Do People Desire Optimism from Others During a Novel Global Crisis?

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Abstract

During a global crisis, does the desire for good news also mean an endorsement of an optimistic bias? Five pre-registered studies, conducted at the start of the COVID pandemic, examined people’s lay prescriptions for thinking about uncertainty—specifically whether they thought forecasters should be optimistic, realistic, or pessimistic in how they estimated key likelihoods. Participants gave prescriptions for forecasters with different roles (e.g., self, family member, public official) and for several key outcomes (e.g., contracting COVID, vaccine development). Overall, prescribed optimism was not the norm. In fact, for negative outcomes that were of high concern, participants generally wanted others to have a pessimistic bias in how they estimated likelihoods. For positive outcomes, people favored more accurate estimation. These patterns held regardless of the assumed forecaster’s role. A common justification for advocating for a pessimistic bias in forecasts was to increase others' engagement in protective or preventative behaviors.

Keywords: optimism, estimation, bias, uncertainty, forecasting, judgments

Word count: 9815

Do People Desire Optimism from Others During a Novel Global Crisis?

*“We just need more optimism. There is good news out there, and we’re not getting it.”*

Senator Rand Paul to Dr. Anthony Fauci during a Senate Hearing, June 30th, 2020

A global crisis causes a rare event; people across all walks of life having similar experiences making predictions about unprecedented outcomes in an uncertain future. Although being well calibrated in one’s uncertainty is highly valued in science and forecasting, do people generally prefer optimism during the threat and uncertainty of a global pandemic? Said differently, what do people *prescribe* about how uncertainty should be considered? This paper presents five studies conducted during the beginning of the COVID-19 pandemic lockdowns in the United States. People were asked to make prescriptions about how other people (and themselves) should estimate the likelihood of various positive and negative pandemic-related outcomes. Not only were we interested in general tendencies toward either optimistic, realistic, or pessimistic prescriptions, but we also sought to determine whether this varied as a function of the specific pandemic-relevant outcome and the person who was the target of the prescription (e.g., the self, a friend/family member, or political leader).

**Measuring Prescriptions of “Optimism”**

People’s prescriptions of how to think about uncertainty can be measured in importantly distinct ways. To record prescriptions about how protagonists in hypothetical scenarios should think about the prospects of a desired outcome (e.g., winning a scholarship), Armor, Massey, and Sackett (2008) offered participants response options ranging from “extremely pessimistic” through “extremely optimistic.” The results were that people generally prescribed optimism (see also Tenney et al., 2015). However, Miller and colleagues (2021) noted that terms like “optimistic” and “pessimistic” are flexibly interpreted and differ in colloquial and scientific interpretations. As a concrete way of asking people for prescriptions of how protagonists should think about the certainty of a desired outcome, they introduced a scale asking if protagonists should underestimate, be accurate about, or overestimate the likelihood of an outcome. Using this measure, people did not prescribe overoptimism (in the form of overestimating). In fact, while some people prescribed accuracy, most prescribed pessimism (in the form of underestimating). Given the more directly interpretable nature of the scales introduced in Miller et al., (2021) we use the same measures in the present work.

**Prescriptions Across Roles and Outcomes in a Pandemic**

The prior work on prescriptions has utilized hypothetical scenarios where protagonists face desired outcomes. This is quite different from the present focus on how people during a pandemic prescribe that friends, family, and leaders should think about critical health-and-safety outcomes. Some of the outcomes were highly threatening (e.g., being hospitalized). Several had relevance to the futures of the public (e.g., respirator supply), not just an individual’s future. Also, the prescriptions that a respondent has for others during a pandemic might be influenced by anticipated consequences for the self. For example, someone who is asked to prescribe how a policy leader should estimate the risk of the public getting infected with coronavirus might be thinking ahead to how the leader’s estimate would influence policy. Similar examples could apply to how a respondent thinks about how a friend’s pessimism/optimism might ultimately change the respondent’s loneliness (if the friend avoids in-person contact) or personal safety (if the friend isn’t safety-conscious enough).

The examples just mentioned illustrate the general plausibility of finding differential prescriptions as a function of either roles, outcomes, or their interactions. We were also interested in the possibility of general trends toward prescribing either pessimism, realism, or optimism amid the pandemic, each of which was plausible.

First, people could show a widespread tendency toward prescribing that other people should estimate likelihoods with a negative (i.e., pessimistic) bias. This finding would broadly relate to work on how people’s attention can be drawn to potential negative outcomes, even leading to overestimations of the likelihoods of those outcomes (Bilgin, 2012; Harris, 2017). A negative bias in prescriptions might also be a form of encouragement for protective or preparatory behavior (Hazlett et al., 2011; Norem, 2001; Norem & Cantor, 1986).

Second, however, if there is ever a time for people to prescribe accuracy, a pandemic might be the time. People are most prone to view an event’s likelihood in realistic terms when the event is non-hypothetical and immediate (Armor & Sackett, 2006; Gilovich et al., 1993; Sweeny & Krizan, 2013). This might generalize to prescriptions about COVID outcomes of immediate relevance. Also, because other people’s beliefs about COVID uncertainties might be perceived as impacting one’s own outcomes, this might create more of a general premium for accuracy.

Third, perhaps under the stress and hardships of the pandemic, people might desire positive news so much that they would prescribe that people estimate the likelihoods in a positively-biased way. This would relate to the debated notion that people often let their own expectations about an outcome be wishfully-biased by desires for that outcome (Harris & Hahn, 2011; Krizan & Windschitl, 2007; Shepperd et al., 2013; Tenney et al., 2015; Weinstein, 1980; Windschitl & Stuart, 2015). It would be alarming but important to find that people widely endorse such wishful thinking as a prescription for others.

**The Current Research**

We report 5 studies that were conducted during the first period of lockdown. We collected the data for our first study, Study 1, on April 4th 2020, less than one month after the World Health Organization declared COVID-19 a global pandemic. There were approximately 75,000 confirmed cases at the time of initial data collection. Based on the findings of Study 1, we then designed and conducted Studies 2-5 concurrently over the month of April, during which time the number of diagnosed COVID-19 cases in the United States increased to over 1,000,000 confirmed cases by the completion of data collection.

Due to quarantine protocols, we employed Amazon Mechanical Turk workers based in the United States. Each study kept consistent the use of estimation-type prescription language by asking participants “How should [role] estimate the likelihood of [pandemic-related outcome] occurring?”

To preview the initial results, participants in the first study tended to prescribe pessimism across many roles and outcomes. That is, they wanted other people to underestimate the likelihood of positive outcomes and overestimate the likelihood of negative outcomes. Study 2 replicated Study 1. In Study 3, we used a question-juxtaposition method to highlight for respondents the meaning of prescriptions and their difference from perceptions of others’ behaviors. In doing so, the study eliminated alternative explanations for the earlier findings. Study 4 explored people’s explanations for pessimistic prescriptions, and Study 5 examined if findings of pessimistic prescriptions would generalize to a hypothetical future pandemic. All studies were preregistered on the Open Science Framework.

**Study 1**

Study 1 examined how participants think people with various roles relevant to both them and the pandemic should estimate the likelihood of pandemic-related outcomes occurring. That is, Study 1 was designed to test if people generally desired pessimistic, accurate, or optimistic estimation from others during the beginning of a pandemic, as well as if those prescriptions would vary depending on the role-outcome combinations.

**Method**

***Preregistration and Hypotheses***

Although we did not make directional predictions regarding these specific role-outcome combinations for Study 1, we preregistered that both role and outcome would have a differentiating effect on people’s prescriptions. The link for the Study 1 preregistration can be found here: https://osf.io/kqadx/?view\_only=604021fe25344b619759c501ada7264a.

***Participants and Design***

The key part of our design was a 6(Role) x 7(Outcome) within-subjects factorial. In addition, there was a 2-level between-subjects manipulation of the question-set structure. This resulted in a 6(Role) x 7(Outcome) x 2(Structure) mixed design. We preregistered a sample size of 120 participants, which given the within-subjects manipulations, far exceeds 80% power to test the main effects of interest as well as any potential role-outcome interactions. After one participant was excluded for failing the attention check,[[1]](#footnote-1) the final sample size was 122 Amazon Mechanical Turk participants located in the United States (43 women, 77 men, 2 unreported, *Mage* = 35.37, *SD* = 9.65). Participants who were recruited for this study and the following ones were excluded from participating in any of the other studies in this paper.

***Procedure***

Participants consented at the beginning of the study and completed a brief attention check. They then read a brief description of COVID-19, its symptoms, and a statistical estimate of the number of COVID cases in the United States. Next, they were given instructions that introduced the type of prescription measure they would encounter (for different roles and outcomes) and the response options. These instructions read:

*“Many of these questions we are going to ask you are asking how other people should think about COVID-19. In other words, for the outcomes that we ask about, do you think the person should underestimate the likelihood of the event occurring, accurately estimate the likelihood, or overestimate the likelihood of the event occurring?”*

An influenza item was used as an illustration, followed by further instructions regarding the interpretation of response options. After reading those, participants then completed sets of prescription measures (described in detail below). Lastly, they completed several sets of exploratory measures, as well as demographic questions, before being debriefed and provided with a code to receive payment.

***Prescription Measures***

The primary dependent variables were a series of prescription measures about each of the different role and outcome combinations. As overviewed earlier, the main prescription measure used estimation-type language as introduced in Miller et al. (2021). Below is an example of the wording of the prescription question that asked about “the average person in the United States” as a role and “contracting COVID-19” as an outcome.

*How should [the average person in the United States] estimate the likelihood of [contracting COVID-19]? In other words, what way of thinking would be advisable? An [average person] should the likelihood of [contracting COVID-19].*

The 5 response options had these labels: *Underestimate*, *Slightly underestimate*, *Accurately estimate*, *Slightly overestimate*, and *Overestimate*. The wording for the main prescription measures was always the same except for the bracketed sections, which specified the role and outcome.

**Roles and Outcomes*.*** Given that there were six different roles and seven COVID-19 related outcomes, each participant gave a total of 42 prescriptions. The six roles participants were asked to give prescriptions for were: a close friend, a family member, the average person in the United States, a public policy official who helps make national decisions about pandemics, a person in a leadership position responsible for communicating with the public, and “you” (the participant themself). The seven outcomes were: contracting COVID-19, being hospitalized because of COVID-19 symptoms, their state experiencing a shortage of respirators because of COVID-19, a vaccine for COVID-19 being ready and available within the next 12 months, a treatment to help COVID-19 symptoms becoming ready and available within the next 3 months, warmer weather reducing the spread of COVID-19, and that careers and education will be back to normal by September.

**Question Set Structure for the Prescription Measures.** Participants were randomly assigned to one of two conditions that determined the question-set structure. Half of the participants saw the prescription measures grouped by role (i.e., they saw questions for different outcomes in a series for a given role before seeing the next role). Half of the participants saw the measures grouped by outcome (i.e., they saw questions for different roles for a given outcome before seeing the next outcome). Within either condition, both the order of the individual measures within a given set and the order of the sets was always randomized, to reduce the influence of order effects. One exception to this overall set structure concerned prescriptions about the self. Because the self has a special status (e.g., Dunning & Hayes, 1996), we omitted the questions about the self-prescriptions from main question-set structures in both conditions; instead, participants answered the set of self-role questions as the last group of prescription measures, after they answered all other role-outcome combinations.

***Exploratory Measures***

After the main sets of prescription measures, there was a series of exploratory measures that are not of central interest here and will not be discussed further. See the materials on OSF for an overview of all exploratory measures included in Study 1.

**Study 1 Results**

***Data Processing***

Prescription responses were coded from -2 to +2, with 0 reflecting the midpoint of accurate estimation. For the three outcomes that had negative valence—contracting COVID-19, being hospitalized, and a respirator shortage—we reverse coded the responses so that the prescriptions for all outcomes had the same directional interpretation. Namely, values above 0 reflected prescriptions of optimism and values below 0 reflected prescriptions of pessimism. This scoring and interpretation scheme applies to all analyses below. See Supplementary Materials for the means and standard deviations across all role and outcome combinations.

***Grand Means for Prescriptions***

Recall that our first initial question of interest was if people generally prescribe optimism or pessimism in the face of uncertain pandemic-related outcomes. The grand average for the prescription measures across roles and outcomes was significantly lower than the midpoint of “accurately estimate”, (*M* = -0.32, *SD* = 0.57), *t*(121) = -6.15, *p* < .001, *d* = -0.56, 95% CI [-0.42, -0.22]. This result reveals that participants generally prescribed a pessimistic outlook about pandemic-related outcomes.

***Prescriptions by Role, Outcomes, and Questionnaire Structure***

Individual prescriptions were submitted to a 6(Role) x 7(Outcome) x 2(Structure) mixed ANOVA, with the question-set structure as the only between-subjects variable. The key results of interest—about roles and outcomes—are displayed in Figure 1 and reviewed shortly, but first we must consider whether structure mattered.

The main effect of structure was not significant and was small in magnitude, which suggests that participants did not give substantially different prescriptions as a function of the order in the prescription measures were encountered, *F*(1, 117) = 0.71, *p* = .402, ηp2 = .006. There was also not a significant two-way interaction between Structure and Role, *F*(3.83, 448.24) = 1.22, *p* = .301, ηp2 = .010, nor Structure and Outcome, *F*(2.22, 259.25) = 0.57, *p* = .581, ηp2 = .005.[[2]](#footnote-2) Lastly, there was not a significant three-way interaction between Role, Outcome, and Structure, *F*(18.85, 2205.39) = 1.41*, p* = .111,ηp2 = .012, thus we do not discuss the structure manipulation further.

Again, the key findings of interest regarding the role and outcome manipulations are displayed in Figure 1. In contrast to our hypothesis about the influence of roles on prescriptions, participants did not give significantly different answers as a function of who they were prescribing for, *F*(3.83, 448.24) = 1.34, *p* = .254, ηp2 = .011. However, participants did give significantly different prescriptions as a function of the different outcomes, *F*(2.22, 259.25) = 11.73, *p* < .001, ηp2 = .091. The last result of interest from the ANOVA was a non-significant Role x Outcome interaction, *F*(18.85, 2205.39) = 0.79, *p* = .716, ηp2 = .007, indicating that the differentiated prescriptions for each outcome did not vary by who participants were prescribing for.

Chart, line chart

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*Figure 1.* Plot of prescription means per role and outcome combination from Study 1. Each line plots the average prescription response per outcome for a given role. The dotted line at 0 represents a mean response of “accurate estimation”, while means significantly above 0 represent optimistically biased prescriptions and means below 0 represent pessimistically biased prescriptions. Error bars represent standard errors of the mean.

Post-hoc analyses revealed more about the differential prescriptions across outcomes. As is suggested by Figure 1, there were three outcomes for which the prescriptions were particularly pessimistic—contracting COVID-19, being hospitalized, and experiencing a respirator shortage. These outcomes are the three negatively valenced outcomes, and they arguably were also the most consequential and immediately relevant outcomes at the time of the study. Prescriptions for each of these three outcomes were significantly different from the scale midpoint (each on the pessimism side and each *p* < .001). When we created a post hoc grouping of these negatively valenced outcomes and compared prescriptions about them to prescriptions about the positively valenced outcomes, we found a significant difference, *t*(121) = 4.00, *p* < .001, *d* = 0.36, 95% CI of the difference [0.21, 0.63]. However, it is important to note that prescriptions for two of the positively valenced outcomes (vaccine developments and warmer weather decreasing spread) were also significantly pessimistic (i.e., below the midpoint; *p* = .044 and *p* = .016, respectively). That is, for five of the seven outcomes, prescriptions were significantly pessimistic. For the remaining two outcomes, which concerned treatment developments and the education/career outcomes, participants generally prescribed accurate estimation, with the mean(s) not significantly differing from the midpoint, *p* = .214 and *p* = .728 respectively.

Figure 2 displays violin plots per outcome but collapsed across the roles (for which the ANOVA results were not significant). These plots show more about the distribution of participants—in terms of whether their mean prescription for a given outcome (across roles) was pessimistic, accurate, or optimistic. For example, the plots show that the medians were below the scale midpoint for the three negatively valenced outcomes. That is, for over 50% of participants, their average prescription (across roles) fell on the pessimistic side of the scale (the respective proportions were 74.6%, 68.9%, and 68% for the three outcomes on the left of the plot). Furthermore, the fact that the top indicator for the interquartile ranges for those outcomes is at the midpoint reveals that only approximately a quarter of participants prescribed optimistic estimates for those outcomes.

Diagram, engineering drawing

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*Figure 2.* The distribution of mean prescription responses per outcome, aggregated across roles, in Study 1. In each violin plot, the circle symbols and error bars indicate the estimated mean(s) and 95% confidence intervals; the black dotted line indicates the median. The shaded areas indicate the distribution of the means, with means at 0 representing “accurate estimation”, means significantly above 0 representing optimistically biased prescriptions and means below 0 representing pessimistically biased prescriptions. The top and bottom lines in each plot indicate the 25th and 75th percentiles of the distribution, respectively.

**Study 2**

Study 2 acted as a replication of Study 1 and was important for various reasons concerning the stability of the results—for example, whether the three events that elicited pessimistic prescriptions in Study 1 would elicit the same in a replication. Study 2 also included extra instructions and checks designed to ensure that participants were accurately understanding the meaning of the prescription questions.

**Study 2 Method**

***Design, Participants, and Preregistration***

Study 2 had the same 6(Role) x 7(Outcome) x 2(Structure) mixed design as Study 1. We preregistered a sample size of 150 MTurk participants (OSF link: https://osf.io/4afmh/?view\_only=90acffbc60244062834347ba97276b1e). After all sessions were completed and one participant was excluded for failing the attention check, the final sample size was 153 participants (55 women, 93 men, 5 unreported, *Mage* = 37.55, *SD* = 11.06). Given the within-subjects manipulations, this far exceeds 80% power to test our effects of interest.

***Procedure and Measures***

The procedure and measures used in the main part of the study were identical to those in Study 1 except for instructional changes.[[3]](#footnote-3) To ensure that participants were interpreting the prescription measure in the way that we anticipated they would, the additional instructions expanded on those used in Study 1:

*The questions in the first part of this survey ask how people should think. For events related to COVID-19, we will ask your views on how people should estimate the likelihoods of events. For a given event....*

*Should they* ***underestimate*** *the likelihood of the event?*

*or*

*Should they* ***accurately******estimate*** *the likelihood of the event?*

*or*

*Should they* ***overestimate*** *the likelihood of the event?*

*We want to know what you think is most advisable.*

Participants were also required to confirm their understanding of the instructions by answering a multiple-choice question about how to interpret the prescription measure.

“*Please confirm your understanding of these instructions. We want to know your view on how people \_\_\_\_\_\_\_\_ think*.” (*currently*, *will*, *used to*, *should*, and *want to)”*

Participants who answered incorrectly (*n* = 44) were told that they were incorrect and were given a reminder about the meaning of the prescription measure before continuing on with the study, while participants who answered correctly (*n* = 109) were told they were correct before proceeding.

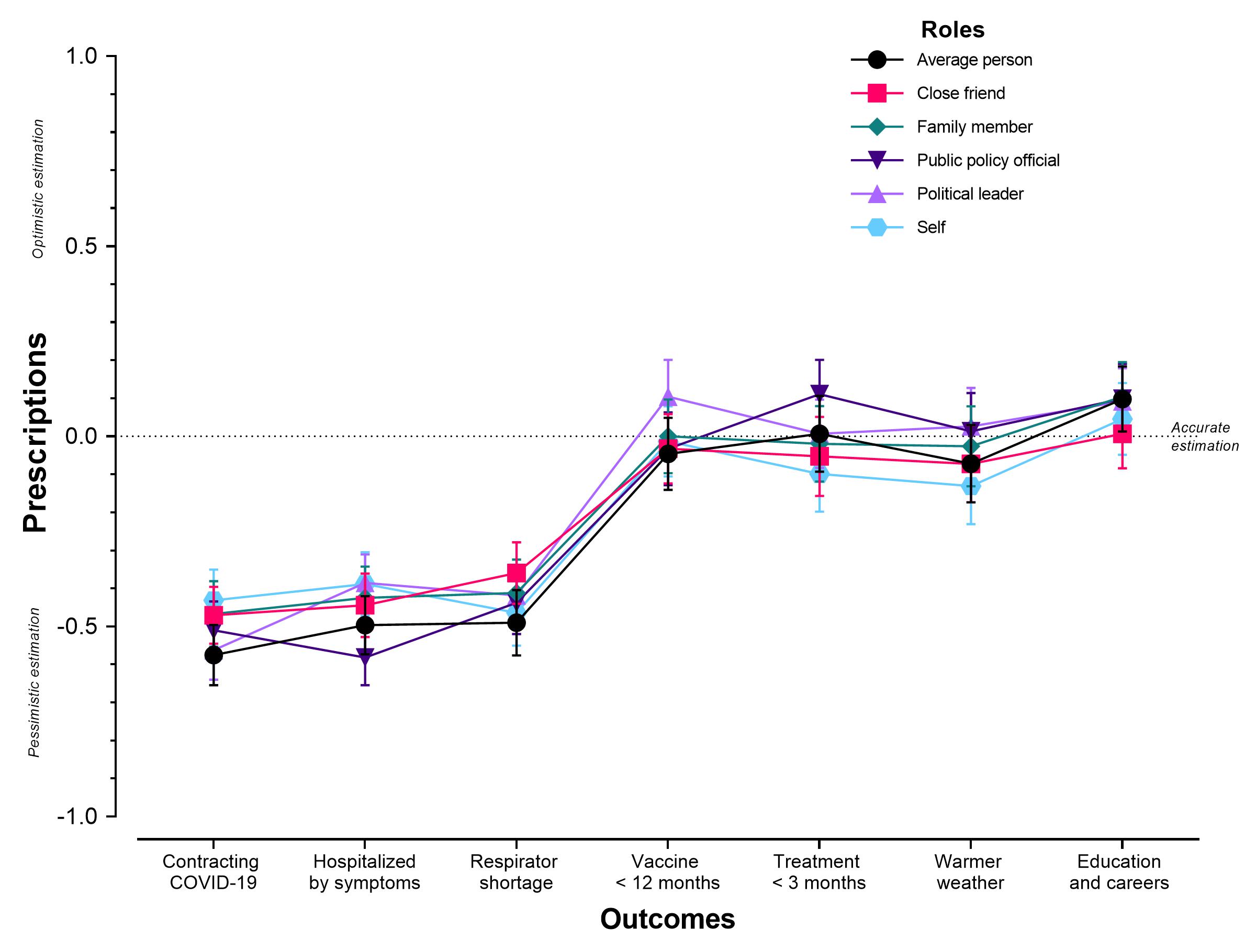
**Study 2 Results**

See Supplementary Materials for the means and standard deviations across all role and outcome combinations. After scoring and coding the data in the same manner as in Study 1, we tested the grand mean of the prescriptions. Across the sample, participants generally prescribed pessimism, as they did in Study 1. That is, the average prescription (*M* = -0.19, *SD* = 0.51) was significantly below the midpoint of “accurately estimate”, *t*(152) = -4.74, *p* < .001, *d* = -0.38, 95% CI [-0.28, -0.11].

Next, we submitted the prescription responses to a 6(Role) x 7(Outcome) x 2(Structure) mixed ANOVA. As with Study 1, we were able to discount the structure factor, because it did not produce a significant main effect, *F*(1, 142) < 0.01, *p* > .999 , ηp2 < .001, nor was Structure involved in any significant two- or three-way interactions (all *p*s > .20).

See Figure 3 for a plot of the means relevant to the Role x Outcome part of the factorial analysis. It is very similar to that for Study 1. Participants again did not prescribe different degrees of pessimism based on who they were prescribing for, *F*(4.14, 587.33) = 0.96, *p* = .429, ηp2 = .007, but they did differentially prescribe based on what outcome they were prescribing about, *F*(1.71, 243.04) = 13.11, *p* < .001, ηp2 = .085. The Role x Outcome interaction was again not significant, *F*(20.30, 2882.77) = 1.12, *p* = .317, ηp2 = .008. In short, all the main findings from Study 1 replicated in Study 2.

Post-hoc analyses revealed that participants were differentially prescribing across outcomes in a similar pattern as in Study 1. That is, participants prescribed pessimism for the three negatively valenced outcomes— contracting COVID-19, being hospitalized, and experiencing a respirator shortage— each of which was significantly below the midpoint. In contrast, participants prescribed accurate estimation for the other four positively valenced outcomes. That is, the means of the prescriptions for outcomes about vaccination, treatment, warmer weather, and education/careers were not significantly different from the midpoint of the scale (all *p*s > .30). Finally, see violin plots in Figure 4, which are like those from Study 1.

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*Figure 3.* Plot of prescription means per role and outcome combination from Study 2 (*N* = 153) Each line plots the average prescription response per outcome for a given role. The dotted line at 0 represents a mean response of “accurate estimation”, while means significantly above 0 represent optimistically biased prescriptions and means below 0 represent pessimistically biased prescriptions. Error bars represent standard errors of the mean.

Diagram, engineering drawing

Description automatically generated

*Figure 4.* The distribution of mean prescription responses per outcome, aggregated across roles, in Study 2. In each violin plot, the circle symbols and error bars indicate the estimated mean(s) and 95% confidence intervals, respectively; the black dotted line indicates the median. The shaded areas indicate the distribution of the means, with means at 0 representing “accurate estimation”, means significantly above 0 representing optimistically biased prescriptions and means below 0 representing pessimistically biased prescriptions. The top and bottom lines in each plot indicate the 25th and 75th percentiles of the distribution, respectively.

**Discussion for Studies 1 and 2**

Studies 1 and 2 suggest that people generally think others should be pessimistic-leaning in their judgments about COVID-related outcomes. In the context of a global crisis like a pandemic—a situation with serious individual and societal consequences—it is notable that participants often desired misestimation instead of accurate estimation.

The results of both studies revealed that participants did not provide substantially different pandemic prescriptions based on *who* they were prescribing for, but rather they differed based on *what* they were prescribing about. Specifically, people seemed to prescribe more pessimism for the three negatively-valenced, immediately consequential outcomes than the four other outcomes that were positively-valenced and less immediately consequential. This finding about how prescriptions differed could be tied to different facets of the outcomes themselves, such as the valence differences, the importance differences, immediacy differences, or a combination of them. Our studies didn’t attempt to disentangle specific contributions of these factors,[[4]](#footnote-4) and instead explored three concepts: determining if pessimistic prescriptions persisted under different testing conditions (Study 3), examining justifications for prescribing pessimism (Study 4), and testing if the findings generalized to prescriptions about future virus-vulnerability outcomes (Study 5).

**Study 3**

Study 3 examined if people draw a distinction between how they think others *should* estimate pandemic-related outcomes and how others are actually estimating the outcomes. We asked participants a pair of measures for each role-outcome combination: the same prescription measure and a *current-estimation* *measure*, which asked participants how they thought various roles were currently estimating the likelihoods of outcomes. By having participants answer a prescription and a current-estimation measure in tandem, participants were repeatedly reminded of the difference in the focus or meaning of these two items. In other words, the juxtaposition of the two measures ensured that participants were interpreting the prescription measure as asking how others “should” estimate, not how they are currently estimating, which is critical for knowing if people truly prescribe pessimism to others during the beginning stages of the pandemic.[[5]](#footnote-5)

Our key preregistered predictions were that people would again prescribe that people be pessimistic in how they estimate likelihood (replicating Studies 1 and 2), but also that people would answer the prescription and current-estimation measures differently. Specifically, we hypothesized participants would say people should be more pessimistic than they are currently being.

**Study 3 Method**

***Design, Participants, and Preregistration***

Study 3 had a 4(Role) x 5(Outcome) x 2(Question Type) completely within-subjects design. We preregistered a sample size of 100 participants (link: https://osf.io/wg72q/?view\_only=9bfc6a2640fa49149919187f9c3aeb49), which resulted in a final sample size of 102 MTurkers (72 men, 27 women, 3 unreported, *Mage* = 35.88, *SD* = 9.57). Given our completely within-subjects design, this ensured that we had well beyond 80% power to examine the effects of interest.

***Roles and Outcomes***

We used a slightly abbreviated list of four roles and five outcomes in Study 3. The four roles were the self, close friend *and* family member, an average person in the United States, and a public policy official. The five outcomes were: contracting COVID-19, hospitalized because of COVID-19, a respirator shortage, a vaccine becoming available within 12 months, and careers/education returning to normal.

***Procedure and Measures***

The procedure started like those for Studies 1 and 2. However, in contrast to the previous studies, Study 3 used a pair of measures for each role-outcome combination. Participants were introduced to these measures with instructions explaining that they would see two different types of questions, the first asking how people should think and the second asking how people currently think. These instructions can be found verbatim in the Open Materials (https://osf.io/u28s5/?view\_only=b155f0e52ee24d9ba114a0246e65952c).

Then, for each role-outcome combination, participants were presented with both measures on a single screen, with the prescription measure always presented first and the current-estimation measure second. To reduce any chance of participant confusion between the measures, each question was preceded by a heading in large, bold font that identified which of the two types of measures it was. Specifically, the prescription measure was preceded by the heading “Should.” The prescription measure itself was the same as in Study 1. Here is an example:

*How should [the average person in the United States] estimate the likelihood of [contracting COVID-19]? In other words, what way of thinking would be advisable? An [average person] should \_\_\_\_ the likelihood of [contracting COVID-19].*

The current-estimation measure was preceded by the heading “Currently.” An example of the current-estimation measure follows:

*How is [the average person in the United States] currently estimating their own likelihood of [contracting COVID-19]? The [average person] currently \_\_\_\_\_(s) their own likelihood of [contracting COVID-19].*

Both the prescription and current-estimation measures were answered on a 5-point scale with the anchors *Underestimate*, *Slightly underestimate*, *Accurately estimate*, *Slightly overestimate*, and *Overestimate*. The 20 pairs of measures appeared in an order that was uniquely randomized per participant. Lastly, participants completed exploratory measures (see Open Materials) before being debriefed and given the code for payment.

**Study 3 Results**

***Data Processing***

We applied the coding schemes used for the prescriptions in the previous studies to both the prescription- and current-estimation responses. That is, both types of responses were coded to -2 to +2, with 0 reflecting the midpoint of accurate estimation. Responses for the three outcomes that were negatively valenced were reverse coded. These coding steps ensured that the directional interpretation of values above and below 0 are the same across outcomes and question types: values above 0 are optimistic and values below 0 are pessimistic. See Supplementary Materials for the means and standard deviations across all role and outcome combinations.

***Do the Patterns of Prescriptions from Studies 1 and 2 Replicate?***

We first examined whether the general findings from Studies 1 and 2 replicated in this study. The grand average for the prescription measures across role and outcomes was significantly lower than the midpoint of “accurately estimate”, (*M* = -0.28, *SD* = 0.46), *t*(101) = -6.17, *p* < .001, *d* = -0.61, 95% CI[-0.37, -0.19]. That is, participants generally prescribed pessimism, as in the previous studies.

A 5(Outcome) x 4(Role) repeated-measures ANOVA on just the prescription measures revealed that, also as in the previous studies, prescriptions did not differ according to the role participants were prescribing for, *F*(2.66, 260.98) = 1.70, *p* = .172, ηp2 = .017. Also, again, the outcome main effect was significant, *F*(1.96, 192.22) = 51.20*, p* < .001, ηp2 = .343. Participants prescribed pessimism for contracting COVID-19, being hospitalized, and a respirator shortage (all *p*s < .001). Meanwhile, participants prescribed optimism for the two outcomes of a vaccine becoming available and education/careers returning to normal, *t*(101) = 3.10, *p* = .003, *d* = .307, 95% CI [0.10, 0.45] and *t*(101) = 2.91, *p* = .004, *d* = .288, 95% CI[0.08, 0.42], respectively. This is slightly different than in Study 1, where the means for those two items were different from the other three but not on the optimistic side of the scale.

Lastly for the prescriptions, there was a small but significant Outcome x Role interaction, *F*(9.79, 959.14) = 1.99, *p* = .032, ηp2 = .020. This differs from the nonsignificant interactions we found in Studies 1 and 2. It is an unexpected finding that might be attributable to noise and is not discussed further.

***Full Analyses***

The full preregistered analyses consisted of a 4(Role) x 6(Outcome) x 2(Question Type) repeated-measures ANOVA. See Figure 5 for the main patterns of results.

Critically, there was a difference between responses to the prescription measure compared with responses to the current estimation measure. That is, there was a significant main effect of question type, *F*(1, 98) = 21.77, *p* < .001, ηp2 = .182. As we overviewed above, participants generally prescribed pessimism, but importantly, participants perceived others to be estimating accurately, as the mean of the estimation measure was not significantly different than the midpoint, (*M* = 0.02, *SD* = 0.36), *t*(101) = 0.62, *p* = .540, *d* = 0.06, 95%CI [-0.05, 0.09]. In other words, they technically desire for others to be inaccurate (i.e., overestimate negative outcomes and underestimate positive outcomes), despite thinking that other people have generally been accurate in their estimation.

Next, we can examine if prescriptions and perceptions differ based on who people are prescribing for. Although there was a main effect of role, *F*(2.68, 262.80) = 6.07, *p* < .001, ηp2 = .058, it was qualified by a significant interaction with the type of question answered, *F*(3, 294) = 4.68, *p* = .003, ηp2 = .046. Figure 3 again shows the pattern of the results. Post-hoc analyses revealed that participants thought that every role *should* be pessimistic in how they estimated likelihoods, but that only the participants themselves were *currently* being pessimistic, *t*(101) = -3.43, *p* < .001, *d* = -0.34 , 95% CI[-0.25, -0.07]. They perceived both their close friend/family members and public policy officials to be accurately estimating, *t*(101) = 1.27, *p* = .206, and *t*(101) = 0.76, *p* = .449, respectively, and they thought that the average person was even being slightly optimistic in their likelihood estimates about COVID-19 related outcomes (*M* = 0.13, *SD* = 0.57), *t*(101) = 2.35, *p* = .021, *d* = 0.23, 95% CI [0.02, 0.25].

In a similar fashion as role, we now turn to examining the influence of the different pandemic-related outcomes. There was again a main effect of outcome, *F*(4, 392)= 46.71, *p* < .001, ηp2 = .323, but importantly there was also a significant interaction between question type and outcome, *F*(2.14, 209.86) = 4.12, *p* = .016, ηp2 = .040. Post-hoc analyses showed that participants said that people should be more pessimistic than they currently are about COVID-19 (*p* < .001), hospitalization (*p* < .001), and a respirator shortage (*p* < .001), but they did not perceive any difference between how others should be and currently are estimating the likelihood of a vaccine (*p* = .057) and their education/careers returning to normal (*p* = .369).

**Study 3 Discussion**

Study 3 replicated the key findings of Studies 1 and 2. More importantly, it also revealed that people’s prescriptions for others were different from their beliefs about how those others were currently thinking. This implies, in essence, that participants wanted other people to change to a more pessimistic bias in how they estimated the likelihood of the pandemic-related outcomes. Exploratory follow-up analyses calculated the frequency of participants who believed that other people should be more optimistic than they currently are. Approximately fifty percent of participants in each outcome thought that other people should be estimating outcomes more pessimistically (*Mpercent* range:46.1- 54.9). In fact, across the whole sample, only seven out of 102 participants did not prescribe an increase in pessimism for at least one of five outcomes, indicating a widespread belief that other people were being more optimistic than they should be at that stage in the pandemic.

Lastly, the findings of Study 3 also ruled out a superficial explanation for the previous results. Participants were not interpreting the prescription measure as asking how people are currently estimating, as we would have expected a non-significant difference between the question types if that were the case. This combination of results from Study 3 allows us to make a two-fold conclusion: not only were people desiring pessimistic estimations, but they also thought people were being more optimistic about the pandemic than they should be.

Chart

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*Figure 5.*  Plot of means per role and outcome combination for both the prescription measures and current estimation measures from Study 3. Each line on the graph on the left represents the average prescription response per outcome for a given role, while each line on the graph on the right represents the average current estimation response per outcome for a given role. For both, the dotted line at 0 represents a mean response of “accurate estimation”, while means significantly above 0 represent optimistically biased prescriptions/current estimations and means below 0 represent pessimistically biased prescriptions/current estimations. Error bars represent standard errors of the mean.

**Study 4**

Earlier, we speculated why people might prescribe pessimism. One idea is that people might tend to be overly cautious or negative when estimating likelihoods because this bias encourages protective or preparatory behavior (Hazlett et al., 2011; Norem, 2001). People might prescribe this strategy for various others across many pandemic outcomes. Are people aware of this or other strategies? Study 4 examined justifications that people give for their prescriptions by simply asking people to explain why they gave the prescriptions they gave. Because these prescriptions are beliefs, asking people to explain their beliefs was a productive window into why people sometimes prescribe pessimism. We considered this study to be exploratory, thus although we preregistered the procedure, materials, and sample size, we did not preregister hypotheses.

**Study 4 Method**

We preregistered a sample size of 30 participants on the OSF (link: https://osf.io/y5qt7/?view\_only=6f8d39744fe749eca89fe213a42974a5) and initially collected a sample of 38 participants. After excluding those who either did not answer the open-ended responses or who provided incoherent responses, we were left with 30 participants (23 men, 7 women, *Mage* = 43.30, *SD* = 15.42).

Study 4 used the same type of prescription measures as in Studies 1 and 2, but we greatly scaled down the numbers of prescriptions being solicited. Participants were randomly assigned to answer six prescriptions from a truncated list of a possible 12 different role-outcome combinations. This list included four different outcomes (i.e., contracting COVID-19, state running out of respirators, vaccine being ready and available within 12 months, and education/jobs being back to normal by September) and three roles (i.e., the average person in the U.S., a public policy official, and a close friend/family member).

After participants provided their answer for a given prescription, they were immediately presented with a text box asking them to explain their thought process behind why they answered the prescription the way they did (i.e., “*Why? Please write a brief explanation of your thought process leading to your answer*”). After doing this for each of the six prescriptions, they were asked additional open-ended exploratory measures (see Open Materials for details) before demographic questions and debriefing.

**Study 4 Results**

***Prescription Results***

As in the previous studies, answers to prescription measures were coded on a -2 to +2 scale, such that responses above 0 indicated optimism, responses at 0 reflected accurate estimation, and responses below 0 reflected pessimism.

On average, the prescriptions were pessimistically biased, with a grand mean significantly below the midpoint of 0, (*M* = -0.54, *SD* = 1.26), *t*(178) = -5.68, *p* < .001, *d* = -0.85, 95% CI [-0.72, -0.35]. In fact, only 39 out of the 180 prescriptions, or approximately 22%, were on the optimistic side of the scale, while the rest of the prescriptions were for either accurate estimation (28%) or pessimistic estimation (50%). Because we used a truncated list of prescriptions with a smaller sample size, we did not preregister or run any inferential analyses to assess if there were any effects of the role or outcome manipulations on prescription responses.

***Coding Results for Written Responses***

Given that 30 participants gave reasons for six prescriptions, we had 180 open-ended responses. In a preliminary phase, we identified six general themes that appeared among prescription responses. The different themes included: a desire for others to use data and facts to inform their predictions, expressions of uncertainty about the future, a desire to increase others’ engagement in protective or preventative behaviors, a desire to increase positive affect (e.g., hope, happiness), concern about negative affect (e.g., fear, anxiety), and lastly, expressions of concern about the consequences for society (e.g., economic concerns, political motivations, etc). We then had a team of undergraduate research assistants, who were blind to the results of the other studies, code each of the 180 responses into one of 7 categories based on the main theme of each response (the seventh category was “Other/None). See Table 1 for a summary of the percentages of responses within each category as well as examples. Over 80% of the open-ended responses were able to be coded into one of the seven main categories, with the remainder coded as other/none.

Although the nature of this study and its sample size does not lend itself to similar inferential analyses as in Studies 1-3, there were notable descriptive patterns found among the reasons cited by participants. The most frequent reason cited was a desire to increase others’ prevention and protection behaviors. Specifically, 28.9% of the 180 responses focused on this rationale. Among responses for pessimistic prescriptions (n=90), this percentage was 41%. For example, when asked about their prescription for how the average person should estimate the likelihood of getting sick with COVID-19, several participants who gave pessimistic prescriptions said that it would make people engage in specific pandemic-related preventative behaviors like mask-wearing and social distancing. One participant responded that “Overestimating [contracting COVID-19] might keep them being proactive and safe.” Also, of the 30 participants, 70% mentioned this type of rationale at least once (i.e., to increase others' engagement in protective or preventative behaviors).

Aside from preventative behaviors, the next most common reason(s) mentioned by participants were expressions of uncertainty about the future, as well as a desire to increase positive affect, or said differently, wanting other people to have hope. See Table 1 for specific examples for these and all the seven categories.

Overall, the results from the written responses reveal that a non-trivial proportion of prescriptions seemed to be strategically motivated by a desire for other people to either maintain or increase their level of preventative and cautionary behaviors to protect themselves and others from becoming infected with COVID-19.

**Study 5**

Our COVID-19 related findings could be beneficial to policymakers facing new pandemics. If policy makers know that people generally value caution over optimism—in other people across many roles, including the policy-making role—this might change policy considerations for how proactive to be in addressing a public health threat. As a step toward assessing the generalizability of our findings, in Study 5 we asked people for prescriptions about contracting a virus in three different domains: the current COVID-19 pandemic, a typical influenza season, and a hypothetical future pandemic.

Although we had no concrete directional hypotheses about domain differences, we preregistered possible patterns of results that one could expect to see. It is plausible that people would prescribe pessimism across all three domains, which would clearly support the generalizability of the previous findings. However, another possible pattern could reflect that prescriptions about the two pandemic-related domains differ from those for a typical influenza season. This pattern is plausible because of the novelty of a pandemic. People often think about novel risks— risky situations they have never encountered before or do not have personal experience with— differently than how they think about more “common” risky situations (Costa-Font et al., 2009; Dolinski et al., 1987; Rudisill, 2013; Weinstein, 1987, 1989). People’s lack of experience with pandemics (at the time of data collection) compared to the annual commonness of a typical influenza season could be reflected in differences in prescriptions across the outcomes.

Although we did not expect that a roles manipulation to show a main effect or interact with domain, we thought including various roles seemed worthwhile given the applied importance of those roles and to check that any patterns were generalizable across them.

**Study 5 Method**

***Design, Participants, and Preregistration***

We used a 3(Domain) x 4(Role) x 6(Counterbalancing) mixed design, with the domain-counterbalancing manipulation acting as the between-subjects factor (see “Procedure, Measures, and Counterbalancing” section below). Other than counterbalancing of domains, it was a completely within-subjects design. We preregistered a sample size of 100 participants (link: https://osf.io/2ztbm/?view\_only=26b794679d954768865fdad60fa77d8d), which resulted in a final sample size of 102 MTurk participants, (*Mage* = 34.69 years, *SD* = 9.90; 72 men, 29 women, 1 not reported).

***Domains and Roles (and Outcomes)***

For the3(Domain) x 4(Role) components of the design, the three domains were: COVID-19, a typical influenza season, and a hypothetical future pandemic. The four roles were: the self, an average person, a close friend/family member, and a public policy official. This led to a set of 12 prescriptions as our primary dependent variables. For each of these 12, the prescriptions were always about the same type of outcome—contacting the relevant virus. Henceforth, we will refer to these responses as the *virus-contracting prescriptions*. Aside from these 12 main dependent measures, there were 1-2 others tucked within each of the domain sets (see next section for more information).

***Procedure, Measures, and Counterbalancing***

After the consent process, participants were saw a basic bot check (i.e., a simple addition problem). Next, they read instructions that introduced the nature of the prescription measures (akin to Study 2), as well as completed an instruction check about their understanding of the prescription measures. Participants who answered incorrectly (*n* = 22) were told that they were incorrect and were given a reminder about the meaning of the prescription measure before continuing with the study, while participants who answered correctly (*n* = 80) were told they were correct before proceeding.

They were then randomly assigned to one of six counterbalancing conditions that determined the order in which they would encounter the 3 domain sets. A given participant had a 1/3 chance of seeing a given domain first. Before beginning the measures in any domain, participants were shown a brief description of the relevant virus (e.g., COVID-19, the flu, or a hypothetical future pandemic). Then participants answered all the prescription measures for that domain—in randomized order—before starting the next domain.

For soliciting the virus-contracting prescriptions, we adopted the type of prescription questions used in Studies 1 and 2, and we made the wording parallel across the roles and each of the three domains. As one example, for the question about the average-person role in the influenza domain, participants were asked: *How should the average person in the United States estimate their own likelihood of contracting the flu during a typical flu season*? As in the previous studies, the answer options were always: *Underestimate*, *Slightly underestimate*, *Accurately estimate*, *Slightly overestimate*, and *Overestimate.*

As already noted, aside from these 12 main dependent measures, there were 1-2 others tucked within each domain set. Specifically, for each domain, there was a prescription question about how a public policy official should estimate the likelihood of a respirator shortage. For the two pandemic domains, we also asked how a public policy official should estimate the likelihood of vaccines becoming available in under a year from the start of the pandemic. See the Open Materials for the exact wording.

After completing all prescription measures, participants answered a brief series of additional measures (See Open Materials for the full list) before being thanked, debriefed, and provided the MTurk code for payment.

**Study 5 Results**

***Data Processing***

As in the other studies, the prescriptions were coded from -2 to +2, with above the midpoint of 0 reflecting optimism, 0 reflecting accurate, and below 0 reflecting pessimism.

***Analyses on the 12 Virus-Contracting Prescriptions***

The counterbalancing factor did not substantially influence the interpretation of any main results.[[6]](#footnote-6) For this reason, we do not discuss it further.

The grand mean for the virus-contracting prescriptions (collapsed across domain and roles) was significantly below zero (*M* = -0.62, *SD* = 0.51), *t*(101) = -12.16, *p* < .001, *d* = -1.20, 95% CI[-0.72, -0.52]. This suggests overall tendency toward pessimistic prescriptions as to the likelihood of contracting a virus.

Figure 6 displays the main pattern of results. In the 3(Domain) x 4(Role) x 6(Counterbalancing) ANOVA, there was a significant main effect of domain, *F*(2, 194) = 4.64, *p* = .011, ηp2 =.046. Participants prescribed a higher degree of pessimism for COVID-19 infection (*M* = -0.70, *SD* = 0.65) than an influenza infection (*M* = -0.50, *SD* = 0.53), *p* = .020, 95% CI of the difference [-0.36, -0.02]. However, participants thought others should estimate the likelihood of an infection resulting from a hypothetical future pandemic in a similar fashion as the likelihood of contracting a COVID-19 infection (*M* = -0.64, *SD* = 0.69), *p* =.162, 95% CI of the difference [-0.29, 0.34]. Critically, the level of prescribed pessimism was significant for each of the three domains (all *p*s < .001 against the midpoint of accurately estimate). This shows that participants are relatively consistent in their prescriptions about pandemic outcomes, even if they are not being asked about a present-day crisis.

Participants did not significantly differ in the level of pessimism they prescribed across the four roles, *F*(2.75, 266.31) = 0.22, *p* = .867, ηp2 = .002. Participants prescribed that for all roles—no matter if it was the self, a close friend or family member, or a public policy member—people should make pessimistic likelihood judgments about contracting a virus (all *p*s < .001). The two-way interaction between Domain and Role was also not significant, *F*(5.31, 515.11) = 0.542, *p* = .755, ηp2 = .006. See Supplementary Materials for the means and standard deviations for the virus-contracting prescriptions across each of the roles per the three domains.

***Analyses on the Additional Prescription***

In addition to the 12 prescriptions about contracting a virus, recall that participants answered—for each domain—about how a public policy person should estimate the likelihood of a respirator shortage occurring. Generally, participants indicated that public policy members should overestimate the likelihood of a respirator shortage, *M* = -0.61, *SD* = 0.71, *t*(101) = -8.71, *p* < .001, *d* = -0.86, 95% CI [-0.75, -0.47], or in other words, be pessimistic about it occurring. A repeated-measures ANOVA showed that there was not a statistically significant difference across the domains in the degree of pessimism prescribed to public policy members about a respirator shortage, *F*(1.75, 176.46) = 1.30, *p* = 0.274, ηp2 = .013.

We also asked two prescriptions—one each in the COVID-19 and hypothetical-future-pandemic domains—about how public policy people should estimate the likelihood of vaccines becoming available in under a year from the start of the pandemic. Similar to our results from previous studies, participants tended to endorse more optimism for the positively-valenced outcome of vaccine availability than they did the other outcomes. In fact, participants prescribed slightly overestimating the likelihood of a vaccine becoming available within twelve months, (*M* = 0.22, *SD* = 0.96), *t*(101) = 2.28, *p* = .025, *d* = 0.22, 95% CI of the difference [0.28, 0.40]. There was no significant difference in vaccine prescriptions between the domains of COVID-19 (*M* = 0.25, *SD* = 1.06) and a hypothetical future pandemic (*M* = 0.19, *SD* = 1.11), *t*(101) = 0.58, *p* = .566, *d* = 0.06, 95% CI [-0.14. 0.26].

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*Figure 6.* Participants from Study 5 (*N* = 102) answered prescriptions about contracting a virus in each of three domains: a typical influenza season, the COVID-19 pandemic, and a hypothetical future pandemic. Each line plots the average prescription response for a given role. The dotted line at 0 represents a mean response of “accurate estimation” while the means below 0 represent pessimistically biased prescriptions. Error bars represent standard errors of the mean.

**Discussion for Study 5**

The results from the COVID-19 domain in Study 5 replicated a key finding from the previous studies. When we asked how people should estimate their risk of contracting COVID, people’s prescriptions were pessimistic for all possible roles. Crucially, results from the other domains from Study 5 suggest that this clear tilt towards pessimism was not something that is specific to how people think about COVID. Prescriptions of pessimism were observed when people were asked both about estimating the risk of contracting a future pandemic virus and a typical influenza virus. In the additional prescriptions answered specifically for public policy officials, we again saw results that fit with our previous findings. People’s prescriptions were generally pessimistic for the more immediate and highly negative problem of a respirator shortage, but not for the more distant and positive event of developing a vaccine within twelve months. These results suggest that, at least for the negative outcomes that might be associated with future public health threats, the general public favors caution, not positivity, in estimating risks.

**General Discussion**

In the burgeoning of a global pandemic, there is a great deal of uncertainty. And there can be a great deal of variation in how that uncertainty is thought about and understood by both experts and the general public (Dieckmann et al., 2015; Gregory et al., 2012). The present work investigated how people wanted others to think about COVID-related uncertainty—specifically whether they wanted others to estimate risks with a pessimistic bent, with accuracy, or with an optimistic bent.

People are widely described as optimistically biased (e.g., Armor & Taylor, 2002; Helweg-Larsen & Shepperd, 2001; Sharot, 2011; Simmons & Massey, 2012; Weinstein, 1980; for an overview, see Windschitl & Stuart, 2015). Work on the unrealistic optimism bias, for example, shows that people tend to think they are less likely to experience negative events than are others (e.g., Burger & Palmer, 1992; Perloff, 1987, Weinstein, 1980). People also show preferences for others who are optimistic rather than pessimistic (Carver et al., 1994; Helweg-Larsen et al., 2002; Hoorens et al., 2017). Given all this, the present results might come as a surprise because for key negative events, people did not want others to estimate relevant likelihoods in a positively biased way. That is, people did not prescribe optimism for the dangers. They did not prescribe it for anyone—not for themselves, friends, family, the average person, policy makers, or politicians. In fact, for estimating the likelihoods of three of the most critical and immediate outcomes discussed at the time—getting COVID, being hospitalized, and experiencing a respirator shortage—people prescribed pessimism.

Critically, the main dependent variables in our work did not include words like “optimistic” or “pessimistic,” which were included in initial research on prescriptions (Armor et al., 2008). In recent work, we noted that such terms are flexibly construed and can differ in both colloquial and scientific interpretations (Miller et al., 2021; also see Cusimano & Lombrozo, 2021 for related discussion). The term “optimistic” could, for example, be interpreted to reflect a positive mood, a hopeful spirit, or a focus on a valued outcome. Therefore, it is possible for people to generally endorse optimism even if they would prescribe that people estimate likelihoods in a realistic or even pessimistic way. Our prior work made that point in a paradigm in which people were asked to make prescriptions for protagonists in hypothetical scenarios. The present findings—about prescriptions for various forecasters about subevents in a global crisis—greatly extend that prior work.

Participants in the present studies were not uniformly in favor of pessimistic prescriptions. This is true in two ways. First, there was considerable individual differences. In Study 1, for example, although approximately 70% of participants tended to prescribe pessimistic estimates for the three critical negatively-valenced events, this means that 30% did not. Second, for some events, the majority of prescriptions were not pessimistic. Whereas prescriptions were reliably on the pessimistic side for the most near-term, negatively-valenced events, when we asked about events that were more distant in time and/or positive in valence, prescriptions varied from being significantly pessimistic in some instances (Study 1) to slightly yet significantly optimistic in other instances (e.g., Study 3).

The open-ended explanations that people gave for their prescriptions in Study 4 offer insight into the reasons why pessimistic prescriptions were favored for the most severe events. Namely, people may have wanted to increase others’ prevention and protection behaviors. This was the most frequent category of explanation that people gave in that study, and they were more likely to offer that explanation when they were explaining their prescription for present-term, negatively-valenced outcomes than more distant, positively-valenced outcomes. Although more empirical work is needed to establish motivation to change others’ behaviors as a causal mechanism, the general notion is supported by previous examinations of how loss asymmetries bias judgments of negative events (Harris et al., 2009).

Future research examining people’s prescriptions for thinking about uncertainty should address how the findings might (or might not) generalize across countries and cultures. Previous work during times of great uncertainty have found that people across various cultural backgrounds sometimes differ in the degree to which they over(under)estimate the likelihood of positive (negative) health events (e.g., Chang et al., 2001; Christian et al., 2014; Heine & Hamamura, 2007; Joshi & Carter, 2013). Although our findings were robust across several studies, the studies were all conducted in the United States using samples of primarily American Mturk participants. This limits our ability to make generalizable conclusions about the global public’s desire for optimism or pessimism during a novel crisis.

As hinted from the opening quote, the public may have welcomed more positive news after the first months of the pandemic—especially if warranted. However, our studies suggest that what the public did not want was for people—including friends, family, and public officials—to underestimate the likelihood of harm. If anything, for highly-threatening events, they wanted estimations that erred on the side of pessimism. As a matter of policy, it’s best for public health officials to estimate and communicate uncertainty as accurately as possible, including its everchanging nature. With that said, the present findings suggest that the public feels there are times when inaccuracies are desired.

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| --- | --- | --- | --- |
| Table 1.  *Summary of Open-Ended Responses from Study 4* | | | |
| Theme of Reason for Prescription Response | Sample Response from  Participants in Study 4 | Percentage of overall explanations  (N = 180)  within theme | Percentage of participants  (N = 30) who mentioned theme at least once |
|  |
|  |
| Desire for others to use data or facts to inform prediction | "…you must be logical and not be swayed by the desire to be perfect rather than reasonable." | 8.30% | 20% |  |
| "They should realistically look at the science and take advice from researchers…" |  |
| Expressions of uncertainty about  the future | "Things are still very much up in the air and it's prudent to prepare for the possibility of this crisis lasting longer than anticipated." | 17.20% | 50% |  |
| "They should try to be accurate in this thinking so they can have a clear idea of what's to come." |  |
| Increase others' engagement in protective or preventative behaviors | "If someone think they are at high risk of getting infected, they will be more vigilant on engaging in behaviors that reduce their risk" | 28.90% | 70% |  |
| "...it might make them a lot more careful and cautious when going about their daily lives...might keep them being proactive and safe." |  |
| Increase other people’s positive affect | "I think the officials should give people hope, so estimating that things will be "back to normal" would be a good thing…" | 17.80% | 53% |  |
| "To cheer up people and give them hope about defeating the pandemic" |  |
| Concern about  negative affect | "...people will be very upset if they are stuck at home longer when they are expecting to get out sooner." | 2.20% | 13% |  |
| "...people will panic unnecessarily." |  |
| Concern about consequences for society | "...public officials should only slightly overestimate so that they don't make too many unnecessary decisions that may hurt people more than it would help them." | 7.80% | 36% |  |
| "...could result in the public losing trust...and the public might thereby disregard the seriousness of the public health threat." |  |
| *Note:* There was a seventh category for "Other/None" responses to the open-ended questions, which represented a catch-all category for either themes we did not identify here or responses that were nonsensical. These composed of 17%, or 32 of the 180 responses given by participants. | | | |  |
|  |

1. For all studies, we included an arithmetic problem at the beginning of each of the studies, which acted as a check to filter out possible bot activity or inattentive participants. See the preregistrations on OSF for the specific attention check used for each of the studies. [↑](#footnote-ref-1)
2. We use the Greenhouse Geiser correction here and in other places analyses where Mauchley’s Test of Sphericity was significant (i.e., *p* < .05; Greenhouse & Geisser, 1959). [↑](#footnote-ref-2)
3. There were also changes to the set of exploratory measures that appeared at the end of the study after all prescriptions were completec. See Open Materials on OSF for all measures included in the study. [↑](#footnote-ref-3)
4. We conducted one study after the other five to attempt to understand how framing influences prescriptions, but the paradigm inadvertently confounded outcome valence with (lack of) agency over contracting COVID-19. See Supplementary Materials for overview. [↑](#footnote-ref-4)
5. Using data from Study 1 and 2, we also did a special, exploratory analysis to check on whether confusion or a lack of participant focus could account for the main results of those studies. Specifically, we examined results from whatever role or outcome set participants in those studies answered first. Although this prohibitively cuts down on the power to do inferential statistics on trends in those data, it is worth noting the all the main findings from the full analyses of Studies 1 and 2 were also well represented when just examining data trends from the initial set of responses in those studies. See Supplementary Materials for more discussion of these results. [↑](#footnote-ref-5)
6. For the 3(Domain) x 4(Role) x 6(Counterbalancing) ANOVA, counterbalancing did not have a significant main effect, *F*(5, 92) = 0.92, *p* = .473, ηp2 = .048, nor did it significantly interact with Domain or Role in any of the two- way interactions, *F*(10, 184) = 0.52, *p* = .873, ηp2 = .028 and *F*(13.75,253.05) = 1.16, *p* = .306, ηp2 = .059, respectively. There was a significant three-way interaction, *F*(26.56, 448.64) = 1.62, *p* = .028, ηp2 = .081. We deconstructed this interaction by examining just the most critical factor of the counterbalancing—the first domain that participants encountered—to see if that had a significant influence on prescriptions. A 3(Domain) x 4(Role) x 3(First Domain) mixed ANOVA showed that the counterbalancing of the first domain participants saw did not have a significant main effect, F(2, 95) = 0.20, p = .819, ηp2  = .004, nor did it interact with any of the other factors to influence prescriptions that participants gave (all *p*s > .10). [↑](#footnote-ref-6)