

Research Note

Popular Attitudes Toward the Distribution of Vaccines Against COVID-19: The Swiss Case  CARLO M. KNOTZ¹ , MIA K. GANDENBERGER² ,
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Abstract: *With the arrival of vaccines against the novel coronavirus in late 2020, the issue of how vaccines should be distributed and which groups should be prioritized has become salient. We study popular attitudes toward the distribution of COVID-19 vaccines and how these have changed over the course of the pandemic in Switzerland, drawing on data from two rounds of an original public opinion survey conducted in the spring and winter of 2020. We find that the public supports prioritizing vulnerable groups such as health care workers or the elderly. We also find a notable degree of cross-generational solidarity: younger age cohorts prioritize the elderly, while older groups prioritize (typically younger) health care workers. We then examine whether this finding is not in fact driven by vaccine hesitancy. This is not the case for older age groups, whose solidarity thus seems to be genuine. Vaccine hesitancy is an issue among younger groups, however.*

Zusammenfassung: *Nachdem seit Ende 2020 Impfstoffe gegen das neuartige Coronavirus verfügbar sind, stellt sich die Frage, wie diese verteilt und welche Gruppen dabei priorisiert werden sollten. Wir untersuchen anhand neuer Umfragedaten vom Frühjahr und Winter 2020 die Einstellungen der Schweizer Bevölkerung zur Verteilung der COVID-Impfstoffe. Wir zeigen, dass die Schweizer Bevölkerung eine Priorisierung von gefährdeten Gruppen (bspw. Gesundheitspersonal oder chronisch Kranke) bei der Verteilung von COVID-Impfstoffen klar unterstützt. Ausserdem finden wir eine auffallende Solidarität zwischen den Generationen: Jüngere Altersgruppen lassen den Älteren den Vortritt, während gleichzeitig die Älteren das (normalerweise jüngere) Gesundheitspersonal priorisieren. Wir können dabei ausschliessen, dass die Solidarität der Älteren mit dem Gesundheitspersonal in Wahrheit von Impfskepsis getrieben ist. Bedenken über die Sicherheit von Impfungen sind dagegen bei den jüngeren Altersgruppen eher ausschlaggebend.*

Résumé: *Avec l'arrivée des vaccins contre le nouveau coronavirus à la fin de l'année 2020, la question est de savoir comment ils devraient être distribués et quels groupes devraient être prioritaires. En nous appuyant sur de nouvelles données, nous étudions les attitudes concernant la distribution des vaccins dans la population suisse. Nos données montrent un soutien clair en faveur de la priorité accordée aux groupes vulnérables tels que le personnel soignant ou les personnes âgées. Nous constatons également un degré notable de solidarité intergénérationnelle : les groupes d'âge les plus jeunes donnent la priorité aux plus âgés, tandis que les plus âgés donnent la priorité aux travailleurs de la santé. Nous pouvons également exclure la possibilité que la solidarité des personnes âgées avec les travailleurs de la santé soit en fait motivée par un scepticisme vis-à-vis de la vaccination.*

KEYWORDS: COVID-19, Vaccination, Public opinion, Switzerland

Introduction

From the onset of the COVID-19 pandemic, vaccines were seen as the key tool for achieving widespread immunization and thereby stopping the spread of the SARS-CoV-2 virus. In early December 2020, after having been developed in record time, the first set of fully evaluated vaccines became available, were granted approval by public health bodies, and entered distribution in Switzerland and a number of other countries.

With the arrival of these vaccines came the question of how they should be distributed. It was clear from the start that the initial number of doses would be limited and that governments would have to determine which groups should be granted priority access to vaccination (Khamsi 2020). Ethical guidelines suggest a prioritization of vulnerable groups, such as the elderly and those with chronic health issues, as well as those providing important in-person functions in society, including healthcare workers or teachers (e.g. Persaud et al. 2020). Countries have generally followed these recommendations (BAG and EKIF 2020; ECDC 2020).

Not much is currently known about how citizens think about these distribution strategies, however. This is problematic insofar as citizens' approval of their governments' distribution strategies is not self-evident. For instance, it is quite possible that members of high-risk groups prefer to be vaccinated as early as possible to reduce their exposure to the disease (building on political economy models of risks and policy preferences, e.g. Hacker et al. 2013). If these groups are then not also prioritized by their countries' vaccination strategies, there is a potential for discontent. It is equally possible that some groups may be hesitant about receiving the vaccine, for example due to safety concerns (Harrison and Wu 2020). Knowledge of such potential conflict lines is important because it allows to avoid disagreement with political decisions that may generate overt protest and is a precondition for the successful communication of scientific information to the public (Lupia 2013). Even in the case of public agreement with government policy and solidarity with vulnerable groups, knowledge of popular attitudes is important because it helps counter 'us-versus-them' narratives and the resulting political polarization that have proven to be detrimental to public health efforts throughout the pandemic (Bavel et al. 2020: 464; Green et al. 2020).

To contribute to closing this gap, we study popular attitudes toward the distribution of COVID-19 vaccines and their changes over the course of the pandemic, focusing on the Swiss case. Drawing on data from two rounds of an original public opinion survey, we find that the Swiss public as a whole would allocate access to vaccination in line with models of deservingness perceptions (Petersen et al. 2012; van Oorschot 2006): target groups are prioritized the more strongly they are in need of protection, the less control they have over their exposure to the disease, and the more they contribute to the well-being of others. Health care workers are accordingly placed first, followed by vulnerable groups, such as the elderly or the sick. In a second step, we analyze how distribution preferences vary between different groups. Contrary to what could be expected based on political economy models, we find that higher-risk groups are not actually in favor of being prioritized. Being of ill health has no effect on attitudes toward the allocation of vaccines, and the elderly would give priority access to health care workers, the chronically ill and (to a lesser extent) teachers and public servants – at their own expense. The young, on the other hand, give significantly greater priority to the elderly and the ill. Finally, we consider whether vaccine

hesitancy could have driven these results. It turns out that older age groups are in fact *less* hesitant toward vaccination in general and more willing to receive a COVID-19 vaccine. Thus, the elderly's willingness to forego early vaccination at the benefit of other groups seems to be driven by genuine solidarity. Younger age groups, however, are indeed more skeptical toward vaccines. It seems that their prioritizing the elderly and the sick might be at least in part driven by their hesitancy to get vaccinated themselves.

The remainder of our research note proceeds as follows: the following section outlines the theoretical considerations that inform our empirical analysis. The third section describes our data, and the fourth section explains our methodological approach. We present our findings in the fifth section and conclude in the final section.

Attitudes Toward the Distribution of COVID-19 Vaccines

To consider how the Swiss population as a whole would prioritize different groups regarding the distribution of COVID-19 vaccines, we build on insights from research on deservingness perceptions (Petersen et al. 2012; van Oorschot 2006). This literature is concerned with how people allocate aid and social protection among different groups and therefore of direct relevance here. In the main, deservingness theory predicts that groups are prioritized the more they are objectively in need of help, the more they are victims of external circumstances outside of their control, and the more they have contributed to others in the past or are currently doing so.¹ Applied to the present case, this would imply that groups are seen as more deserving of early vaccine access if they are strongly in need of protection against the disease, have little control over their vulnerability, and are contributing to others' welfare. Health care workers fulfill all these criteria and should accordingly be seen as very deserving; the elderly and those with pre-existing health conditions are high in need and low in control over their situation and should accordingly come next in the hierarchy. Next are groups that are moderately exposed to the disease but still contribute to the community. This would include public servants outside of the health care sector, such as teachers or police officers. Others who are not providing crucial services and/or are not in need of protection against the disease should come last. This rank ordering aligns relatively well with recommendations by bioethicists, which also tend to prioritize high-risk groups and those providing important services (Persad et al. 2020).

The predictions above should apply to the Swiss population as a whole, but there are reasons to assume that some groups may deviate from this baseline hierarchy. First, and based on political economy theories of the relationship between risk exposure and demand for social protection (Hacker et al. 2013), it can be expected that groups who are themselves most strongly affected by the virus will seek early access to the vaccine to be able to reduce their exposure to the disease. This obviously concerns those groups that have a high risk of experiencing severe illness or dying if they contract the disease, such as the elderly or those with pre-existing health conditions. If risk avoidance, or at least reduction, is a relevant concern to them, then they should seek to prioritize their own groups when it comes to the distribution of vaccines.

¹ It should be added that a person's or group's social identity – how different or similar they are perceived to be – is also generally a relevant criterion for perceived deservingness (Reeskens and van der Meer 2019). Foreigners are, for example, typically seen as less deserving than natives. We are not considering foreigners as a target group here, but given what we know about this 'identity effect', foreigners would in all likelihood be placed toward the bottom of the list of vaccine recipients.

However, the above consideration assumes that people will generally see vaccination as a way to reduce risks and therefore as desirable. But this clearly does not have to be the case. In fact, the utility and safety of vaccines in general have become increasingly in question in recent years, and sizable parts of the publics in Switzerland and elsewhere are either hesitant or even completely refuse to get vaccinated (MacDonald and Sage Working Group on Vaccine Hesitancy 2015). This can be driven by different motivations (Betsch et al. 2018). One is a concern, valid or not, about the safety of vaccines and their potential side effects; a second is complacency, driven by the perception that severe illnesses have become rare (ironically due to the success of vaccination programs); a third driver can be constraints as simple as everyday stress that prevents people from seeking vaccination; a fourth is a desire to carefully weigh the potential risks and benefits of a vaccine; a fifth is a lack of social responsibility or, put differently, the intention of benefiting from the fact that others are getting vaccinated and are thereby providing 'herd immunity' to those who are not immune. In any case, it is possible that groups that are on average hesitant toward vaccines would place themselves lower on the list out of a desire to receive the COVID vaccine later or not at all.

Data

To test our expectations, we draw on data from two rounds of an original public opinion survey related to the COVID-19 pandemic that we conducted in the French- and German-speaking cantons of Switzerland (Gandenberger et al. 2020). The first round was fielded between 22 April and 4 May 2020, i.e., shortly after the peak of the first wave, while the second round was fielded between November 19 and December 14, 2020, i.e., shortly after the peak of the (more severe) second wave. Survey participants were recruited from an online panel operated by a European opinion research and marketing firm (Bilendi) and were selected to obtain a sample that resembles the general Swiss population with respect to residency in the two largest linguistic regions (German- and French-speaking), gender, age, and educational attainment (see the Online Appendix for descriptive statistics). After excluding some respondents with problematic response patterns (e.g., very short response times), we retained samples of approximately 1500 responses per round ($N=1535$ in round one and $N=1498$ in round two) for our analysis.

Both rounds of the survey included a ranking task to capture how respondents thought a COVID-19 vaccine should be allocated once it became available. Respondents were asked to rank seven groups according to the order in which they should be given access to the vaccine. These groups included 1) children, 2) the elderly, 3) the chronically ill, 4) health care workers, 5) police officers, 6) teachers, and 7) the general population. These target groups were selected because they are seen as the central candidate groups for priority access to vaccines in the medical literature (Persad et al. 2020). The order in which the groups were initially presented to each respondent was randomized, and ties or incomplete rankings were not permitted.

At the time of the first round, this task concerned a hypothetical situation, as no COVID-19 vaccine had been developed let alone approved by public health authorities in any country. Still, the potential value of vaccines was discussed from the outset of the pandemic, which means that the broader public had already been exposed to information about the issues connected to developing and distributing a COVID-19 vaccine (Nottaris 2020). At the time of the second round, the first vaccines had entered approval processes or had been granted approval, and the issue of how to allocate early access to the vaccine

had become salient (Häusler 2020). We are therefore confident that our respondents had been able to form meaningful opinions about the distribution of COVID vaccines at the time we fielded either round.

In our second round, we also asked whether respondents would themselves be vaccinated once a COVID vaccine becomes available and is deemed safe by the authorities. Respondents could indicate their readiness to receive vaccination on a 0 to 10 Likert scale, where 0 indicates complete disagreement with vaccination. In addition, we included an item battery to capture the various dimensions of general vaccine hesitancy, which was designed and validated by Betsch et al. (2018). We use five items from that battery that each measure one of the potential considerations underlying vaccine hesitancy: the extent to which respondents a) are confident that vaccines are safe, b) see vaccines as unnecessary, c) feel everyday stress prevents them from getting vaccinated, d) carefully calculate the benefits and risks of vaccination, and e) think they do not need to be vaccinated if everyone else already is. Respondents were asked to indicate their views regarding each consideration on seven-point Likert scales ranging from 1 (“Strongly disagree”) to 7 (“Strongly agree”). We provide the item texts in Figure 4 below.

Methods

Since our dependent variable is a rank ordering, we use methods for rank-ordered data (following Allison and Christakis 1994) in our analysis. Our first step is to analyze the overall rank ordering of target groups descriptively and to verify via nonparametric tests that there is meaningful variation in the rankings using the Friedman rank sum test and Wilcoxon signed-rank tests for pairs of options. Both tests indicate that there are indeed meaningful differences in the rankings.²

To test whether different groups of respondents ranked the target groups differently, we use multivariate regression models. Ideally, we would use the rank-ordered logit model (Allison and Christakis 1994) to be able to make full use of the data. It turns out, however, that there are signs of increased randomness in how respondents assigned the lower ranks, which violates a key assumption of the model.³ Therefore, we restrict our analysis to respondents’ first-ranked alternative, meaning we dummy-coded the ranking data so that the alternative chosen for the first rank was coded as 1 and all other alternatives are coded 0, and use the simpler conditional logit model (McFadden 1974). Respondent-level covariates are introduced into the model by including interaction terms between the intercept terms for all choice alternatives (except for one) and each of the respondent-specific covariates (Long and Freese 2006: Chapter 7). The raw estimation results are only partly informative, and we therefore report these in our Online Appendix. We present more meaningful predicted choice probabilities and the marginal effects of predictors on these choice probabilities here in the main text.

² The detailed results of both tests are reported in the Online Appendix.

³ We test for this by estimating a rank-ordered logit model that includes intercepts for all alternatives but one plus interaction terms with a dummy for upper ranks (for each respondent, those alternatives that they had ranked as the top three) and then testing for the joint significance of all interaction terms via a likelihood-ratio test. The tests clearly indicate greater randomness for lower ranks, even when we consider only the first two as upper ranks.

Results

The two graphs in Figure 1 present a descriptive overview of how respondents rank the various target groups with respect to their deservingness to receive priority access to a COVID-19 vaccine. Panel A presents the data from the first round, and panel B presents the data from the second round. The preferred rank order is rather clear and stable between the two rounds: health care workers are given the highest priority, as approximately 61 per cent of respondents assign them the first rank. Next are the chronically ill, who are predominantly placed in the second rank, followed by the elderly, who are placed in the third rank. Teachers and police officers are placed on ranks four and five. The general population is the preferred group for the sixth rank, while children are placed in the last rank by nearly 50 percent of respondents. The only difference between the two rounds is that respondents in round one preferred more clearly police officers for the fourth and teachers for the fifth rank. Overall, respondents prioritize those groups that are particularly vulnerable to the disease and provide some service to the public. Health care workers clearly satisfy both criteria and were consequently placed first, followed by the elderly and chronically ill, who score high in terms of vulnerability. Police officers and teachers, who were placed fourth and fifth, provide important public services, and at the time the survey was conducted, police officers were also directly exposed to the disease, albeit less so than health care workers. Children, as the arguably least endangered group in the context of this specific illness, are placed last. This ranking is consistent with our expectations.

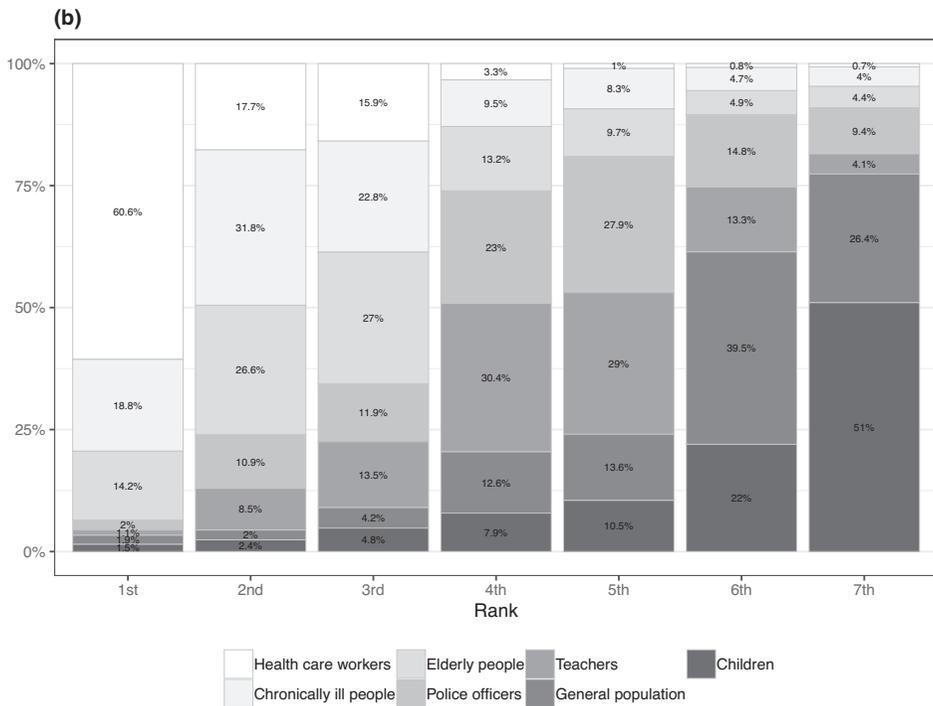
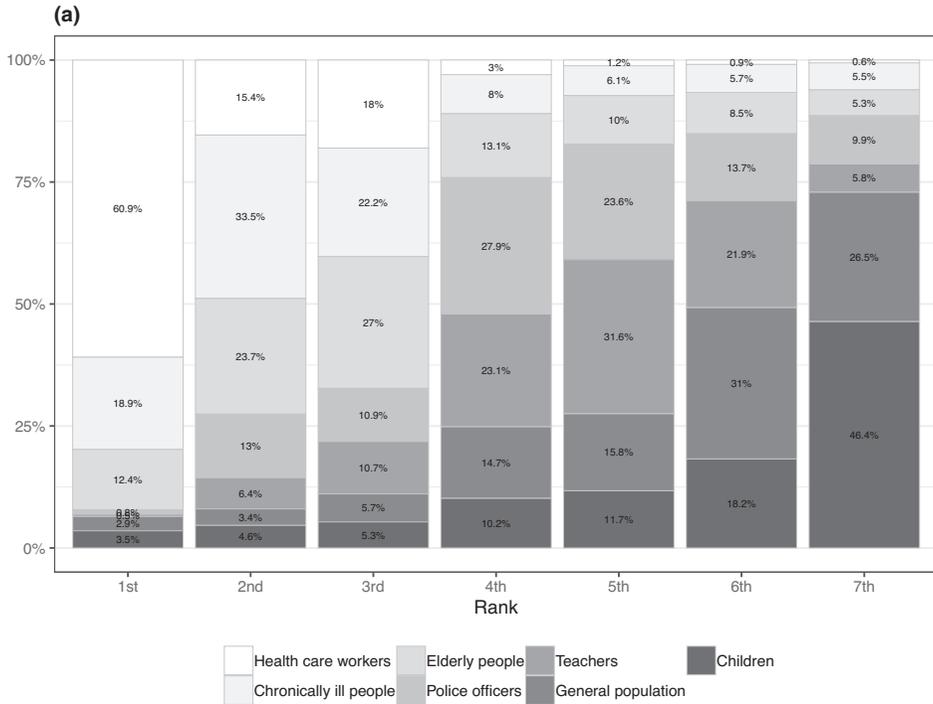
We next look for variation in ranking preferences within the Swiss population, focusing on the effects of two variables that correlate directly with exposure to the COVID-19 pandemic. These are age (measured in years) and self-rated health (ranging from 0 for very poor to 10 for very good). As mentioned, we expect that advanced age and ill health should lead to an increased preference to prioritize the elderly and the chronically ill, respectively, in the allocation of vaccine access (Hacker et al. 2013).

We control for a range of sociodemographic variables that could correlate with both the degree of exposure to the pandemic and preferences for the allocation of vaccines and may thus act as confounders. First, we control for whether respondents are economically affected by the pandemic. This group could conceivably prefer to make vaccination available to the general population as soon as possible in order to achieve 'herd immunity' and thus obviate lockdowns faster than when specific groups are prioritized. At the same time, economic exposure also correlates with age, which makes it a potential confounder. We operationalize economic exposure via a dummy that takes the value 1 for those who were employed or self-employed before the pandemic and who at the time of the survey were either working less than before or not working at all and the value 0 for all who were not economically active before the pandemic (e.g., retired, in school, unemployed, domestic worker, other) or who were not economically affected (those working as before and those working from home).

We also control for other variables that are correlated with economic exposure to the pandemic, including income (via a dummy for earning above 8,000 CHF per month), education (via a dummy for having an upper secondary, upper vocational or university degree), and linguistic region (French- or German-speaking), the latter because the French-speaking cantons were initially more heavily hit by the pandemic.

We further control for self-reported political interest ranging from 0 for no interest at all to 10 for very high interest, because it is plausible that better informed respondents

Figure 1: The preferred allocation of priority access to vaccination against COVID-19



received more information about ethical considerations regarding the distribution of vaccines from experts in the media and there is at the same time some evidence that political interest also varies with age (Jennings and Markus 1984). We also control for gender because of reporting during the pandemic's first wave that men were at a higher risk of experiencing more severe symptoms of the disease (Li et al. 2020), which might have affected risk perceptions. Finally, we control for left-right self-placement because there are at least some indications that political ideology changes over people's life course (Peterson et al. 2019), and ideology might also affect people's vaccination allocation preferences, thus potentially confounding the effect of age.

We first estimate a model that includes only the two main predictors for personal vulnerability to the disease and then test for the joint significance of the interaction terms between each of the covariates and the alternative-specific intercepts using Wald tests. Table 1 lists the results of the Wald tests for both rounds. Age turns out to be a significant and stable predictor across both survey rounds. Self-reported health, however, is significant only in the second round but not in the first round.

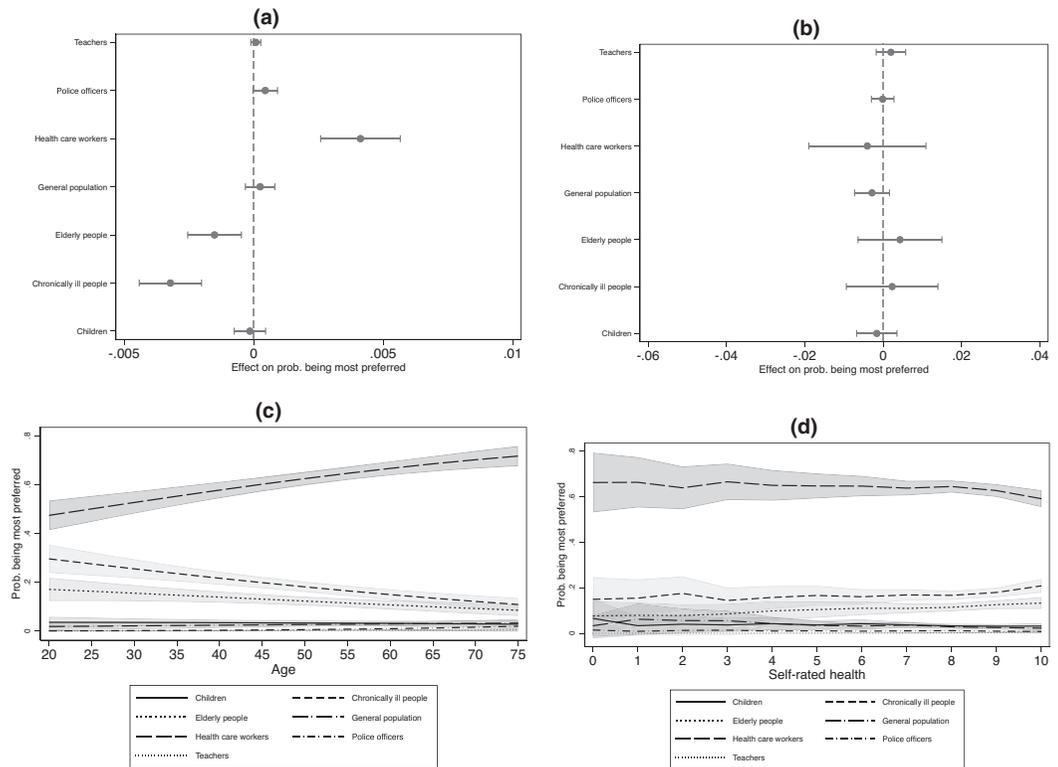
This does not change when we introduce the other covariates as controls in the second models for each round. Among the controls, being female and left-right self-placement have consistently significant effects on ranking preferences. In the data from the first round, we also find additional significant effects of being economically affected and living

Table 1: Results of Wald tests of significance of predictors

Round 1	Model 1			Model 2		
	χ^2	df	<i>p</i>	χ^2	df	<i>p</i>
Age	71.52	6	0.000	44.31	6	0.000
Health	5.24	6	0.513	4.07	6	0.667
Econ. affected				18.68	6	0.005
Income				4.97	6	0.547
Female				13.35	6	0.038
Pol. interest				8.41	6	0.210
High education				6.46	6	0.373
Left-right placement				13.59	6	0.035
French-speaking				23.23	6	0.001

Round 2	Model 1			Model 2		
	χ^2	df	<i>p</i>	χ^2	df	<i>p</i>
Age	79.70	6	0.000	18.86	6	0.004
Health	12.68	6	0.048	13.38	6	0.037
Econ. affected				4.41	6	0.621
Income				4.11	6	0.662
Female				14.60	6	0.024
Pol. interest				2.47	6	0.872
High education				2.13	6	0.907
Left-right placement				13.59	6	0.035
French-speaking				7.97	6	0.240

Figure 2: The effects of age and self-reported health on attitudes toward the distribution of COVID-19 vaccines (first round)

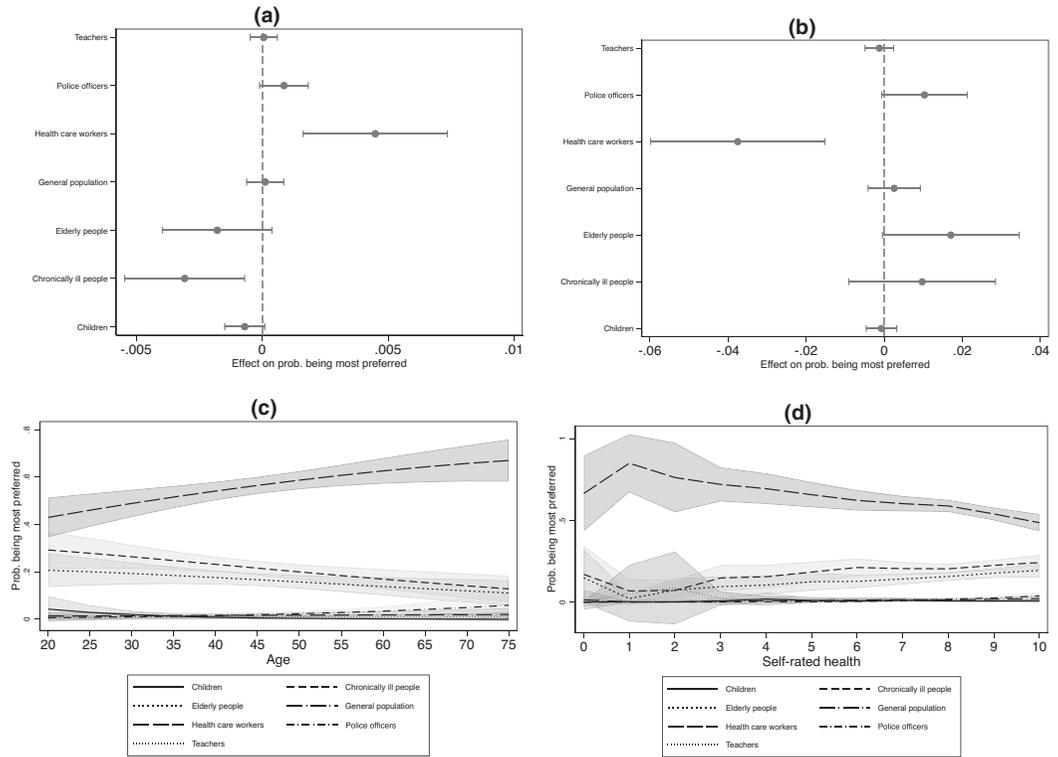


in the French-speaking part of Switzerland. Overall, there are no persistent differences in vaccination preferences along core socioeconomic lines (income and education). Rather, we find some differences along political lines and gender.

The estimated substantive effects of the two primary predictors are presented in the graphs in Figures 2 (first round) and 3 (second round). Panel A in Figure 2 shows that an additional year of age significantly increases the probability of placing health care workers in first rank by approximately half a per cent per year, while it simultaneously lowers the probabilities of choosing both chronically ill and elderly individuals by approximately 0.3 and 0.1 per cent, respectively. Increased age does not affect the probabilities of selecting teachers, police officers, the general population, or children for the first rank, however. Panel C shows the magnitude of these effects in absolute terms. There is a general consensus across generations to put health care workers first, but, interestingly, younger generations prioritize both the chronically ill and the elderly more strongly than older generations. This finding runs counter to our initial expectation, which was that advanced age – and the increased vulnerability it brings – should lead to a *greater* propensity to prioritize the elderly and chronically ill. The data from the second round (Figure 3) exhibit essentially the same patterns, the only exception being that age has no longer a statistically significant negative effect on prioritizing the elderly.

While age does consistently affect people’s vaccination rankings, this is not the case for self-rated health. As already indicated by the Wald tests shown above, self-rated health

Figure 3: The effects of age and self-reported health on attitudes toward the distribution of COVID-19 vaccines (second round)



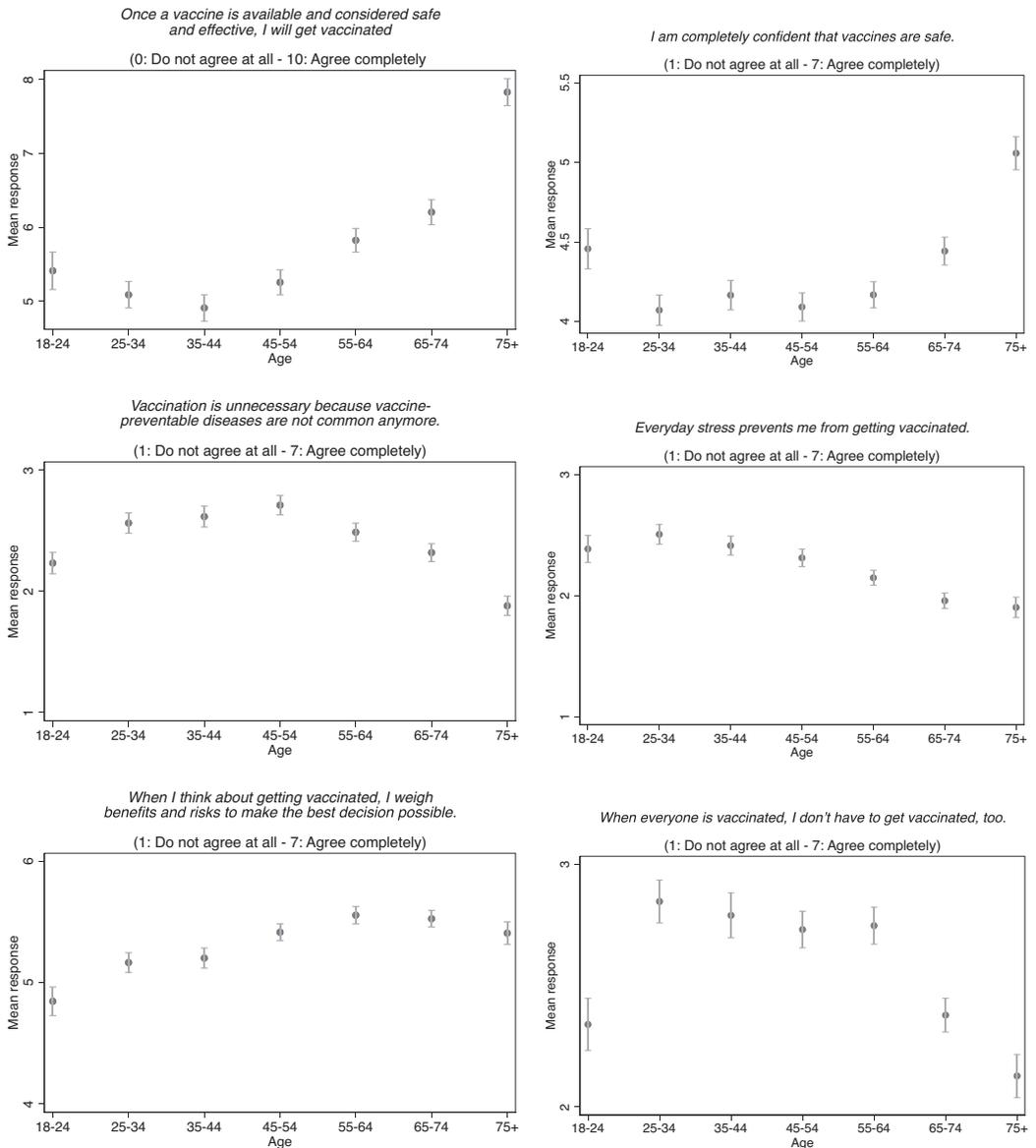
has no effect on people’s rankings in the first round (see Panel B in Figure 2). Correspondingly, we find no marked change in the predicted choice probabilities for persons with different levels of self-rated health (Panel D in Figure 2). In the second round, however, self-rated health does have a significant negative effect on the probability to prioritize health-care workers (Panel B in Figure 3). But a look at the predicted probabilities and in particular at the imprecise estimates at the lower end of the self-rated health scale suggests that the effect might have been an artifact of a low number of respondents who rated their health as poor. A look at the distribution of this variable (shown in the Online Appendix) confirms that only relatively few respondents felt their health was poor. To further substantiate this, we dichotomize the self-rated health variable into a dummy that takes on the value of 1 for self-rated health scores of 5 and lower and 0 otherwise and enter it into our model instead of the numerical measure. A Wald test indicates that self-rated health in its dummy-coded version has no significant effect on any ranking priorities (see the Online Appendix). With respect to the other controls that have significant effects, we find that women consistently express a priority for the chronically ill (by about 6 per cent). In the other cases, the effects are inconsistent between the two rounds (see the Online Appendix).

Having found that older age groups prioritize health care workers at their own expense, we consider in a final step that this might not in fact have been driven by concern for and solidarity with health care workers but rather by a hesitancy to be vaccinated. As outlined

above, it is conceivable that groups would de-prioritize themselves in the allocation of vaccines not out of a sense of solidarity with others but out of a desire to avoid vaccination. To assess whether this could be a motivation underlying the effect of advanced age, we use the data on the intention to take a COVID-19 vaccine and on general vaccine hesitancy, which we collected in the second round of our survey.

Figure 4 presents the results. It is immediately apparent that older age groups are in fact *more* likely to say that they would get vaccinated. Older age groups are also in general less

Figure 4: Attitudes toward vaccination over age groups (95% confidence intervals indicated)



likely to hold views related to vaccine hesitancy. They are more likely to have confidence in the safety of vaccines, they are less likely to think that vaccines are unnecessary, or to say that every day stress prevents them from getting vaccinated, or to have intentions of ‘free-riding’ on the herd immunity provided when others get vaccinated, all while being more likely to carefully weigh of the benefits and risks of vaccines. These findings all strongly suggest that the elderly would in fact take the vaccine if it was offered to them but still actively choose to prioritize other groups, in part at their own expense. In contrast, given the more pronounced vaccine hesitancy we observe among younger groups, it seems more plausible that they prioritize the elderly and the sick out of a hesitancy to take the vaccine themselves.

Conclusion

We studied attitudes toward the allocation of a COVID-19 vaccine in the Swiss population using data from two original surveys conducted during the first and second waves of the pandemic. We observed a pronounced general concern for vulnerable individuals and those providing important public services, first and foremost health care workers. We further found that older age groups in particular express solidarity by prioritizing health care workers – although they not only would objectively benefit themselves from receiving the vaccine first, but also express a clear desire to receive the vaccine if it was offered to them. Overall, our findings add to those of others (e.g. Street and Cossman 2006) suggesting that concerns about generational conflicts are exaggerated. At the same time, our findings also suggest that more needs to be done to convince younger age groups of the safety and value of vaccines against COVID-19 and other diseases.

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Open research badges



This article has earned Open Data and Open Materials badges for making publicly available the digitally-shareable data necessary to reproduce the reported results. The data are available at <https://forsbase.unil.ch>.

Data Availability Statement

The data used in our analysis as well as replication code are available in the database of the Swiss Centre of Expertise in the Social Sciences (FORS) in FORSBASE (study ref: 14069; dataset ref: 1264).

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Supporting Information

Additional Supporting Information may be found in the online version of this article:
Supplementary Material

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