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Awareness of ethical dilemmas enhances public support for the principle of saving more lives in the United States: A survey experiment based on ethical allocation of scarce ventilators

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ABSTRACT

Recommendations by health experts to deal with public health emergencies are primarily guided by the principle of "saving more lives" (SML). It is unclear whether people perceive this principle as ethically more legitimate than some other principle such as "saving more life-years". Understanding the answer to this question is particularly relevant to the allocation of scarce medical resources during public health emergencies. Different principles typically lead to different allocations, and consequently have dramatically different implications as to who survives and who dies. We fielded an online randomized controlled survey experiment in the context of scarce ventilator allocation with a demographically representative sample of US adults (n = 700) in October 2020. Participants faced hypothetical situations where they had to allocate few available ventilators among several needy patients. The experiment was designed such that the allocation decision made by a participant can be used to infer the principle in line with their personal ethical values. We interpret this inferred principle as the one that the participant perceives to be most legitimate. The treatment group, but not the control group, was provided balanced information that described the ethical dilemmas faced by experts in developing ventilator allocation guidelines. Nearly half of the participants in the control group perceive saving more lives the most legitimate principle. Despite the balanced nature of the information, the perceived legitimacy of SML was 7.6 percentage points higher in the treatment group. The magnitude of this impact was particularly strong among republican-leaning participants, a subgroup that has less trust in experts according to previous research. Our findings suggest that enhancing public awareness of ethical dilemmas faced by health experts can increase the perceived legitimacy of their proposed guidelines even among those with lower trust in experts.

KEYWORDS: The principle of saving more lives; allocation of scarce medical resources; ethical dilemmas faced by public health experts; trust in science and experts.

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INTRODUCTION

Recommendations by public health experts to deal with public health emergencies, including the Covid-19 pandemic, are primarily guided by the principle of saving more lives (SML). For example, social distancing guidelines, mandatory mask wearing, and lockdown measures to "flatten the epidemic curve" are primarily motivated by SML.[1,2] The guidelines for allocating scarce life-saving medical resources such as ventilators and intensive care beds also are primarily, if not exclusively, guided by SML.[3–6] However, it is unclear whether the majority of the general public perceives SML to be the most legitimate principle. One prominent alternative is the principle of saving more life-years (SMLY). For instance, there have been reports of hospitals refusing admission to elderly patients during the ongoing pandemic despite the availability of hospital beds, perhaps in anticipation that a younger patient might soon need one.[7] Such examples highlight the simple fact that differences in the principles that guide allocation of scarce medical resources create substantive differences in terms of who lives and who dies.

This study investigated which principle is perceived to be most legitimate by the general public for allocating scarce ventilators during public health emergencies. We focused on three principles – saving more lives (SML), saving more life-years (SMLY), and saving healthier lives (SHL) – that are prominently discussed in ventilator allocation guidelines.[3–6] SML recommends allocating scarce resources in order to maximize the expected number of *lives* that can be saved. SMLY seeks to maximize the expected number of *life-years* that can be saved. SHL essentially recommends using SML as the *primary* principle; and, using SMLY as the *subordinate* tie-breaking principle if multiple decisions are consistent with SML. SHL is thus a refinement of SML. A decision consistent with SHL is consistent with SML, but typically inconsistent with using SMLY alone.

Ventilator allocation guidelines are formulated by expert committees after careful deliberation. The guidelines specify which patient characteristics (e.g., age, occupation, and comorbidities) should be used to determine priority orderings in cases of scarcity. The general public is likely unaware of the arguments and counterarguments regarding the use of these patient characteristics, and thus may not fully appreciate the ethical dilemmas that health experts have to grapple with in formulating the guidelines. Our experiment primarily focused on investigating the impact of *balanced* information about the ethical dilemmas faced by health experts on the perceived legitimacy of the underlying principles among the general public. We are not aware of any previous study aimed towards exploring this question.

During the main part of the experiment, participants faced hypothetical situations and had to decide who among several needy patients should receive the few available ventilators. The experiment was designed such that allocation decisions made by participants permit us to infer the principles behind their decisions. We assumed that a participant whose decisions are consistent with a particular principle perceives that principle to be more legitimate than other principles. As SML and SMLY are the two core principles, the situations presented to the participants were designed to ensure that decisions consistent with SML differ from those consistent with SMLY. The primary objective was to understand the impact of balanced information on the perceived legitimacy of these principles. The treatment group was provided this balanced information, while the control group was not.

Our interest in investigating the legitimacy of various principles is grounded in both pragmatic and principled reasons. For instance, the Massachusetts state guidelines for allocating critical care in response to Covid-19 that were first released on April 7 2020 had to be revised within two weeks following a public outcry.[8] Further, scholars across several academic disciplines have argued that the more the general public understands and accepts the arguments behind policies and guidelines, the greater their legitimacy among the public.[9,10] In fact, some existing guidelines explicitly call for efforts to publicly justify the guidelines to enhance their perceived legitimacy among the general public. For instance, the New York state guidelines for the allocation of scarce ventilators state that "[I]mplementation of the guidelines requires clear communication to the public about the goals and steps of the clinical ventilator allocation protocol."

At a more general but closely related level, prior studies across a variety of contexts have shown that people are more likely to *comply* with official guidelines if those recommendations are derived from principles that people perceive to be legitimate.[11,12] Hence, while our experiment was conducted in the context of ventilator allocation, the findings may hint towards a broader message. It is possible that in many contexts increasing awareness of the ethical dilemmas that experts grapple with in formulating the relevant recommendations can increase compliance with those recommendations. In the context of the Covid-19 pandemic, experts have largely relied on the unbiased communication of scientifically accurate information to justify their recommendations regarding social distancing and mask wearing. While our study is admittedly narrow, the broader motivation was to inquire whether ethical awareness can complement scientific information.

Before proceeding we would like to clarify that our investigation was largely exploratory. It would be internally inconsistent on our part to claim that (a) our goal is to assess the impact of *balanced* information, and yet (b) confidently hypothesize the *direction* of its impact. For instance, it is unclear whether support for saving more lives (SML) will be greater among older participants in the treatment ("Info") group or in the control ("No Info") group. Balanced information containing the competing ethical principles may lead some older participants in the treatment group to better appreciate that SML discriminates against the young. Other older participants in the treatment group may view the balanced information as providing, on the net, additional arguments as to why SML is the more legitimate principle.

This argument applies for all population subgroups, and thus prevents us from hypothesizing about the impact of balanced information not only at the subgroup level but also at the aggregate level.

METHODS

Overview

Ventilator allocation protocols typically have four components: (i) which patients are to be categorically excluded, (ii) how the eligible patients are to be prioritized, (iii) what tie-breaking criteria to use within the same priority ranking, and (iv) when to withdraw the ventilator from a patient.[3–6] Our design implicitly accounted for the first three components and ignored withdrawal of ventilators.

All the 700 participants in our experiment were first asked a series of questions regarding their exposure to Covid-19, their willingness to accept a vaccine for Covid-19 that has been deemed safe and offered for free by health authorities, and familiarity with ventilator allocation guidelines. Then, the kind of situations they would face during the main part of the experiment was explained in ten steps, and an incentivized quiz question was included in each step. We are confident participants understood the situations they were going to face during the main experiment as the average number of correct quiz responses out of ten was 9.3 in the control group and 9.4 in the treatment group.

Participants that were randomly assigned to the treatment group (n = 355) were then provided balanced information about the competing ethical considerations before moving to the main part of the experiment. In contrast, participants that were randomly assigned to the control group (n = 345) did not receive this information, and moved to the main part of the experiment after the explanation stage.

In the main part of the experiment, participants faced hypothetical situations where several patients have contracted Covid-19 and need a ventilator to survive, but there is a shortage of ventilators. Participants had to choose a subset of patients who should receive the available ventilators. Finally, subjects answered a post-experiment survey.

Study Sample

The experiment was conducted on the online platform Prolific that has approximately 36,000 USA-based participants who have registered to participate in research studies. At the time we conducted the experiment, there were approximately 25,000 eligible US participants who were deemed active (participated in a study in the past 90 days) and provided sufficient information about their characteristics for us to obtain a demographically representative sample. 722 respondents initiated our study, and 22 did not complete the study. While initiating the study, participants did not know whether they are in the treatment or control group. Incomplete responses are not due to assignment to the treatment or the control group.

Our analysis is based on the 700 respondents who provided complete responses, and we refer to these respondents as the *participants*. The sample of participants was slightly more educated and slightly younger than the general US adult population but otherwise demographically similar. Further, there is no statistical difference between the participants in the control and treatment groups on a variety of demographic and socioeconomic dimensions, prior familiarity with ventilator allocation guidelines, and attitudinal dimensions such as vaccine hesitancy and political orientation (see Table S2 in Supplementary Material).

Information treatment

Before making decisions in the choice experiment, participants in the treatment group were informed about the competing ethical considerations that public health experts consider in developing guidelines for the allocation of scarce ventilators. This information contained arguments and counterarguments for using four patient characteristics – age, occupation, comorbidities, and survival chances conditional on receiving a ventilator – that are prominently discussed in ventilator allocation guidelines.[3–6]

The arguments and counterarguments were not intended to prime the participants to favor any particular principle, but to instead increase their awareness of the ethical dilemmas that experts have to grapple with in formulating the guidelines. For instance, an argument for prioritizing younger patients over older patients is to provide them a fair chance to experience all stages of life. An obvious counterargument is the clear discrimination against the elderly. Table 1 provides the exact arguments and counterarguments provided to the treatment group regarding all the four patient characteristics.

The main choice experiment

The main experiment involved two stages: the "personal preference" stage and the "social agreement" stage. All participants faced the same five choice situations in both stages. The situations were presented in the same order across both stages to all participants.

In the personal preference stage, participants had to choose a subset of patients who should receive the scarce ventilators based on their own preferences. We refer to the subset of patients chosen by a participant in a situation as the participant's "decision" in that situation. The personal decisions help identify which principle is personally most preferred. In the social agreement stage, participants played an incentivized coordination game.[13] For each situation in the social agreement stage, a participant earned a monetary bonus if their patient choices in a situation matched the most frequent patient choices among all the participants in that situation. The coordination decisions help identify which principle is socially focal, i.e., the most likely principle upon which social agreement can emerge despite differences in personal preferences.

We designed the five choice situations to ensure that the decisions consistent with SML in any situation are different from the decisions consistent with SMLY in that situation. Each situation involved eight patients who had contracted Covid-19: two were 5-year-old children, two were 45-year-old doctors, two were 45-year-old general adults working in a sector other than healthcare, and two were 75-year-old elderly. It was explained to the participants that every patient needed a ventilator to survive Covid-19, but there was a shortage of ventilators. The participants were told to assume any patient who did not receive a ventilator was expected to die within a week.

The patients differed in their chances of surviving Covid-19 *conditional* on receiving a ventilator. One patient in each age/occupation category had a relatively lower conditional survival chance (60%) and the other had a relatively higher conditional survival chance (90%). The conditional survival chances were used as a proxy for Sequential Organ failure Assessment scores and other such measures that are used in ventilator allocation guidelines.[3] It was explained to the participants that these chances indicate the very near-term chances of surviving Covid-19 upon receiving a ventilator. Participants were told to assume any patient who survived Covid-19 upon receiving a ventilator was expected to recover fully from Covid-19 and get discharged from the hospital within one month.

The choice situations

The five choice situations differed in the number of available ventilators and which patients had comorbidities (Table 2). Incorporating decreased life-expectancy due to comorbidities is a challenging but important component of ventilator allocation guidelines.[3–6] Presence of comorbidities was explained as affecting survival chances of patients beyond the immediate episode. While comorbidities and the immediate conditional survival chances are likely correlated, our experimental design manipulates them as independent factors.

In situation NONE, four ventilators were available and no patient had comorbidities. In each of the remaining four situations – which we label as ELDERLY, ADULT, DOCTOR, and CHILD – only three ventilators were available and both the patients in a particular age/occupation category had comorbidities. For instance, in situation ELDERLY the two elderly patients had comorbidities, while the remaining six patients did not have comorbidities.

Participants were told to assume that, conditional on receiving a ventilator and surviving Covid-19, a patient without comorbidities was expected to live for the remainder of their natural term of life (specified as 80 years of age). A patient with comorbidities was described as someone expected to die within *two years even if they fully recovered* from Covid-19 upon receiving a ventilator.

Key design choices

We made two key design choices. First, we ignored situations involving withdrawing a ventilator from a patient in order to allocate it to another patient. Second, we specified the remaining life-expectancy of patients with comorbidities to be the relatively short period of two years. In the following, we describe the rationale behind these design choices.

Withdrawing a ventilator raises fundamentally different ethical questions relative to withholding (i.e., not allocating in the first place): withdrawal may be viewed as active killing, while withholding as passive killing.[14,15] The differences relate to acts of commission versus acts of omission**.** Previous research has documented that this difference substantially influences moral and legal judgments across a wide range of settings.[16,17] We were concerned participants may be induced to think about both aspects – omission and commission – while making choices in a situation where only one is relevant.

In light of these considerations we chose to focus on withholding rather than withdrawing because withholding decisions have to be made much more often by healthcare professionals. Further, most guidelines view withdrawal as the more difficult decision. In fact, all publicly available guidelines contain details regarding withholding ventilators but some do not contain any information about withdrawing ventilators.[3] Finally, we were concerned that situations involving withdrawal decisions might be more disturbing for the participants, and may thus cause greater attrition.

We specified the remaining life-expectancy of patients with comorbidities to be the relatively short period of two years. There is significant variation in ventilator allocation guidelines across states in the USA on this matter. Four states in the USA use life-expectancy of less than six months as an exclusion criterion, but it can range up to fifteen years in some other states.[3] A detailed explanation of this design choice is included in the Supplementary Material. Here we simply highlight that even a participant who finds SML the most legitimate principle may hesitate in allocating the ventilator to a patient with comorbidities if it can be allocated to a patient without comorbidities. Hence, the shorter the life-expectancy for patients with comorbidities, the greater the implicit force against SML. Consequently, if we find that balanced information increases support for SML *despite* this implicit force against SML, then we can be reasonably confident that balanced information indeed increases support for SML. We chose to trade off some realism for greater confidence in the potential impact of balanced information.

Measures

A participant's choice of patients in a situation allows us to infer whether the decision was consistent with SML, SMLY, or inconsistent with both SML and SMLY (see Table 2). For instance, 70 different decisions are feasible in situation NONE, and they correspond to the 70 different ways in which four people can be chosen out of eight to receive the available ventilators. Out of these 70 decisions, the unique decision consistent with SML involves choosing the four patients with higher conditional survival chance. Given that the maximum conditional survival chance is 90%, the maximum expected number of lives saved is 3·6 in situation NONE and 2·7 in each of the four situations other than NONE. In contrast, the unique decision consistent with SMLY involves choosing both the children, and the doctor and the general adult with higher conditional survival chance, because the expected number of life-years saved corresponding to a decision is calculated by weighting the remaining life-years of the chosen patients with their conditional survival chances.

Arguably, even people who are guided by SML may prefer to save "healthier lives" when multiple decisions are consistent with SML, especially under severe resource constraints. The ventilator allocation guidelines in some states (e.g., Colorado, Michigan and Pennsylvania) effectively suggest using SML as the primary principle, and SMLY as the subordinate principle if multiple decisions are consistent with SML.[3,18–20] The four situations other than situation NONE allowed us to investigate this possibility.

There are 56 feasible decisions in each of these situations, and they correspond to the 56 different ways in which three patients can be chosen out of eight. Four out of these 56 decisions are consistent with SML (see Table 2). These four decisions involve choosing any three out of the four patients with higher conditional survival chance. Among these four decisions consistent with SML, the decision that involves choosing the three patients without comorbidities is deemed consistent with "saving healthier lives" (SHL). We label the remaining three decisions that are consistent with SML but not with SHL as being consistent with "saving any lives" (SAL).

There is a fundamental difference between decisions guided by SHL versus those guided *primarily* by SMLY. For instance, SMLY permits categorical exclusion of patients with limited remaining years of life (e.g., the very elderly and patients with severe comorbidities) from receiving ventilators. In contrast, categorical exclusion is prohibited by SHL because it utilizes SML as the primary principle, and SMLY as the subordinate tie-breaking principle when multiple decisions are consistent with SML. Table 2 highlights that decisions consistent with SHL are different from the decisions consistent with SMLY in all the four situations other than situation NONE. The decision consistent with SHL is the one that has been underlined among the decisions consistent with SML.

Statistical analyses

Our analysis focused on the principles described above: SML, SHL, SAL, and SMLY. In order to identify the causal effect of information about competing ethical considerations on the share of decisions consistent with a principle p, we estimated the following Ordinary Least Squares regression model (which was pre-specified in the analysis plan):

$$Y_{ijp} = a + b\ Information_i + \epsilon_{ij} \qquad (1)$$

where the outcome variable Y_{ijp} equals 1 if the decision by participant i in situation j is consistent with principle p and 0 otherwise; $Information_i$ is an indicator variable for the participant being in the treatment group; a and b are coefficients to be estimated; and ϵ_{ij} is a random error term.

The estimated value of a provides the share of decisions in the control group that are consistent with principle p. The estimated value of b captures the impact of information about the competing ethical considerations by providing the difference in the share of decisions consistent with principle p between the treatment and the control groups. We estimated equation (1) separately for the personal decisions and the coordination decisions. Standard errors are clustered at the participant level since each participant made five personal decisions and five coordination decisions. When reporting the results, we also report the odds ratio between the treatment and the control groups that was estimated by a logistic regression**.**

For the subgroup analysis, we estimated equation (1) across population subgroups by focusing on three factors: (i) differential vulnerability to Covid-19, as captured by differences in age and race;[21–23] (ii) potential differences in prior awareness of the competing ethical considerations, as captured by differences in educational attainment and prior familiarity with ventilator allocation guidelines; and, (iii) potential differences in sources of public health information as captured by differences in the willingness to take a freely available Covid-19 vaccine deemed safe by health experts and differences in political orientation.[24–27]

RESULTS

We first examine whether any particular principle received majority support. Each decision by every participant in all the five situations was categorized into one of three mutually exclusive and exhaustive categories: consistent with SML, consistent with SMLY, and other (which was the residual category containing decisions inconsistent with both SML and SMLY). We shall refer to treatment and control groups as "Info" and "No Info" groups, respectively.

Saving lives versus saving life-years

We first discuss the findings in the No Info group. Figure 1A shows the share of personal and coordination decisions consistent with SML and SMLY across all the five situations, and the impact of information about the competing ethical considerations. The underlying regression results are presented in Table 3A. The main finding is that decisions consistent with SML are the modal personal decision and the modal coordination decision among participants in the No Info group. The share of personal decisions consistent with SML is 0·50 (95% CI, 0·45 to 0·54) while the share of personal decisions consistent with SMLY is 0·31 (95% CI, 0·28 to 0·33).

For coordination decisions in the No Info group, the share of decisions consistent with SML is 0·47 (95% CI, 0·42 to 0·52), while the share of decisions consistent with SMLY is 0·35 (95% CI, 0·31 to 0·39). Overall, participants in the No Info group seem to perceive SML more legitimate than SMLY. However, for almost half of the participants SML is not the most legitimate principle.

Impact of balanced information

The left panel in Figure 1A shows that balanced information about the competing ethical considerations increases personal decisions consistent with SML by 7·6 percentage-points (95% CI, 0·01 to 0·14; *P* = 0·02). This increase comes at the expense of personal decisions consistent with SMLY which decline by 6 percentage-points (95% CI, -0·11 to -0·01; *P* = 0·02).

The right panel in Figure 1A shows that balanced information also increases the likelihood of SML being the socially focal principle. The share of coordination decisions consistent with SML in the Info group is 5·7 percentage-points higher than that in the No Info group (95% CI, -0·01 to 0·12; *P* = 0·08).

Comparing the left and the right panels in Figure 1A highlights that among the participants in the No Info group, the share of coordination decisions consistent with SML is 3·0 percentage-points lower (95% CI, -0·06 to 0·001; *P* = 0·06) than the share of personal decisions consistent with SML. Similarly, among the participants in the Info group, the share of coordination decisions consistent with SML is 4·8 percentage-points lower (95% CI, -0·08 to -0·01; *P* = 0·005) than the share of personal decisions consistent with SML.

The comparison of personal and coordination decisions suggests as if some participants who personally perceive SML to be the most legitimate principle are doubtful whether others also perceive SML to be the most legitimate principle.

Saving healthier lives

To assess the support for SHL, SAL, SMLY, and other (i.e., the residual category), we next utilized the data from the four situations other than situation NONE. The underlying regression results are presented in Table 3B. Figure 1B highlights that the shares of personal and coordination decisions consistent with SHL are significantly larger than the shares of corresponding decisions consistent with SMLY in both the No Info group and the Info group.

The comparison between the Info and No Info groups suggests that balanced information about competing ethical considerations increases the share of personal decisions consistent with SHL by 6·2 percentage-points (95% CI, 0·00 to 0·12; P = 0·05), and significantly decreases the share of personal decisions consistent with SMLY by 6 percentage-points (95% CI, -0·11 to -0·01; P = 0·03). The impact of balanced information on coordination decisions is qualitatively similar but quantitatively weaker.

Overall, balanced information increases support for SML at the expense of support for SMLY. Also, the increased support for SML is largely driven by the increased support for SHL. These two findings suggest that balanced information induces some participants, that would have otherwise used SMLY, to use SHL (i.e., SML as the primary and SMLY as the subordinate principle).

All the findings reported above are robust to excluding the 64 participants with significantly less or significantly more response times compared to the average response time (see Table S3 in the Supplementary Material). Also, we had included a quiz question in between the “personal preference” stage and the “social agreement” stage. It served as an attention-check, and also helped assess whether participants understood the incentive mechanism used to determine their payment in the coordination games. Only about 4% of the participants (27 out of 700) answered this question incorrectly, and all the findings reported above hold upon excluding these 27 participants from the analysis.

Impact of balanced information on subgroups

Given that SML is the modal preferred principle at the aggregate level, we focus on investigating the support for SML in the subgroup analysis. Figure 2 shows the share of personal decisions consistent with SML across the various subgroups categorized by differences in age, race, education, prior familiarity with ventilator allocation guidelines, vaccination attitude, and political orientation. The underlying regression results are presented in Table S4 (see Table S5 and Fig. S1 for coordination decisions).

There exists significant heterogeneity in the extent of support for SML among the participants in the No Info group. For instance, the support for SML is highest among participants aged more than 47 years (mean, 0·55; 95% CI, 0·48 to 0·62), followed by non-white participants (mean, 0·54; 95% CI, 0·46 to 0·63). In comparison, the support for SML seems weaker among vaccine hesitant participants (mean, 0·46; 95% CI, 0·37 to 0·54), participants without a college degree (mean, 0·45; 95% CI, 0·39 to 0·51), and republican or republican-leaning (GOP-leaning) participants (mean, 0·43; 95% CI, 0·36 to 0·51).

Balanced information about the competing ethical considerations does not decrease the support for SML in any subgroup, and significantly increases the support for SML in several subgroups. The support for SML increases among Covid-19 vulnerable groups, such as older adults (mean, 0·09; 95% CI, -0·003 to 0·17; P = 0·06) and non-white (mean, 0·13; 95% CI, 0·01 to 0·25; P = 0·03). It is perhaps more noteworthy that the support for SML increases by 16 percentage-points (95% CI, 0·04 to 0·28; P = 0·008) among vaccine hesitant participants, and 16 percentage-points (95% CI, 0·05 to 0·27; P = 0·003) among GOP-leaning participants. As in the aggregate level analysis, balanced information shifts some participants within a particular subgroup that would have used SMLY as the primary principle, to using SML as the primary and SMLY as the subordinate principle. The estimates of the impact of balanced information in the subgroup analysis are similar when we use SHL, rather than SML, as the outcome measure (see Table S6 and Table S7).

Differences in political ideology predict differential levels of trust in experts, which in turn explains individual-level variation in vaccine hesitancy.[28,29] While vaccine hesitancy seems positively correlated with negative views of experts, there is insufficient evidence to treat vaccine hesitancy as a *proxy* for lower trust in experts. However, there is broad agreement in the existing literature that political orientation is a proxy for lower trust in experts.[30,31] Our finding for the GOP-leaning participants suggests that balanced information about the relevant ethical dilemmas can potentially increase support for SML even among those population subgroups that have lower trust in experts.

DISCUSSION

We investigated whether the general public finds saving more lives (SML) the most legitimate principle in allocating scarce ventilators in a survey experiment. Participants who were not provided information about the underlying ethical dilemmas were split: half perceive SML is the most legitimate principle, while the other half do not. Among those who do not, the substantial majority seem to perceive saving more life-years (SMLY) as the most legitimate principle.

Lack of factually correct and scientifically accurate information is often viewed as an important driver of differences between expert views and public opinion. Provision of facts and scientific information is therefore often the primary tool to bridge such differences.[31–33] Our study focused on a largely neglected channel, i.e., provision of balanced information about the competing ethical considerations that health experts have to grapple with. Balanced information about the competing ethical considerations underlying allocation of scarce ventilators enhances the perceived legitimacy of SML at the expense of SMLY, at least to some extent, regardless of differences in age, race, education, attitudes towards vaccination, and political orientation. However, these findings are weaker for coordination decisions than for personal decisions. It seems people are doubtful whether others perceive SML as the most legitimate principle.

The increased support for SML due to provision of balanced information is largely driven by the increased support for the principle of saving healthier lives (SHL). This suggests that a significant fraction of participants that would have otherwise used SMLY as the primary principle, use SML as the primary and SMLY as the subordinate principle when they become aware of the underlying ethical dilemmas.

The finding at the aggregate level seem to hold for several population subgroups we analyzed. In particular, our subgroup analysis suggests that even the participants without a college degree and GOP-leaning participants are significantly more likely to perceive SML as the legitimate principle once they become aware of the ethical dilemmas. This is worth noting because previous research has shown that sources of information and trust in science vary with educational attainment and political orientation.[34,35]

There are some noteworthy limitations of our study. First, our sample is not perfectly representative of the general US adult population. The average age of participants in our sample is slightly lower and the educational attainment is slightly higher than the corresponding actual means. Second, ignoring withdrawal of ventilators is a clear limitation of our study because withdrawal and (re)allocation decisions are not independent of each other. Third, while the short life-expectancy of patients with comorbidities (two years) offers greater confidence in the observed impact of balanced information, it suffers from the fact that life-expectancy of people with comorbidities is typically a function of their age.

The choice situations were presented to all participants in the treatment and control groups in a particular fixed order rather than a randomized order. We cannot be certain about the biases due to the particular order we used. However, since the same order was used for both the treatment and the control groups, such biases are unlikely to cause major concern about the estimates of the impact of balanced information. Another potential limitation relates to our indirect inference method. We inferred the principle preferred by a participant via the allocation decisions. An alternative is to describe the principles, and have the subjects directly indicate their preferred principle. However, it is debatable whether the direct response approach or the indirect inference approach is more likely to suffer from responder bias.

As findings from survey experiments often suffer from generalizability concerns, it is useful to clarify the particular sense in which these concerns are pertinent to our study. Most participants in our study were not healthcare professionals, and thus are unlikely to make ventilator allocation decisions in practice. Consequently, we cannot generalize the findings as to how ventilator allocation decisions by healthcare professionals might change if they are fully aware of the underlying ethical considerations. However, our interest was not in the decision-making of healthcare professionals. The central goal of our study was to investigate perceived legitimacy of the principles behind these guidelines among the general public because public opinion can also influence policies. Hence, given the nature of our question, external validity concerns are likely to be minimal.

Our work does not presuppose that SML is a more legitimate principle than the alternatives. Given that most public health experts and authorities do endorse SML as the primary principle, our findings suggest that, in addition to disseminating scientific facts and combating misinformation about scientific facts, promoting public awareness about the competing ethical considerations that public health experts grapple with can help increase the perceived legitimacy of SML, even among subgroups with lower trust in experts. Skeptics may erroneously but plausibly hold the belief that some factual or scientific information is produced and propagated by profit-seeking entities. Such a belief is harder to hold when the information is balanced, and relates to the underlying ethical dilemmas in the allocation of scarce medical resources. While further research is needed to better understand the behavioral mechanisms behind our findings, this difference between scientific and ethical information could be an important driver.

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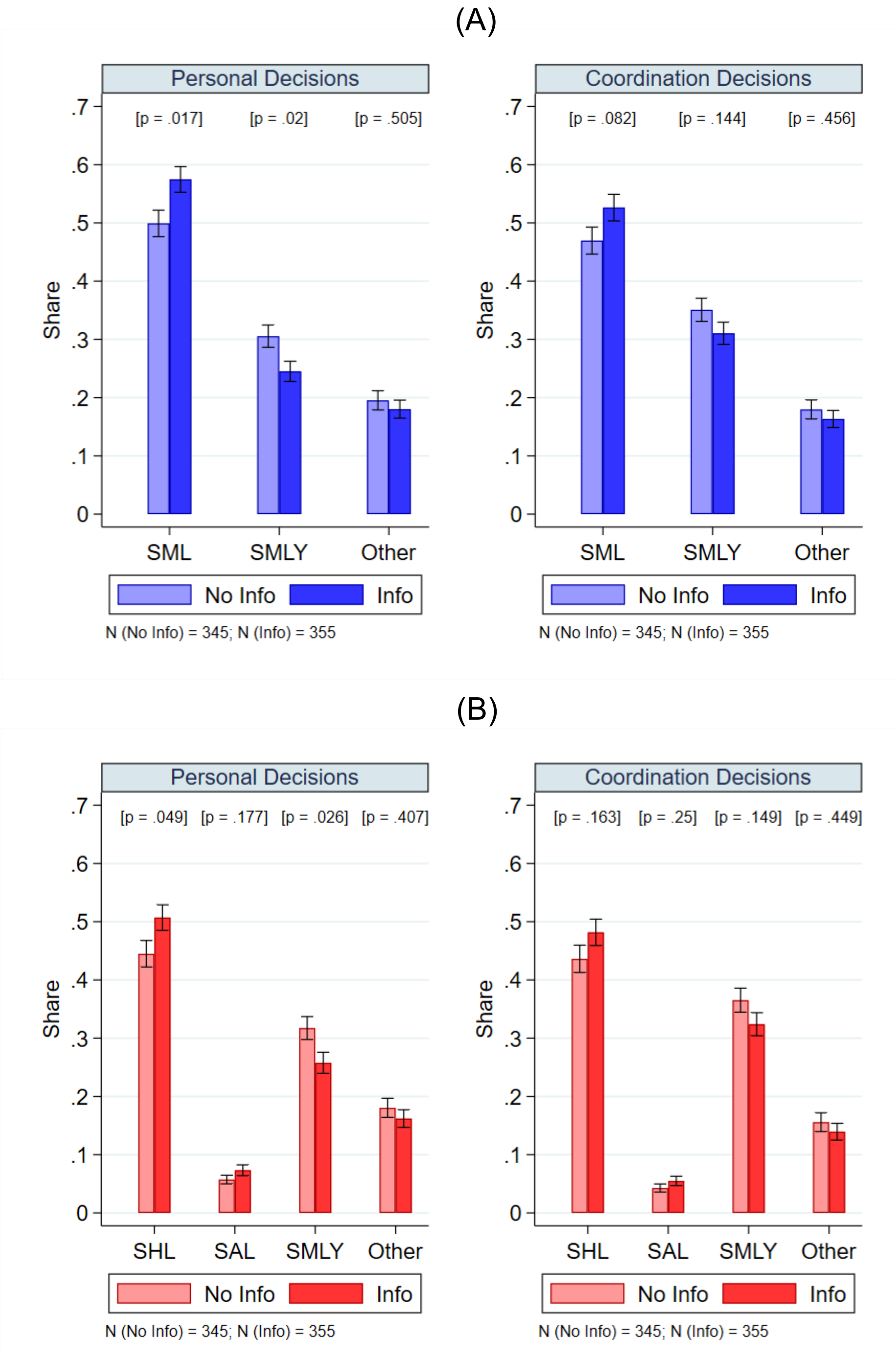
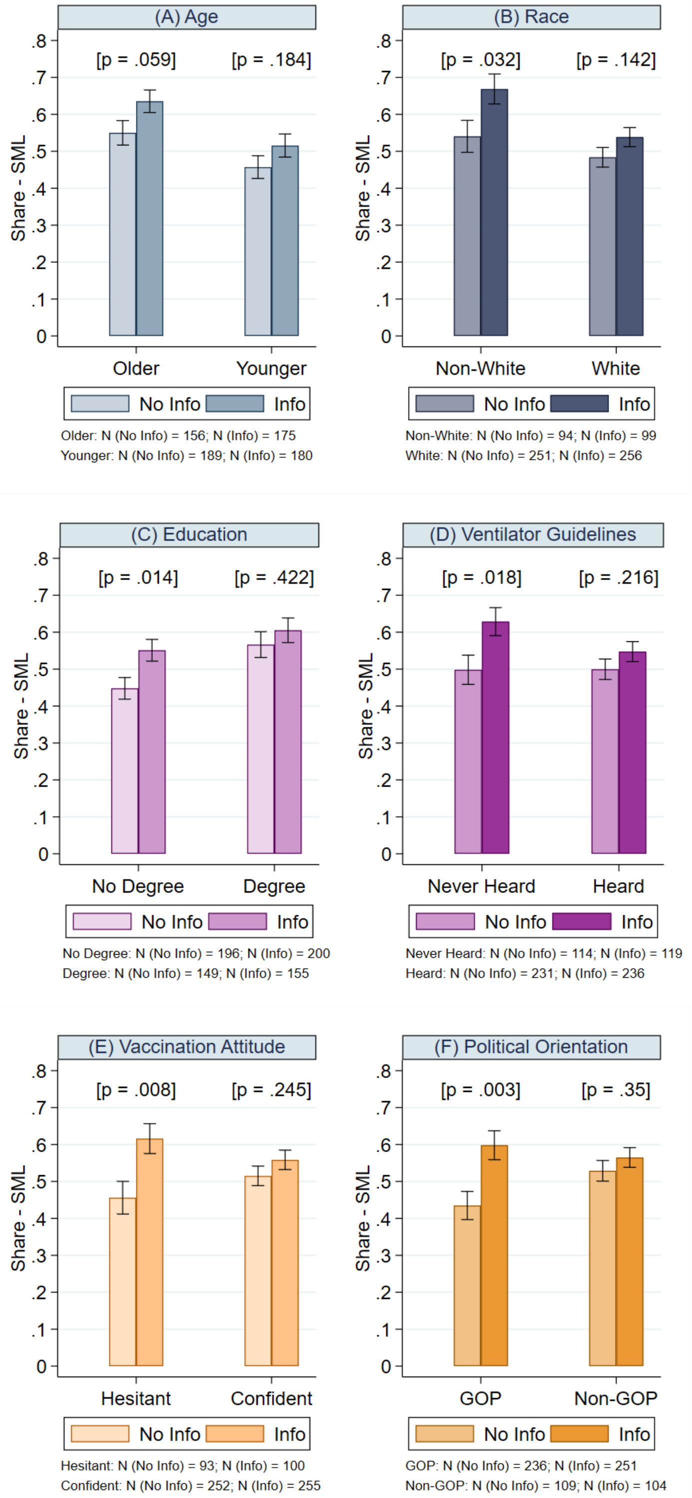
Figure 1 - Share of personal and coordination decisions consistent with various principles



Note. Mean differences between the no info group and the info group are shown. (A) Share of decisions consistent with SML, SMLY, and other principles pooled across all the five situations. (B) Share of decisions consistent with SHL, SAL, SMLY, and other principles pooled across the four situations other than NONE. The P values reported in square brackets are based on t tests of differences in means with standard errors clustered at the participant level. Error bars represent mean ± SEM.

Figure 2 - Share of personal decisions consistent with SML across population subgroups



Note. Each panel shows the mean differences between the no info group and the info group pooled across all the five choice situations in the personal decision stage. (A) Participants aged 47 years or more were categorized as "Older" and the rest were categorized as "Younger". (B) Participants who reported belonging to any race other than "White" were categorized as "Non-White". (C) "No degree" refers to participants who reported not having a college degree. (D) Participants who reported they never heard of any guidelines for the allocation of ventilators or ICU beds were categorized as "Never Heard". (E) Willingness to take a Covid-19 vaccine was ascertained based on responses to the following question: "Suppose a vaccine is developed for Covid-19 that health authorities consider safe. If the government offers this vaccine for free, would you take it?" Participants who responded "No" were categorized as "Vaccine-Hesitant" and participants who responded "Yes" were categorized as "Vaccine-

Confident" (F) Political orientation was ascertained based on responses to the following question: "In current politics, which category do you consider yourself more of?" Participants who responded "Republican" or "Independent, leaning towards Republican" were categorized as "GOP". The remaining participants were categorized as "Non-GOP". The P values reported in square brackets are based on t tests of differences in means with standard errors clustered at the participant level. Error bars represent mean ± SEM.

Table 1 - Arguments for and counterarguments against using patient characteristics to prioritize the allocation of scarce ventilators

Characteristic	Argument	Counter-argument
Young age	An argument for prioritizing younger patients over older patients is that it allows the young to have a fair chance to experience all stages of life, and saves more life-years.	A counter-argument is that this clearly discriminates against the elderly and may not account for economic or public health considerations. It is debatable whether the right to life of the elderly can be ignored to satisfy the right to a long life of children and adults. Further, from an economic and public health perspective, general adults and healthcare workers may be more likely to keep the economy and the healthcare system functioning.
Healthcare worker	An argument for prioritizing healthcare workers is that society should provide some insurance to healthcare workers for the risks they face in caring for others. One way to do this would be to prioritize healthcare workers for receiving ventilators, if they contract Covid-19 while caring for others.	A counter-argument is that healthcare workers (i) should have priority in receiving Personal Protective Equipment so that they do not get sick, but (ii) if they get sick while working, then they should be regarded as a general member of the population and should not have priority in receiving ventilators. • This counter-argument highlights the difficulties in clearly distinguishing between "critical" and "non-critical" healthcare workers, since the smooth operation of health services during a pandemic relies on a whole range of workers in the healthcare sector, not just doctors and nurses. In addition, one may ask, why not prioritize "critical" workers in occupations other than healthcare. For example, adults who are not healthcare workers may contribute significantly to keep the economy going during a pandemic.
No comorbidities	An argument for prioritizing patients without co-morbidities is that if ventilators are given to patients with co-morbidities, then scarce medical resources will get wasted because patients with co-morbidities are unlikely to live long even if they fully recover from Covid-19.	A counter-argument is that this discriminates against certain groups (e.g., some ethnic or racial groups, and some income groups) who may be systematically more likely to suffer from chronic illnesses.
High survival chances	An argument for allocating ventilators solely on the basis of who is more likely to survive Covid-19 if they receive a ventilator is that a greater number of people are likely to be saved.	A counter-argument is that this may implicitly discriminate against some groups of people. For example, people from low socio-economic backgrounds may be much more likely to get seriously sick if they contract Covid-19. This could be due to the poor environment they live in, the high-risk occupations they work in, and lack of nutrition or health services.

Table 2 - Features of the five choice situations faced by the participants

Feature	Situation				
	NONE	ELDERLY	ADULT	DOCTOR	CHILD
No. of ventilators	4	3	3	3	3
No. of patients	8	8	8	8	8
Patients with 60% conditional survival chance	E_1, A_1, D_1, C_1	E_1, A_1, D_1, C_1	E_1, A_1, D_1, C_1	E_1, A_1, D_1, C_1	E_1, A_1, D_1, C_1
Patients with 90% conditional survival chance	E_2, A_2, D_2, C_2	E_2, A_2, D_2, C_2	E_2, A_2, D_2, C_2	E_2, A_2, D_2, C_2	E_2, A_2, D_2, C_2
No. of feasible decisions	70	56	56	56	56
Patients with comorbidities	None	E_1 and E_2	A_1 and A_2	D_1 and D_2	C_1 and C_2
No. of decisions consistent with SML	1 out of 70	4 out of 56	4 out of 56	4 out of 56	4 out of 56
Decisions consistent with SML	E_2, A_2, D_2, C_2	A_2, D_2, C_2 E_2, D_2, C_2 E_2, A_2, C_2 E_2, D_2, C_2	A_2, D_2, C_2 E_2, D_2, C_2 E_2, A_2, C_2 E_2, D_2, C_2	A_2, D_2, C_2 E_2, D_2, C_2 E_2, A_2, C_2 E_2, D_2, C_2	A_2, D_2, C_2 E_2, D_2, C_2 E_2, A_2, C_2 E_2, D_2, C_2
No. of decisions consistent with SMLY	1 out of 70	2 out of 56	1 out of 56	1 out of 56	2 out of 56
Decisions consistent with SMLY	A_2, D_2, C_1, C_2	A_2, C_1, C_2 D_2, C_1, C_2	D_2, C_1, C_2	A_2, C_1, C_2	A_1, A_2, D_2 A_2, D_1, D_2

Note. The easiest way to read this table is to fix attention on a particular column. For instance, consider the column labelled ELDERLY that refers to Situation ELDERLY presented to the participants. As we move down the ELDERLY column, we find information about the relevant features of Situation ELDERLY: 3 ventilators are available; there are 8 patients who need a ventilator to survive; 4 patients – E_1, A_1, D_1, and C_1 – have 60% survival chance if they receive a ventilator; the remaining 4 patients – E_2, A_2, D_2, and C_2 – have 90% survival chance if they receive a ventilator; two patients – E_1 and E_2 – have comorbidities; there exist a total of 56 different ways of allocating the 3 available ventilators among the 8 patients; only 4 out of these 56 decisions are consistent with the principle of saving more lives (SML); the 3 patients who receive the ventilators in the 4 decisions consistent with SML are reported and the 1 decision that is consistent with the principle of saving healthier lives (SHL) is underlined; only 2 out of the 56 decisions are consistent with the principle of saving more live-years (SMLY); the 3 patients who receive the ventilators in the 2 decisions consistent with SMLY are reported. All the other columns can be read analogously.

Table 3 – Mean fraction of participant decisions consistent with various principles

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	-------- Personal decisions ------				--------- Coordination decisions ---------			
	No info	Info	Diff.	Odds ratio	No info	Info	Diff.	Odds ratio
A. All 5 situations								
SML	0·50	0·57	0·08**	1·36**	0·47	0·53	0·06*	1·25*
	(0·02)	(0·02)	(0·03)	(0·17)	(0·02)	(0·02)	(0·03)	(0·16)
SMLY	0·31	0·25	-0·06**	0·74**	0·35	0·31	-0·04	0·83
	(0·02)	(0·02)	(0·03)	(0·10)	(0·02)	(0·02)	(0·03)	(0·10)
Other	0·20	0·18	-0·02	0·91	0·18	0·16	-0·02	0·89
	(0·02)	(0·02)	(0·02)	(0·13)	(0·02)	(0·01)	(0·02)	(0·14)
B. Situations except NONE								
SHL	0·44	0·51	0·06**	1·28**	0·44	0·48	0·05	1·20
	(0·02)	(0·02)	(0·03)	(0·16)	(0·02)	(0·02)	(0·03)	(0·16)
SAL	0·06	0·07	0·02	1·30	0·04	0·05	0·01	1·30
	(0·01)	(0·01)	(0·01)	(0·25)	(0·01)	(0·01)	(0·01)	(0·30)
SMLY	0·32	0·26	-0·06**	0·75**	0·37	0·32	-0·04	0·83
	(0·02)	(0·02)	(0·03)	(0·10)	(0·02)	(0·02)	(0·03)	(0·11)
Other	0·18	0·16	-0·02	0·88	0·16	0·14	-0·02	0·88
	(0·02)	(0·02)	(0·02)	(0·14)	(0·02)	(0·01)	(0·02)	(0·15)

Note. In panel A, each mean estimate is based on 3500 observations made up of 700 participants across the 5 situations. In panel B, each mean estimate is based on 2800 observations made up of 700 participants across 4 situations, excluding situation NONE. Each mean estimate for the no info group corresponds to a in regression equation 1. Each mean estimate for the info group corresponds to $a + b$ in regression equation 1. The odds ratios are estimated using logistic regressions. Standard errors clustered at the participant level are reported in parentheses. *, **, and *** indicate statistical significance for t tests at the 10, 5, and 1% levels, respectively.

SUPPLEMENTARY MATERIAL

1. Materials and Methods

1.1. Experimental Methodology

Ventilator allocation guidelines are formulated by expert committees after careful deliberation of the arguments and counterarguments for each of these principles. The general public may not necessarily be aware of the arguments and counterarguments against particular principles.

The experiment consisted of multiple components, which are outlined in Table S1. Participants in the experiment were randomly assigned into either the treatment or the control group. Only participants in the treatment group were informed about the competing ethical considerations that public health experts have to consider in developing guidelines for the allocation of scarce ventilators. The components of the experiment are discussed in detail here.

<u>Pre-experiment survey.</u> Participants were asked a series of questions regarding their exposure to Covid-19, their willingness to accept a vaccine for Covid-19 and familiarity with ventilator allocation guidelines.

<u>Explanation and quiz.</u> Participants were explained the setting of the experiment and the kind of situations they would face during the choice experiment. The explanation was presented along with quiz questions to assess whether participants understood the setting. Participants could earn a monetary bonus for correct answers to these quiz questions, providing incentives for participants to carefully read and understand the structure of the situations in the actual experiment. The correct answer to a quiz question was provided immediately after a participant answered a quiz question, regardless of whether the participant answered correctly or incorrectly.

Balanced information. Participants were randomly assigned to either the treatment group or the control group. Participants in the treatment group were provided the arguments and counterarguments for utilizing four patient characteristics to allocate scarce ventilators (Table 1). Specifically, these characteristics were age, occupation as healthcare worker, presence of comorbidities, and survival chances conditional upon receiving a ventilator. Information about these four characteristics was presented sequentially (one at a time) in four steps in a random order. An unincentivized quiz question was included at each step to ensure participants read the information carefully.

Personal preference stage (Personal decisions). Participants were sequentially presented with five hypothetical situations. Each situation described eight patients who have contracted Covid-19, as shown in Table 2. Each of these patients needs a ventilator to survive Covid-19, but there is a shortage of ventilators. Patients differ in their age and occupation, as well as their chances of surviving Covid-19 conditional upon receiving a ventilator.

The five situations differ in terms of the number of available ventilators and which patients have comorbidities. As shown in Table 2, in situation NONE, four ventilators were available and no patient had comorbidities. In each of the remaining four situations – which we label as ELDERLY, ADULT, DOCTOR, and CHILD – only three ventilators were available and both the patients in the age/occupation category corresponding to the label of the situation had comorbidities.

Participants were told to assume: (i) a patient with comorbidities is expected to die within two years even if the patient survives Covid-19 upon receiving a ventilator; (ii) a patient without comorbidities is expected to live for the remainder of their natural term of life, conditional on receiving a ventilator and surviving Covid-19; (iii) the natural term of life is 80 years of age; (iv) a patient who survives Covid-19 upon receiving a ventilator is expected to be discharged from the hospital within one month. The responses of the participants to the quiz questions indicate that the overwhelming majority of the participants paid attention to these assumptions.

In each of the five situations, participants had to choose which patients should receive the available ventilators. We refer to the set of patients chosen by a participant in a given situation as their 'decision' in that situation. In this stage, participants were asked to make their decisions based on their individual perspectives. These decisions help identify which principle is personally preferred by a respondent (see Table 2).

The situations were constructed such that it is possible to infer whether a participant personally subscribes to the principle of saving more lives (SML), saving more life-years (SMLY), or some other principle based on their decision in a given situation. In addition to listing the five situations, Table 2 provides the patient decisions that are consistent with SML or SMLY.

The decisions consistent with SML correspond to the maximum expected number of lives that can be saved in a situation. Choosing the patients with higher survival chances (90%), conditional upon receiving a ventilator, forms a decision that is consistent with SML in each of the five scenarios. Given that the maximum conditional survival chance is 90%, the maximum expected number of lives saved is 3.6 (= 4 × 0·9) in Situation NONE where only four ventilators are available, and 2.7 (= 3 × 0·9) in each of the four situations other than NONE where only three ventilators are available.

The expected number of life-years saved corresponding to a decision is calculated by weighting the remaining life-years of the chosen patients with their conditional survival chances. For example, in situation NONE, the unique decision consistent with SMLY involves choosing A2, D2, C1 and C2. The expected life-years saved under this decision are 175.5 (= 35 × 0·9 + 35 × 0·9 + 75 × 0·9 + 75 × 0·6). Table 2 lists the decisions consistent with SMLY in each situation. The decisions consistent with SMLY are different from the decisions consistent with SML in each of the five situations.

The ventilator allocation guidelines in some states (e.g., Colorado, Michigan and Pennsylvania) effectively suggest using SML as the primary principle, and SMLY as the subordinate principle if multiple decisions are consistent with SML.[1-4] The four situations other than situation NONE help investigate this possibility. In each of these four situations, among the four decisions consistent with SML, the one that is consistent with "saving healthier lives" (SHL) is underlined in Table 2. It involves choosing the three patients without comorbidities who have higher conditional survival chance. We label the remaining three decisions that are consistent with SML but not with SHL as being consistent with "saving any lives" (SAL). Decisions consistent with either SHL or SAL are distinct from the decisions consistent with SMLY in any of these four situations.

Social agreement stage (Coordination decisions). In this part of the experiment, participants are presented with the same five situations they encountered in the personal preference stage. However, in this stage, each participant was told they would earn a bonus of GBP 0·20 in a situation if (and only if) their decision matches the patients most frequently chosen by all participants in the particular situation. Before stating this stage, participants were explained the payment mechanism.

This part of the experiment incentivizes participants to think which patients are most likely to be prioritized by other participants. The decisions made by participants in this stage thus allow us to understand which principle is socially most focal in the sense that it is most likely to be agreed upon when people appreciate that the personal preferences of others may differ from their own preferences.

We had included a quiz question in between the "personal preference" stage and the "social agreement" stage. It served as an attention-check, and also helped assess whether participants *understood* the incentive mechanism used to determine their payment in the coordination games. Only about 4% of the participants (27 out of 700) answered this question incorrectly. All the findings reported continue to hold upon excluding these 27 participants from the analysis.

<u>Post-experimental survey.</u> The final component of the experiment involved demographic, socioeconomic, and attitudinal questions to collect information from participants regarding factors such as age, gender, educational attainment, and political leaning. Participants also responded to three incentivized questions (worth GBP 0·10 each) that are commonly used as part of the Cognitive Reflection Test.[5,6]

1.2. Subject pool

The randomized controlled choice experiment was conducted online across various US states between October 22, 2020 and October 30, 2020 via Prolific, a UK research survey platform. The experiment was programmed using Qualtrics. Prolific has approximately 36,000 US participants available for research studies. At the time that we conducted the experiment, there were approximately 25,000 eligible US participants who were deemed active (participated in a study in the past 90 days) and provided sufficient information about their characteristics for us to generate a demographically representative sample.

Once a research study is published on Prolific, Prolific makes them visible to the eligible participants and sends out emails to those who subscribe for notifications. Participants interested in our study would then need to log into Prolific, select our study, and launch the survey. 722 respondents launched the survey, but 22 of them did not complete it. Among these

22 incomplete respondents, only three of them responded more than the quiz questions for the explanation. Two of these three respondents are in the treatment group. None of these three respondents moved beyond the personal choice decisions.

Our data consists of the 700 participants who provided complete responses. The control and treatment groups consisted of 345 and 355 participants, respectively. Each participant was paid GBP 2.50 for participation, and could earn up to an additional GBP 2.50 depending on the coordination decisions, and responses to the quiz questions and the cognitive reflection test.

Summary statistics for the sample of participants are presented in Table S2. As a measure of representativeness, the sample statistics for various demographic and socio-economic dimensions can be compared with population statistics from the American Community Survey (ACS) data for the US adult population aged 18 and over.[7] Relative to the US adult population, the fraction of participants with a college degree in our sample is slightly higher and the fraction of older adults is slightly lower. The gender composition (male or female) and the racial composition (white or non-white) is similar to the US adult population.

There is no statistically significant difference in the fractions of participants in the treatment group (Info) and the control group (No Info) with respect to gender, race, age, education, prior familiarity with ventilator allocation guidelines, hesitancy towards taking a Covid-19 vaccine, and political orientation.

1.3. Key design choices

We made two key design choices. First, we ignored situations involving withdrawing a ventilator from a patient in order to allocate it to a different patient. All the reasons behind this design choice have been provided in the main manuscript. Second, we specified the remaining life-expectancy of patients with comorbidities to be two years. In the following, we describe the rationale behind this design choice in detail.

We chose 2 years as the *common* remaining life-expectancy of patients with comorbidities regardless of their age for *qualitative* and *quantitative* reasons. *Qualitatively*, we argue that specifying a relatively short life-expectancy will strengthen the confidence in the finding that awareness of ethical considerations increases public support for the principle of saving more lives, *if* indeed the data shows this. A *shorter* life-expectancy for patients with comorbidities lends greater salience to the presence of comorbidities. A higher life-expectancy reduces the difference between patients with and without comorbidities.

To see the argument in detail, suppose there are two patients – E and A – but only one ventilator is available. Further suppose,

- E is 75 years old and is expected to die within Y years due to comorbidities (even if he recovers fully upon receiving the ventilator); A is 45 years old and has no comorbidities.
- But, E has 90% chance of surviving Covid-19 upon receiving the ventilator, while A has only 60% chance.

The principle of saving more lives (SML) will recommend allocating the ventilator to E due to his greater survival chance, despite his comorbidities. A participant who faces this decision might find it relatively "easier" to allocate the ventilator to E when Y is a large value such as 10 years. When Y is a small value such as 2 years, even someone who finds SML a good principle, may hesitate in allocating the ventilator to E.

Hence, allocating the ventilator to E when Y is only 2 years is a much stronger indication of a participant's belief in the primacy of the SML principle relative to the case where Y is 10 years. Intuitively, the smaller the value of Y, the greater the implicit force *against* SML.

Hence, if we observe that balanced information increases support for SML *despite this implicit force against* SML, then we can be reasonably confident that balanced information indeed increases support for SML. This was the *qualitative* reason for choosing the relatively short 2 years as the remaining life-expectancy of patients with comorbidities. We traded off some realism for greater confidence in the potential impact of balanced information.

Turning to the *quantitative* reason, we found significant variation in ventilator allocation guidelines across states in the USA on this matter. In fact, four states in the USA use life-expectancy of less than 6 months as an exclusion criterion[1]. Similarly, four other states use dialysis-dependent end-stage renal disease as an exclusion criterion, and the expected remaining lifespan for patients aged 70+ years with end-stage renal disease undergoing dialysis is estimated to be less than 4 years[8]. In conjunction with the *qualitative* reason described above, we believed it would be appropriate given the goals of our study to choose a value less than 4 years.

An additional consideration was that we specified the age of elderly patients as 75 years. The current life expectancy in the USA is about 79 years (pooling across men and women)[9]. As a rough guide, we used the difference of 4 years (79 – 75) as an upper bound for the *common* life-expectancy of patients with comorbidities. In light of all these considerations, we specified 2 years as the expected remaining years of life for patients with comorbidities *regardless of their age* in order to simplify the presentation of the situations to the participants.

2. Analysis

2.1. Nature of analysis

We have highlighted that our analysis was largely exploratory because the balanced nature of the information we provided to participants in the treatment group precludes us from specifying clear-cut hypothesis about the impact of balanced information. In fact, there are three main classes of hypotheses to consider in our study.

1. Hypotheses about differences between participants *within the control group* based on differences in a particular characteristic. For example, we expected older participants

in the control group will be more likely to support SML than younger participants in the control group since SML does not discriminate against older people. We could similarly hypothesize about differences within the control group based on prior familiarity with ventilator allocation guidelines and political ideology. However, we had no clear hypothesis about the remaining 3 characteristics: race, education, and vaccine hesitancy. For example, we had no grounds to hypothesize that white participants in the control group are expected to be more (or, less) likely to support SML than non-white participants in the control group.

2. Hypotheses about differences between participants *within the treatment group* based on differences in a particular characteristic. For instance, once all participants are aware of the competing ethical considerations, it is unclear that support for SML will be greater among older rather than younger participants.
3. Hypothesis about the *effect of balanced information* on participants with a given characteristic. Due to the "balanced" nature of the information, we had no clear hypothesis of this type. For example, we were unsure whether support for SML among older participants in the treatment group will be higher or lower than the support for SML among the older participants in the control group.

Given the primary focus of our study, hypotheses in class 3 were most relevant for us as they intend to hypothesize about the impact of balanced information. But, it is the balanced nature of the information that prevented us from formulating clear-cut hypothesis about its impact. In this sense, we viewed our subgroup analysis as exploratory. In fact, for the same reasons, even the primary analysis was exploratory. Hence, we did not specify any hypothesis.

2.1 Robustness of aggregate level results

We now describe the two robustness checks conducted for the aggregate level results that have been mentioned in the manuscript.

Survey response times. The average response time in the control and treatment groups was roughly 27 and 33 minutes, respectively. The higher average response time in the treatment group is as expected because participants had to read the arguments and counterarguments about the prioritization criteria.

To assess robustness, we consider participants with a response time less than half the average response time in the control group (i.e., less than $0.5 \times 27 \sim 14$ minutes) as not paying sufficient attention. 47 participants fall into this group. Similarly, we consider participants with a response time higher than double the average response time in the treatment group (i.e., more than $33 \times 2 \sim 66$ minutes) as potentially facing difficulties/distractions while responding to the survey. 17 participants fall into this group.

The findings presented in Table 3 of the main text are not sensitive to the exclusion of these 64 participants (9.1% of the sample). Table S3 reports the aggregate level results with the exclusion of the 64 participants that were considered to be giving potentially unreliable responses.

Incentivized attention-check question. We also checked the fraction of participants who might not be paying attention during the middle of the decision tasks using an incentivized attention-check question that appears between the personal decision tasks and coordination decision tasks. The question checks whether participants understand how they will be paid for the coordination tasks. 27 out of the 700 participants answered this question incorrectly (3.9% of the sample). Our results are not sensitive to the exclusion of these 27 participants.

2.2. Means of personal decisions consistent with SML for various population subgroups

Table S4 provides the underlying regression results presented in Figure 2 of the main text. The mean shares of personal decisions consistent with SML are presented for the subgroups categorized by differences in age, race, education, prior familiarity with ventilator guidelines, vaccination attitude, and political orientation.

2.3. Means of coordination decisions consistent with SML for various population subgroups

Table S5 provides the regression results that are presented in Figure S1. The mean shares of coordination decisions consistent with SML are presented for the same population subgroups as in Table S4, which are categorized by differences in age, race, education, prior familiarity with ventilator guidelines, vaccination attitude, and political orientation.

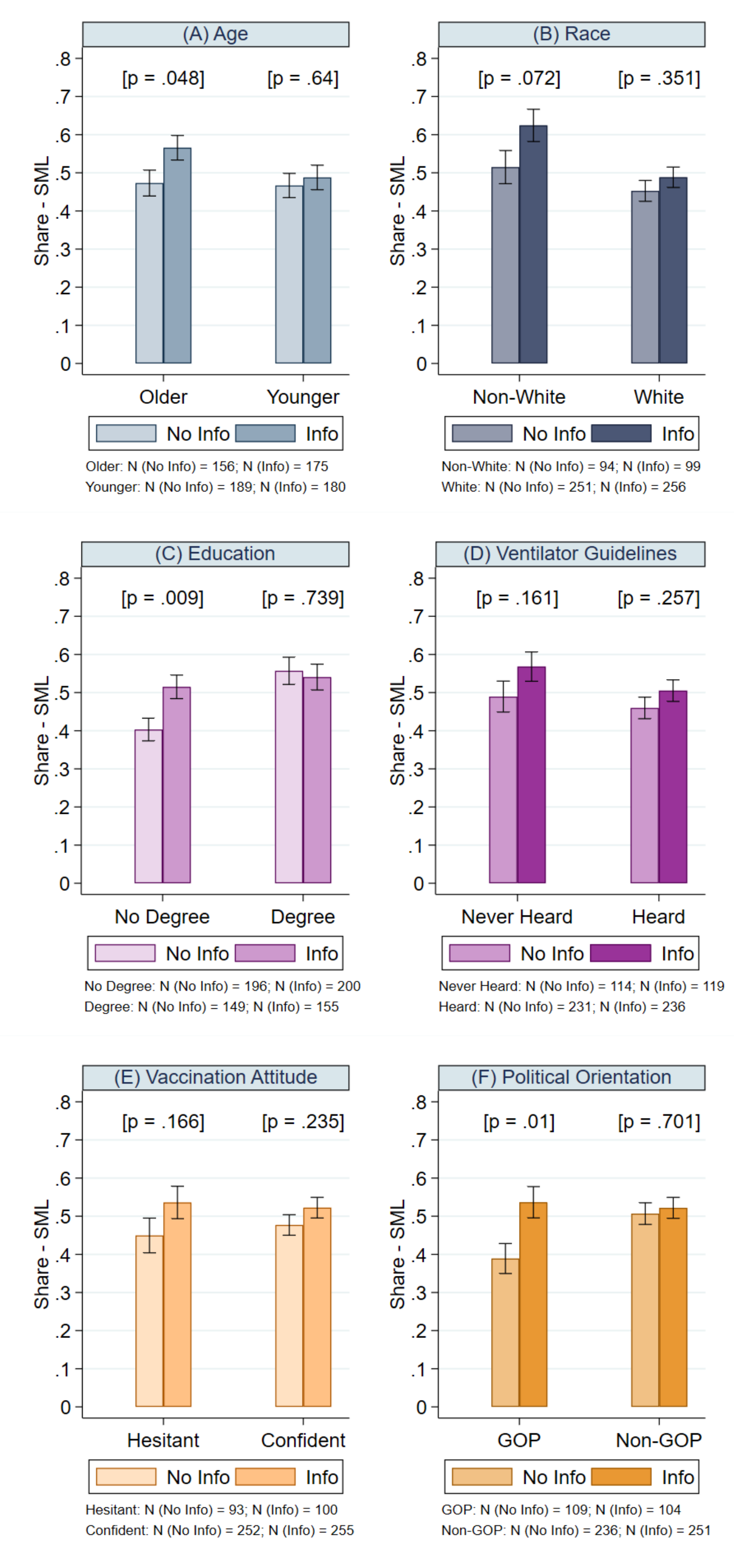
2.4. Means of personal decisions consistent with SHL for various population subgroups

The mean shares of personal decisions consistent with SHL for the subgroups categorized by differences in age, race, education, prior familiarity with ventilator guidelines, vaccination attitude, and political orientation are reported in Table S6. Table S6 also shows the estimated differences across groups (both sub-groups and treatment groups). The estimates are similar to those for SML (Table S4).

2.5. Means of coordination decisions consistent with SHL for various population subgroups

The mean shares of coordination decisions consistent with SHL for the subgroups categorized by differences in age, race, education, prior familiarity with ventilator guidelines, vaccination attitude, and political orientation are reported in Table S7. Table S7 also shows the estimated differences across groups (both sub-groups and treatment groups). The estimates are similar to those for SML (Table S5).

Figure S1 - Share of coordination decisions consistent with SML across population subgroups



Note. Each panel shows the mean differences between the no info group and the info group pooled across all the five choice situations in the coordination decision stage. (A) Participants aged 47 years or more were categorized as “Older” and the rest were categorized as “Younger”. (B) Participants who reported belonging to any race other than “White” were categorized as “Non-White”. (C) “No degree” refers to participants who reported not having a college degree. (D) Participants who reported they never heard of any guidelines for the allocation of ventilators or ICU beds were categorized as “Never Heard”. (E) Willingness to take a Covid-19 vaccine was ascertained based on responses to the following question: “Suppose a vaccine is developed for Covid-19 that health authorities consider safe. If the government offers this vaccine for free, would you take it?” Participants who responded “No” were categorized as “Vaccine-Hesitant” and participants who responded “Yes” were categorized as “Vaccine-Confident” (F) Political orientation was ascertained based on responses to the following question: “In current politics, which category do you consider yourself more of?” Participants who responded “Republican” or “Independent, leaning towards Republican” were categorized as “GOP”. The remaining participants were categorized as “Non-GOP”. The P values reported in square brackets are based on t tests of differences in means with standard errors clustered at the participant level. Error bars represent mean ± SEM.

Table S1 - Outline of the experiment

	Control group	Treatment group
Pre-experiment survey	Yes	Yes
Explanation and quiz	Yes	Yes
Balanced information	**No**	Yes
Personal decisions	Yes	Yes
Coordination decisions	Yes	Yes
Post-experiment survey	Yes	Yes

Note. The only difference between the control (no info) group and treatment (info) group was that balanced information containing arguments and counterarguments for using patient characteristics was provided only to the participants in the treatment (info) group.

Table S2 - Summary statistics

	ACS 2018	No info	Info	Difference (Info – No Info)
Characteristics				
Fraction Male	0·487	0·481	0·490	0·009
		(0·027)	(0·027)	(0·038)
Fraction White	0·738	0·728	0·721	-0·006
		(0·024)	(0·024)	(0·034)
Fraction of Adults aged 47 and above	0·505	0·452	0·493	0·041
		(0·027)	(0·027)	(0·038)
Fraction having a college degree or more	0·383	0·432	0·437	0·005
		(0·027)	(0·026)	(0·038)
Fraction who had heard of ventilator allocation guidelines		0·670	0·665	-0·005
		(0·025)	(0·025)	(0·036)
Fraction who were vaccine-hesitant		0·270	0·282	0·012
		(0·024)	(0·024)	(0·034)
GOP-leaning		0·316	0·293	-0·023
		(0·025)	(0·024)	(0·035)

Note. The participant characteristics and primary outcomes are reported as fractions. American Community Survey (ACS) 2018 data are based on US adult population aged 18 and above.7 We had 345 participants in the no info group and 355 participants in the info group. Compared to the US adult population, the participants in our experiment had similar gender, race, and educational characteristics, but are slightly younger and more educated. Predetermined characteristics of participants in the no info group and info group are statistically similar. Standard errors clustered at the participant level are reported in parentheses.

Table S3 - Mean fraction of participant decisions consistent with various principles, excluding participants whose survey completion times were considered outliers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	-------- Personal decisions ------				--------- Coordination decisions ---------			
	No info	Info	Diff.	Odds ratio	No info	Info	Diff.	Odds ratio
C. All 5 situations								
SML	0·50	0·57	0·07**	1·33**	0·47	0·53	0·06*	1·26*
	(0·02)	(0·02)	(0·03)	(0·18)	(0·02)	(0·02)	(0·03)	(0·17)
SMLY	0·30	0·25	-0·05*	0·77*	0·35	0·31	-0·04	0·84
	(0·02)	(0·02)	(0·03)	(0·10)	(0·02)	(0·02)	(0·03)	(0·11)
Other	0·20	0·18	-0·02	0·88	0·18	0·16	-0·02	0·87
	(0·02)	(0·02)	(0·02)	(0·14)	(0·02)	(0·01)	(0·02)	(0·14)
D. Situations except NONE								
SHL	0·45	0·51	0·06*	1·26*	0·44	0·49	0·05	1·23
	(0·02)	(0·03)	(0·03)	(0·17)	(0·02)	(0·02)	(0·03)	(0·17)
SAL	0·06	0·07	0·01	1·28	0·05	0·05	0·01	1·20
	(0·01)	(0·01)	(0·01)	(0·26)	(0·01)	(0·01)	(0·01)	(0·28)
SMLY	0·32	0·26	-0·05*	0·78*	0·37	0·32	-0·04	0·83
	(0·02)	(0·02)	(0·03)	(0·11)	(0·02)	(0·02)	(0·03)	(0·11)
Other	0·18	0·16	-0·02	0·86	0·15	0·13	-0·02	0·86
	(0·02)	(0·02)	(0·02)	(0·14)	(0·02)	(0·01)	(0·02)	(0·16)

Note. In panel A, each mean estimate is based on 3195 observations made up of 639 participants across 5 situations. In panel B, each mean estimate is based on 2556 observations made up of 639 participants across 4 situations, excluding situation NONE. Participants excluded from the samples are those who spent less than 14 minutes to complete the survey and those spent more than 66 minutes to complete the survey. Each mean estimate for the no info group corresponds to a in regression equation 1. Each mean estimate for the info group corresponds to $a + b$ in regression equation 1. The odds ratios are estimated using logistic regressions. Standard errors clustered at the participant level are reported in parentheses. *, **, and *** indicate statistical significance for t tests at the 10, 5, and 1% levels, respectively.

Table S4 - Means of personal decisions consistent with SML for various population subgroups

	(1) Age	(2) Race	(3) Education	(4) Ventilator guidelines	(5) Vaccination attitude	(6) Political orientation
(A) Subgroup	Older	Non-white	No degree	Never heard	Hesitant	GOP
No info	0·55	0·54	0·45	0·50	0·46	0·43
	(0·03)	(0·04)	(0·03)	(0·04)	(0·04)	(0·04)
Info	0·64	0·67	0·55	0·63	0·62	0·60
	(0·03)	(0·04)	(0·03)	(0·04)	(0·04)	(0·04)
Info – No Info	0·09*	0·13**	0·10**	0·13**	0·16***	0·16***
	(0·05)	(0·06)	(0·04)	(0·05)	(0·06)	(0·05)
Observations	1655	965	1980	1165	965	1065
Participants	331	193	396	233	193	213
(B) Subgroup	Younger	White	Degree	Heard	Confident	Non-GOP
No info	0·46	0·48	0·57	0·50	0·52	0·53
	(0·03)	(0·03)	(0·03)	(0·03)	(0·03)	(0·03)
Info	0·52	0·54	0·61	0·55	0·56	0·56
	(0·03)	(0·03)	(0·03)	(0·03)	(0·03)	(0·03)
Info – No Info	0·06	0·05	0·04	0·05	0·04	0·04
	(0·04)	(0·04)	(0·05)	(0·04)	(0·04)	(0·04)
Observations	1845	2535	1520	2335	2535	2435
Participants	369	507	304	467	507	487
(C) Subgroup Difference						
No info (A – B)	0·09**	0·06	-0·12***	0·00	-0·06	-0·09**
	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)
Info (A – B)	0·12***	0·13***	-0·05	0·08*	0·06	0·03
	(0·04)	(0·05)	(0·04)	(0·05)	(0·05)	(0·05)

Note. Panels A and B reports the means of personal decisions consistent with SML among the no info group, the means of personal decisions consistent with SML among the info group, and the mean differences of personal decisions consistent with SML between the no info and info group. Panel C reports the mean differences of personal decisions consistent with SML between two population subgroups of the no info group and mean differences of personal decisions consistent with SML between two population subgroups of the info group. Column (1) reports estimates for participants aged 47 years and more ("Older") in panel A and participants aged less than 47 ("Younger") in panel B. Column (2) reports estimates for white participants in panel A and non-white participants in panel B. Column 3 reports estimates for participants without a college degree in panel A and participants with at least a college degree in panel B. Column 4 reports estimates for participants who had no prior familiarity with ventilator allocation guidelines in panel A and participants with prior familiarity with ventilator allocation guidelines in panel B. Column 5 reports estimates for participants who were vaccine hesitant in panel A and participants who were vaccine confident in panel B. Column 6 reports estimates for participants who were republican or independent that leans republican in panel A and participants who were not republican or independent that leans republican in panel B. Standard errors clustered at the participant level are reported in parentheses. *, **, and *** indicate statistical significance for t tests at the 10, 5, and 1% levels, respectively.

Table S5 - Means of coordination decisions consistent with SML for various population subgroups

	(1) Age	(2) Race	(3) Education	(4) Ventilator guidelines	(5) Vaccination attitude	(6) Political orientation
(A) Subgroup	Older	Non-white	No degree	Never heard	Hesitant	GOP
No info	0·47	0·51	0·40	0·49	0·45	0·39
	(0·03)	(0·04)	(0·03)	(0·04)	(0·05)	(0·04)
Info	0·57	0·62	0·52	0·57	0·54	0·54
	(0·03)	(0·04)	(0·03)	(0·04)	(0·04)	(0·04)
Info – No Info	0·09**	0·11*	0·11***	0·08	0·09	0·15***
	(0·05)	(0·06)	(0·04)	(0·06)	(0·06)	(0·06)
Observations	1655	965	1980	1165	965	1065
Participants	331	193	396	233	193	213
(B) Subgroup	Younger	White	Degree	Heard	Confident	Non-GOP
No info	0·47	0·45	0·56	0·46	0·48	0·51
	(0·03)	(0·03)	(0·04)	(0·03)	(0·03)	(0·03)
Info	0·49	0·49	0·54	0·51	0·52	0·52
	(0·03)	(0·03)	(0·03)	(0·03)	(0·03)	(0·03)
Info – No Info	0·02	0·04	-0·02	0·05	0·05	0·02
	(0·05)	(0·04)	(0·05)	(0·04)	(0·04)	(0·04)
Observations	1845	2535	1520	2335	2535	2435
Participants	369	507	304	467	507	487
(C) Subgroup Difference						
No info (A – B)	0·01	0·06	-0·15***	0·03	-0·03	-0·12**
	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)
Info (A – B)	0·08*	0·14***	-0·03	0·06	0·01	0·01
	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)

Note. Panels A and B reports the means of coordination decisions consistent with SML among the no info group, the means of coordination decisions consistent with SML among the info group, and the mean differences of coordination decisions consistent with SML between the no info and info group. Panel C reports the mean differences of coordination decisions consistent with SML between two population subgroups of the no info group and mean differences of coordination decisions consistent with SML between two population subgroups of the info group. Column (1) reports estimates for participants aged 47 years and more ("Older") in panel A and participants aged less than 47 ("Younger") in panel B. Column (2) reports estimates for white participants in panel A and non-white participants in panel B. Column 3 reports estimates for participants without a college degree in panel A and participants with at least a college degree in panel B. Column 4 reports estimates for participants who had no prior familiarity with ventilator allocation guidelines in panel A and participants with prior familiarity with ventilator allocation guidelines in panel B. Column 5 reports estimates for participants who were vaccine hesitant in panel A and participants who were vaccine confident in panel B. Column 6 reports estimates for participants who were republican or independent that leans republican in panel A and participants who were not republican or independent that leans republican in panel B. Standard errors clustered at the participant level are reported in parentheses. *, **, and *** indicate statistical significance for t tests at the 10, 5, and 1% levels, respectively.

Table S6 - Means of personal decisions consistent with SHL for various population sub-groups

	(1) Age	(2) Race	(3) Education	(4) Ventilator guidelines	(5) Vaccination attitude	(6) Political orientation
(A) Sub-group	Older	Non-white	No degree	Never heard	Hesitant	GOP
No info	0·49	0·50	0·40	0·45	0·42	0·39
	(0·03)	(0·04)	(0·03)	(0·04)	(0·04)	(0·04)
Info	0·56	0·60	0·48	0·57	0·53	0·54
	(0·03)	(0·04)	(0·03)	(0·04)	(0·04)	(0·04)
Info – No Info	0·07	0·10*	0·08**	0·12**	0·11*	0·16***
	(0·05)	(0·06)	(0·04)	(0·06)	(0·06)	(0·06)
Observations	1324	772	1584	936	772	852
Participants	331	193	396	233	193	213
(B) Sub-group	Younger	White	Degree	Heard	Confident	Non-GOP
No info	0·41	0·43	0·51	0·44	0·45	0·47
	(0·03)	(0·03)	(0·04)	(0·03)	(0·03)	(0·03)
Info	0·46	0·47	0·54	0·48	0·50	0·49
	(0·03)	(0·03)	(0·03)	(0·03)	(0·03)	(0·03)
Info – No Info	0·05	0·05	0·03	0·03	0·04	0·02
	(0·04)	(0·04)	(0·05)	(0·04)	(0·04)	(0·04)
Observations	1476	2028	1216	1868	2028	1948
Participants	369	507	304	467	507	487
(C) Sub-group Difference						
No info (A – B)	0·08*	0·07	-0·11**	0·00	-0·04	-0·08*
	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)
Info (A – B)	0·10**	0·13***	-0·06	0·09*	0·03	0·05
	(0·04)	(0·05)	(0·04)	(0·05)	(0·05)	(0·05)

Note. Panels A and B reports the means of personal decisions consistent with SHL among the no info group, the means of personal decisions consistent with SHL among the info group, and the mean differences of personal decisions consistent with SHL between the no info and info group. Panel C reports the mean differences of personal decisions consistent with SHL between two population sub-groups of the no info group and mean differences of personal decisions consistent with SHL between two population sub-groups of the info group. Column (1) reports estimates for participants aged 47 years and more ("Older") in panel A and participants aged less than 47 ("Younger") in panel B. Column (2) reports estimates for white participants in panel A and non-white participants in panel B. Column 3 reports estimates for participants without a college degree in panel A and participants with at least a college degree in panel B. Column 4 reports estimates for participants who had no prior familiarity with ventilator allocation guidelines in panel A and participants with prior familiarity with ventilator allocation guidelines in panel B. Column 5 reports estimates for participants who were vaccine hesitant in panel A and participants who were vaccine confident in panel B. Column 6 reports estimates for participants who were republican or independent that leans republican in panel A and participants who were not republican or independent that leans republican in panel B. Standard errors clustered at the participant level are reported in parentheses. *, **, and *** indicate statistical significance for t tests at the 10, 5, and 1% levels, respectively.

Table S7 - Means of coordination decisions consistent with SHL for various population sub-groups

	(1) Age	(2) Race	(3) Education	(4) Ventilator guidelines	(5) Vaccination attitude	(6) Political orientation
(A) Sub-group	Older	Non-white	No degree	Never heard	Hesitant	GOP
No info	0·44	0·46	0·37	0·45	0·42	0·36
	(0·03)	(0·04)	(0·03)	(0·04)	(0·04)	(0·04)
Info	0·51	0·57	0·47	0·53	0·47	0·49
	(0·03)	(0·04)	(0·03)	(0·04)	(0·04)	(0·04)
Info – No Info	0·08*	0·11*	0·10**	0·08	0·05	0·12**
	(0·05)	(0·06)	(0·04)	(0·06)	(0·06)	(0·06)
Observations	1324	772	1584	932	772	852
Participants	331	193	396	233	193	213
(B) Sub-group	Younger	White	Degree	Heard	Confident	Non-GOP
No info	0·44	0·43	0·52	0·43	0·44	0·47
	(0·03)	(0·03)	(0·04)	(0·03)	(0·03)	(0·03)
Info	0·45	0·45	0·50	0·46	0·49	0·48
	(0·03)	(0·03)	(0·03)	(0·03)	(0·03)	(0·03)
Info – No Info	0·01	0·02	-0·02	0·03	0·04	0·01
	(0·05)	(0·04)	(0·05)	(0·04)	(0·04)	(0·04)
Observations	1476	2028	1216	1868	2028	1948
Participants	369	507	304	467	507	487
(C) Sub-group Difference						
No info (A – B)	0·00	0·03	-0·15***	0·03	-0·02	-0·10**
	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)
Info (A – B)	0·06	0·12**	-0·04	0·07	-0·02	0·01
	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)	(0·05)

Note. Panels A and B reports the means of coordination decisions consistent with SHL among the no info group, the means of coordination decisions consistent with SHL among the info group, and the mean differences of coordination decisions consistent with SHL between the no info and info group. Panel C reports the mean differences of coordination decisions consistent with SHL between two population sub-groups of the no info group and mean differences of coordination decisions consistent with SHL between two population sub-groups of the info group. Column (1) reports estimates for participants aged 47 years and more ("Older") in panel A and participants aged less than 47 ("Younger") in panel B. Column (2) reports estimates for white participants in panel A and non-white participants in panel B. Column 3 reports estimates for participants without a college degree in panel A and participants with at least a college degree in panel B. Column 4 reports estimates for participants who had no prior familiarity with ventilator allocation guidelines in panel A and participants with prior familiarity with ventilator allocation guidelines in panel B. Column 5 reports estimates for participants who were vaccine hesitant in panel A and participants who were vaccine confident in panel B. Column 6 reports estimates for participants who were republican or independent that leans republican in panel A and participants who were not republican or independent that leans republican in panel B. Standard errors clustered at the participant level are reported in parentheses. *, **, and *** indicate statistical significance for t tests at the 10, 5, and 1% levels, respectively.