but not least, it is important to note that the present studies just tapped into anticipated willingness to get vaccinated; they did not observe actual vaccination uptake. This is an important difference, given that willingness to do something and intentions to do something do not always translate into actual behavior. Future research should therefore urgently go beyond studying inclinations and consider actual behaviour.

In sum, intergroup processes matter. They do not only affect how people want to treat outgroups, or whether or not they will trust a 'gift' by an outgroup. They even affect what people are willing to do with their own bodies, and whether they are willing to use certain vaccine products. With this contribution, we wish to highlight intergroup psychology as highly relevant to any attempt to address vaccine hesitancy.

Footnotes

1   Excluding the already vaccinated participants from the analyses did not substantially alter the

pattern of results for either study.

2   The questionnaires for both studies also included some other variables that are not relevant to the

present study. They feature in a separate manuscript currently under review. There is no overlap in

the variables featured in the two manuscripts.

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Table 1

Means for trust in vaccine and willingness to personally use vaccines originating from different sources

Source	Study 1 – Philippines		Study 2 –Pakistan	
	Trust in vaccine from…	Willingess to use vaccine from…	Trust in vaccine from…	Willingess to use vaccine from…
WHO	2.58 a (.46)	2.68 a (.49)	2.27 a (.55)	2.28 a (.64)
UN	2.54 a (.46)	2.64 ab (.49)	2.20 ab (.52)	2.15 b (.62)
International community	2.45 b (.43)	2.60 b (.51)	2.17 bc (.47)	2.13 b (.62)
USA	2.45 b (.44)	2.56 b (.54)	2.11 c (.54)	2.05 b (.65)
China	1.96 c (.47)	1.85 c (.69)	2.16 bc (.52)	2.18 ab (.63)

Note. WHO = World Health Organisation. UN = United Nations. Standard deviations in parentheses. Means sharing the same subscript are not significantly different at $p < .05$ with Bonf. adjusted pairwise comparisons (column-wise comparisons). Data from Studies 1 ($N = 289$) and 2 ($N = 275$).

Table 2

Predicting overall willingness to get vaccinated

	β	B	CI$_{lower}$	CI$_{upper}$
Study 1 - Philippines Overall R^2= .25 ***				
Perceived safety of vaccines	-.17 *	-.06	-.11	-.01
Perceived efficacy of vaccines	-.33 ***	-.13	-.19	-.08
Perceived global common fate	.12 *	.08	.004	.15
Study 2 - Pakistan Overall R^2= .28***				
Perceived safety of vaccines	-.26 ***	-.10	-.16	-.05
Perceived efficacy of vaccines	-.10	-.04	-.11	.02
Perceived global common fate	.43 ***	.16	.10	.21

Note. * p < .05; ** p < .01; *** p < .001. Data from Studies 1 (N = 289) and 2 (N = 275)