How Safe is this Trip? Judging Personal Safety in a Pandemic Based on Information from Different Sources

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Abstract

In a pre-registered experiment, we presented participants with information about the safety of traveling during a deadly pandemic and during a migration trip using five different sources (a news article, a family member, an official organization, someone with personal experience, and the travel organizer) and four different verbal descriptions of the likelihood of safety (*very likely*, *likely*, *unlikely*, and *very unlikely*). We found that both for the pandemic and migration contexts, judgments about the likelihood of safely traveling and decisions to travel were most strongly influenced by information from the respective official organizations and that participants also indicated greater willingness to share information from official organizations with others. These results are consistent with the established finding that expert sources are more persuasive. However, we also found that, regardless of source, participants thought that it would be safe to travel even when told that it was *unlikely* or *very unlikely* to be safe. Additionally, participants did not discriminate between the grades of likelihood description (such as between *likely* and *very likely* or between *unlikely* and *very unlikely*), suggesting that in the contexts examined directionality matters much more than attempts to communicate more fine-grained likelihood information with verbal phrases.

Public Significance Statement

This study suggests that people differ in their interpretation of information about [potential] risk depending on the source of the information, with official organizations being the most influential. We also found that people generally expressed willingness to travel during a pandemic or as part of a migration journey, even if told it was unlikely or very unlikely to be safe.

Keywords: COVID-19, source, verbal likelihood, risk communication, risk judgment

How Safe is this Trip? Judging Personal Safety in a Pandemic Based on Information from Different Sources

People are regularly required to make risky decisions and judgments about the safety of a course of action. Nowhere has this become more apparent than during the COVID-19 pandemic. During this period, people's daily lives were upended, and they were bombarded with a deluge of new information from many sources regarding what they should do to keep themselves and their families safe. These situations, in which people receive information about the risk or safety of a particular course of action, motivated the research conducted in this study. We were interested in how people react to information about the likelihood of safety obtained from multiple sources, as well as how they combine and integrate this information to form overall judgments and make decisions. Throughout this paper, we use the term 'likelihood' to refer to the subjective verbal measures of ambiguity, so as not to be restricted by the constraints of formal numerical definitions of probability. When some of the literature we rely on deals with probability in the strict sense, we highlight that by using the latter term.

There are likely few situations in which it is more crucial that people attend and respond to accurate information than during a global pandemic. New information about the COVID-19 virus continues to be learned at a rapid pace. Thus, governments and health authorities are required to continually administer new, updated advice to persuade the general population to make massive changes to their lifestyle and behaviors to limit the spread of the virus (Bailey et al., 2020; Meyerowitz-Katz, 2020; UC Davis Health, 2020). Additionally, as became clear throughout 2020, the environment of a new pandemic is also fertile ground for misinformation and conspiracy theories to rapidly spread (Brennen et al., 2020; Frenkel et al., 2020; Li et al., 2020). Thus, clearly and persuasively communicating information about risks is critical. Although there is some evidence that issues such as framing (e.g., Pink et al.,

2020) make a difference to intentions to comply with recommendations and guidelines, here we focus on the influence of the source of the information.

The Role of Information Source

The role of information source has been extensively studied within psychology, communications, marketing, and other fields. Consequently, there are many different theoretical approaches that attempt to explain the influence of source on how people process information and change their beliefs or attitudes (for a review, see Briñol & Petty, 2009). In general, these theories posit that sources can influence the impact of messages in several ways: by serving as a cue (Briñol et al., 2004), by influencing the amount of thinking (DeBono & Harnish, 1988), by biasing the direction of thinking (Chaiken & Maheswaran, 1994; Tormala et al. 2006), by serving as an argument (Hahn et al., 2009; Kruglanski et al., 2005), and by having metacognitive impacts (e.g., on confidence; Petty et al., 2002). The myriad ways that sources can impact people's decisions clearly shows the important role that the messenger plays when communicating.

One source manipulation that has been extensively studied is the expertise of the source (Hovland & Weiss, 1951; Maddux & Rogers, 1980). Considerable evidence has indicated that information is more persuasive when it is presented by an expert compared to a novice (Chaiken & Maheswaran, 1994; Petty et al., 1981; Pilditch et al., 2020; Pornpitakpan, 2004; Tobin & Raymundo, 2009). Relying on the expertise of the source may be considered an appeal to authority and therefore fallacious (i.e., the *ad verecundiam* fallacy, see Hansen, 2020). However, in many circumstances, considering source expertise may lead to forming more accurate beliefs (see Walton, 1997 for detailed discussion of when appeals to expert opinion are valid). People are unable to be expert across all domains. Therefore, using source expertise as a cue and/or argument when assessing information may be a useful strategy for belief updating (Hahn et al., 2009; 2012; Harris et al., 2016).

Trust is another factor that can (and perhaps should) influence how people interpret information from sources (Hahn et al., 2009; Harris et al., 2016; Pilditch et al., 2020; Pornpitakpan, 2004). Although trust can be related to expertise, they are technically independent because there may be cases where a source possesses expertise but is not motivated or willing to communicate truthfully and with the best interests of the communication recipient in mind. For example, an expert source may have political or financial motivations to be an untrustworthy communicator. Moreover, in some cases, their expertise may actually enhance their ability to mislead or obfuscate. Indeed, McGinnies and Ward (1980) found that persuasiveness – the degree to which the recipients were inclined to change their views – was more strongly influenced by trust than expertise.

The degree of social connection between the message communicator and the receiver, including the importance of the ingroup versus outgroup distinction, is another aspect of source that has been extensively studied (see, e.g., Clark & Maass, 1988; Feldman, 1984; Sechrist & Milford-Szafran, 2011; Sechrist & Young, 2011; Suhay, 2015). Being influenced by social connection may even be rational. For example, if people know that they already share characteristics, interests, and/or have a social connection with someone, then they may be more likely to share assumptions regarding what information is credible and how one should go about forming views and beliefs. Therefore, information shared by a social connection is *a priori* more likely to be information that people would want to influence their views.

As noted earlier, trust is an important factor in the degree to which people find sources persuasive. If there is an existing level of similarity and/or social connectedness between recipients and the source, then recipients may perceive the source as more trustworthy (e.g., Harris et al., 2016). However, social connectedness can also have negative

impacts. For example, it can affect people's willingness to share misinformation presented by a personal contact (Buchanon & Benson 2019).

Within the current study, we use experimental methods to provide insight into which sources are the most influential on risk perceptions and decisions. Our specific focus is on pandemics, but we contrast performance in this context with a similar scenario in a different context involving a risky migration trip. Our study, therefore, provides general psychological insights while also being readily applicable to real-world contexts.

Based on the body of research outlined above, in our work we wanted to ensure that a variety of sources were presented to the participants that were relevant to judgments and decisions about traveling in a risky situation (i.e., during a pandemic). We also wanted to vary the sources along dimensions that are relevant for how people process and are influenced by sources, such as expertise and social connectedness. Hence, we decided to include sources that varied in the specific type of expertise that they had. Specifically, we included sources that might traditionally be considered expert (e.g., an official international organization, such as the World Health Organization – WHO, or the United Nations Refugee Agency – UNHCR) as well as sources that had some relevant personal experience or knowledge that may also provide expertise and insight. Additionally, to investigate the role of trust on judgments and decisions, we also asked participants their level of trust in each of the sources.

Finally, we also asked participants about their confidence in their likelihood judgments. Throughout this paper, we use the term 'confidence' to denote second order (metacognitive) judgements about the likelihood statement. We gathered confidence ratings to investigate whether some specific information sources affected confidence independently of likelihood judgments; it may be that some sources lead to differences in metacognitive

judgments about likelihood, even if the actual likelihood judgments themselves do not change.

Verbal Descriptions of Likelihood

Another issue that we investigated in this study is how people convert verbal descriptions of likelihood into numerical likelihood ratings, as well as how these different descriptors impact decision making. Communicating information about likelihood using natural, verbal language is a challenge that communicators regularly encounter. The challenge arises because there is a great deal of variability in how people interpret verbal descriptions of likelihood and how they convert these verbal descriptors into numerical likelihood ratings (Mauboussin & Mauboussin, 2018). Several guidelines for communicating likelihood have previously been developed in organizations where managing risk and uncertainty and the related attitudes is of paramount importance. The Intergovernmental Panel on Climate Change (IPCC; Mastrandrea et al., 2010) and the intelligence community are both good examples. In both cases, it is crucial that risk information is communicated accurately and appropriate guidelines have been developed (Table 1; Office of the Director of National Intelligence, 2015). However, previous research into the verbal descriptors used in both sets of guidelines has found that many people do not necessarily interpret them in the way intended. For example, likelihood ratings given by members of the general public do not always match those laid out in the guidelines (Budescu et al., 2014; Wintle et al., 2019). This mismatch is perhaps unsurprising because even the two sets of guidelines differ in the likelihoods ascribed to the verbal descriptors that appear in both.

Although some of the verbal descriptors differ, there are four key words that are shared across both sets of guidelines cited in the paragraph above: *very likely, likely, unlikely,* and *very unlikely* (Table 1). Therefore, these were the four verbal descriptors of likelihood that we chose for the current study. These verbal descriptors were also selected because they refer to

mid-range levels of likelihood (Mastrandrea et al., 2010; Office of the Director of National Intelligence, 2015). Therefore, we believe they are more appropriate for examining the potential impacts of source and context on how verbal likelihood information is interpreted compared to terms such as *exceptionally unlikely* or *almost no chance*. These latter descriptors may be judged at or near 0% or 100%, potentially masking any impact of the source and context variables due to floor or ceiling effects, respectively (Budescu et al., 2014; Groth et al., 2020; Wintle et al., 2019). It should also be borne in mind that communicating using verbal descriptors for mid-range levels of likelihood may allow for *strategic ambiguity*. Such ambiguity can help to protect the communicator from scrutiny and allow for deniability in the face of criticism or if outcomes differ from those implied (Aragonès & Neeman, 2000; Bräuninger & Giger 2018; Eisenberg et al., 2013).

Table 1

Verbal Descriptors of Likelihood Chosen and Overview of the Guidelines

Verbal Descriptors Chosen	IPCC Guidelines[a]	US Intelligence Community Standards[b]
	Virtually certain (>99%)	Almost certain(ly) (95-99%)
Very likely	Very likely (>90%)	Very likely (80-95%)
Likely	Likely (>66%)	Likely (55-80%)
	About as likely as not (33-66%)	Roughly even chance (45-55%)
Unlikely	Unlikely (<33%)	Unlikely (20-45%)
Very unlikely	Very unlikely (<10%)	Very unlikely (5-20%)
	Exceptionally unlikely (<1%)	Almost no chance (1-5%)

[a] IPCC Guidelines reproduced from Mastrandrea et al., 2010

[b] US Intelligence Community Standards reproduced from Intelligence Community Directive 203 (Office of the Director of National Intelligence, 2015)

It is important to note that, unlike Budescu et al. (2014) and Wintle et al. (2019), the current study is not a direct translation study, in which participants only assign numerical likelihoods to verbal likelihood descriptors. Instead, within the current study, participants assigned numerical likelihoods and made decisions based on verbal likelihood descriptors that were presented within two contexts. The first context involved traveling to see a loved one during a pandemic (pandemic context), whereas the second involved deciding whether to take a boat trip across the sea to reach a safe country during a forced migration journey (migration context). By embedding the likelihood judgments in a specified context rather than having participants simply translate acontextual likelihood descriptors into numbers, we provided a rich environment with more social and other relevant information regarding the communications that participants received. Our research was, therefore, more applicable and relevant to real-world situations than research which strips out this context and focuses solely on translating verbal likelihood descriptors to numerical values (Collins & Hahn, 2018; Moxey & Sanford, 2000).

Within this study, we presented participants with information from a variety of different sources that used different verbal likelihood descriptors. Therefore, we were interested in how participants would combine the multiple verbal likelihoods from various sources to form overall likelihood judgments and overall decisions about the safety of travelling. There has been considerable prior research on how information from multiple sources can and/or is combined and aggregated (e.g., Budescu et al. 2003; Budescu & Rantilla, 2000; Budescu & Yu, 2006; 2007; Osherson & Vardi, 2006; Yaniv & Milyavsky, 2007). The majority of this prior research has focused on formulas and methods for aggregating information from multiple experts or multiple forecasts to form overall judgments (e.g., Budescu et al. 2003; Budescu & Rantilla, 2000; Budescu & Yu, 2006; 2007; Yaniv & Milyavsky, 2007; for a review see Bonaccio & Dalal, 2006). The finding that is of

greatest relevance to the current study is that participants generally consider information from all of the experts by averaging across them, whilst at least partially accounting for differences in accuracy and the amount information (Budescu et al. 2003; Budescu & Rantilla, 2000; Budescu & Yu, 2006).

This previous research suggests that our participants will be influenced by all of the sources when making their overall judgments and decisions. However, the current study differs from previous research on combining information from multiple sources. Specifically, all of the sources were experts in previous research, whereas in the current study, the multiple sources varied in their level of expertise, trustworthiness, and social connectedness. This difference is compatible with our interest in the overall judgments and decisions that people make after being presented with information from a diverse set of sources. We were also interested in how participants weight these various sources and the extent to which each source influences the overall judgments and decisions.

Research Questions

The key research questions for the current study were:

1. How do likelihood judgments and travel decisions that people make regarding the safety of decisions differ depending on the information received from different sources (i.e., sources that vary in terms of trust, expertise, and social connectedness) and in different contexts?
2. How do people aggregate and weight information from multiple sources?
3. Do decisions about sharing information differ depending on source?
4. Do decisions about sharing likelihood ratings differ depending on confidence?

Method

Participants

We recruited 1321 participants from the United States of America using Amazon's Mechanical Turk and TurkPrime (Litman et al., 2017). Participants were reimbursed $2.50 USD for completing the study. Participants were excluded if they took multiple attempts at the study (128 participants), took less than three minutes (109 participants) or more than 60 minutes to complete the study (1 participant). We also included an attention check question after each of two vignettes that described the decision-making scenario. Participants who failed this attention check were presented with the vignette again and then given the chance to answer the attention check question once more. Any participant who failed the attention check after a second viewing of the vignette was excluded from the study (77 participants). This left us with a final sample of 1006 participants included for analysis (aged 18-24 n = 78, aged 25-34 n = 372, aged 35-44 n = 236, aged 45-54 n = 157, aged 55-64 n = 124, aged 65-74 n = 36, aged 75-84 n = 3). Data were collected between June 11 and June 23, 2020.

Design

This study used a 5 (*source*: news article, family member, official organization, personal experience, travel organizer) × 4 (*verbal likelihood*: very likely, likely, unlikely, very unlikely) × 2 (*context*: pandemic, migration) mixed-model design. Source and context were within-subject factors, and a verbal likelihood was randomly assigned to each piece of information (i.e., one randomly assigned verbal likelihood for each combination of source × context). Thus, each participant saw only one verbal likelihood for each combination of source and context, with the verbal likelihood for each combination of source and context varying between participants. Therefore, the design was only partially crossed because each individual participant did not see all combinations of verbal likelihood and source. However,

across the 1006 participants all possible combinations occurred approximately equally often, and the use of random assignment ensured that no confounding variables were introduced.

We opted for a sample size of 1000 participants to ensure that we had 250 participants per between-subjects condition. Given the complex nature of the analytical models used within this study and a lack of a priori information regarding the expected data and model structure, we did not think that it would be appropriate to conduct a power analysis for the current study.[1]

This paper focuses on the results for the pandemic context, with the migration context considered here primarily as a test of consistency and robustness of the results across different domains. The design and procedure of this study were vetted and approved by the University of Southampton Ethics Committee (ERGO number 56865). The hypotheses, study design, statistical analyses, exclusion criteria, and number of participants for this study were preregistered on the Open Science Framework (https://osf.io/3qrs8).

Materials

The two contexts in which participants made their judgments and decisions were introduced using vignettes. These vignettes briefly described the situation in which participants were making their judgments and decisions. Specifically, participants were asked to imagine that they were either traveling to stay with loved ones in another city during a pandemic (pandemic context) or deciding whether to take a boat trip across the sea to reach a safe country (migration context). After the context was established via the vignette, participants received five pieces of information, with one piece of information presented from each of the five sources (news article, family member, official organization, personal

[1] Kumle et al. (2021) outline procedures for simulating power for (Generalized) Linear Mixed Models. However, they also note that "This method may become unsuitable for more complex models with a variety of fixed and random effects—as justifying and choosing parameters becomes more difficult with increasing model complexity" (Kumle et al., 2021, p. 9).

experience, travel organizer). In relation to official organizations, we chose two highly respected international agencies, the World Health Organization (WHO) and the United Nations Refugee Agency (UNHCR), respectively for the pandemic and migration contexts. For the travel organizer, this was a travel agent in the pandemic context and the person organizing the boat trip in the migration context. These pieces of information were presented one at a time, in a randomized order and with a verbal likelihood descriptor which was randomized anew for each source.

After reading the initial vignette, each participant read statements about the safety of travel from five sources. For example, in the pandemic context, one participant might have read that (1) a news article has reported that travel was *very likely* to be safe, (2) the World Health Organization (WHO) has stated travel was *unlikely* to be safe, (3) a travel agent stated travel was *very likely* to be safe, (4) a family member stated travel was *unlikely* to be safe, and (5) someone with personal experience stated travel was *likely* to be safe. In the migration context, the participant might have read that (1) a news article has reported that travel was *likely* to be safe, (2) the United Nations Refugee Agency (UNHCR) has stated travel was *very likely* to be safe, (3) the person organizing the boat trip stated travel was *very unlikely* to be safe, (4) a family member stated travel was *likely* to be safe, and (5) someone with personal experience stated travel was *unlikely* to be safe. Each participant received the five statements from the various sources in a randomized order and the verbal likelihood descriptors assigned to each source were also randomized and could differ between participants (e.g., a family member stating it was *very likely* to be safe, news article stating it was *very unlikely* to be safe). To minimize repetition for participants, we also had five sentence structures for the statements per context which were randomized anew for each statement. For example, participants might see the statement “traveling to another city is *likely* to be safe” on one trial and the statement “it is likely that it is safe to travel to see your loved ones” on another.

For each piece of information presented, participants answered a series of five questions. Participants were instructed to answer these questions based solely on the piece of information provided. First, they were asked to provide a rating of the likelihood that they would safely travel on a scale from 0-100%, based solely on that piece of information. Then, they made a binary yes/no travel decision on whether they would travel, again based solely on that piece of information. Participants then made a binary yes/no decision regarding whether they would share the piece of information with someone who was also considering traveling in the same circumstances. Subsequently, participants were presented with a new screen and asked to provide their confidence on a scale from 0-100% in the accuracy of their likelihood rating. Specifically, they were asked "allowing for a reasonable margin of error (+ or – 5 percentage points) how confident are you that the likelihood rating you just gave XX out of 100 was correct?". At this point, participants also indicated whether they would share their likelihood rating with someone who was also considering traveling in the same circumstances (binary yes/no decision). To minimize memory demands and cognitive load, the participants likelihood ratings were also presented on the screen on which they provided confidence judgments and answered the question about sharing their likelihood rating (see Figure 1 for an example trial).

Once participants had seen all five pieces of information and answered the questions for each, participants were asked to provide an overall *likelihood of safety* rating (0-100) and make an overall travel decision (yes/no) based on all the pieces of information jointly. To reduce memory demands and cognitive load, the five pieces of information were presented at the top of the screen (in a randomized order) so that participants could refer to all the information for their overall judgments and decisions. On a new screen, participants then provided their confidence for their overall *likelihood of safety* rating (0-100) and indicated whether they would share their overall likelihood rating with someone in similar

circumstances. Once again, the likelihood rating from the previous screen was presented to minimize memory demands and cognitive load.

Procedure

Prior to beginning the main body of the study, participants read an information sheet and provided informed consent. Participants were then presented with the instructions and the vignette for either the pandemic or migration context. After reading the introductory vignette that outlined the context, participants received one piece of information (i.e., a verbal likelihood descriptor) from each source (i.e., five pieces of information per context, ten pieces of information overall). The presentation order of the five sources within each context was randomized. Once participants had received a piece of information from each of the five sources and answered the related questions, they then answered the overall questions which required them to integrate the information provided from all five sources, as described above.

Upon completing the procedure for the first context (either pandemic or migration), participants were presented with the vignette for the second context, which they had not yet seen, and repeated the process for this context. The presentation order for the pandemic and migration contexts was counterbalanced across participants. After the procedure had been completed for both contexts, participants answered five *trust* questions. For each question, participants indicated their general level of trust on a scale from 0-100% for each of the five sources (news articles, family members, official organizations, people with relevant personal experience, and travel organizers selling a service or product). Before being fully debriefed, participants indicated whether they had ever seriously considered or made plans to migrate to a new country, whether they had previously migrated to a new country, and provided their age.[2]

[2] For further information on the materials and procedure used in this study, the survey can be accessed at this link: https://sotonpsychology.eu.qualtrics.com/jfe/form/SV_41PZg9XavyKFNl3

Figure 1

Vignette for the Pandemic Context (Panel A), Followed by the Screening Question to Ensure Participants Paid Attention (Panel B) and an Example of a Trial on Which Participants Answer Questions Based on Information from a News Article (Panels C to F).

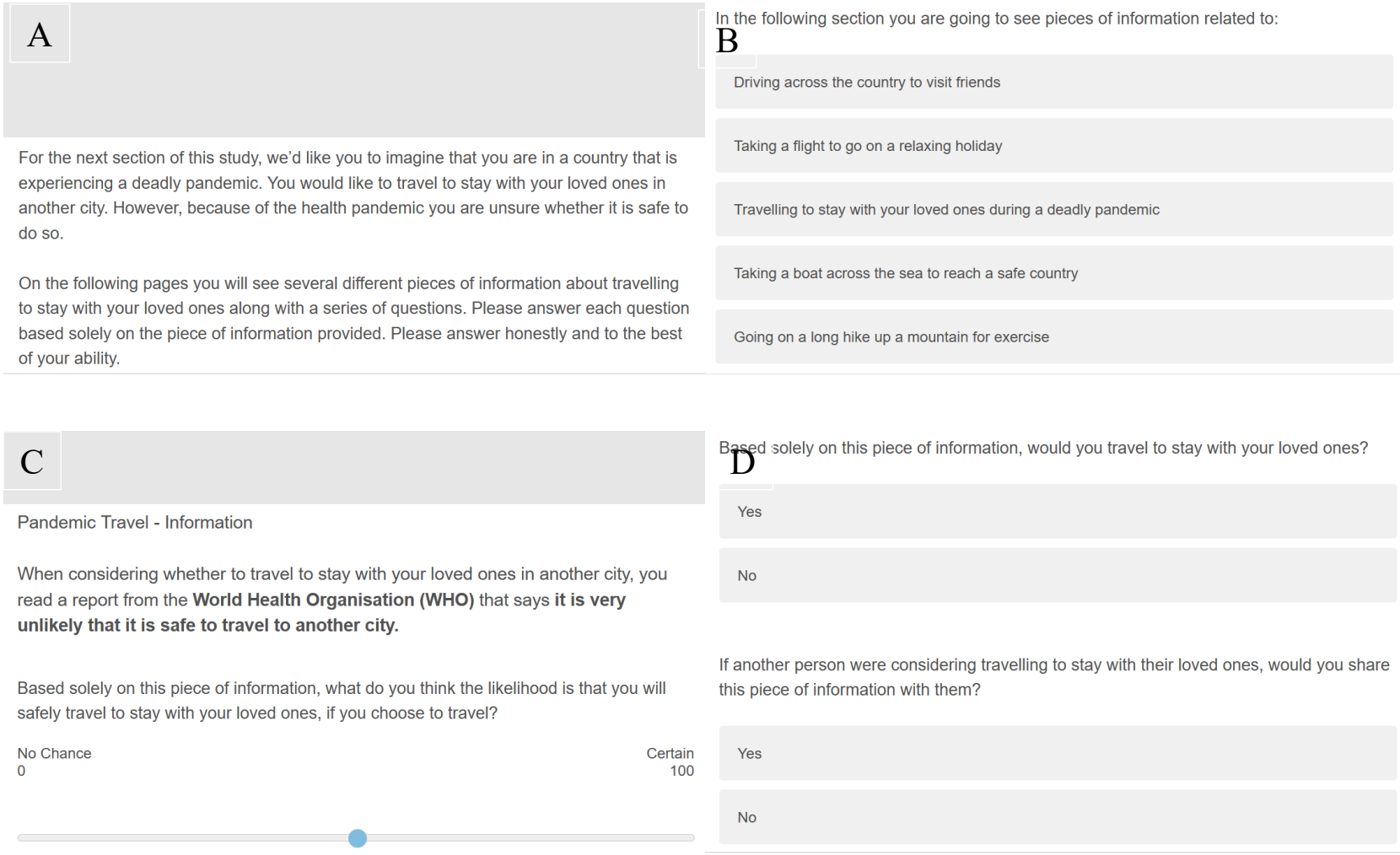
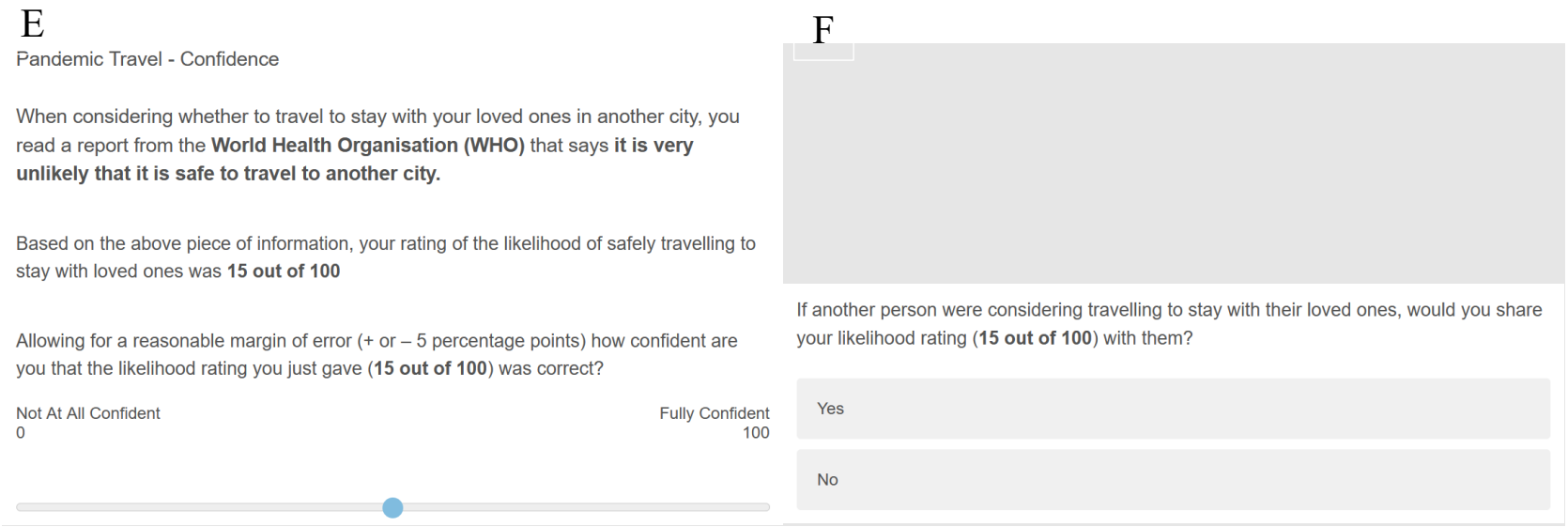


Figure 1 (continued)



Note. These are screenshots of the experiment as it was presented to participants in Qualtrics

Results

Preregistered Analyses

We conducted analyses by fitting separate 5 (*source*: news article, family member, official organization, personal experience, travel organizer) × 4 (*verbal likelihood*: very likely, likely, unlikely, very unlikely) × 2 (*context*: pandemic, migration) mixed-models for each of the dependent variables (*likelihood of safety* rating [0-100], travel decision based on the piece of information [yes/no], sharing decision for the piece of information [yes/no], confidence rating [0-100] in the *likelihood of safety* rating, and sharing decision for the *likelihood of safety* rating [yes/no]). For dependent variables with continuous outcomes, we used Bayesian linear mixed models. For dependent variables with binary outcomes, we used Bayesian generalized linear mixed models with a Bernoulli family and logit link. These models were fitted in R (R Core Team, 2020; R Studio Team, 2020) using the `brms` package (Buerkner, 2017; Carpenter et al., 2017). All models used the weakly informative default `brms` priors, designed to have minimal influence on the results and to give prominence to the data: improper flat real priors were thus assumed for all population-level effects, and half Student-*t* priors with 3 degrees of freedom for standard deviations of group-level (here including individual-level) parameters (Buerkner 2017). The models were run for 10,000 iterations with 5,000 warmup iterations, 4 MCMC chains, and a thinning rate of 4. We also set `adapt_delta` to 0.9 because at the default of 0.8 there were too many divergent transitions. The formal specification of these models was:

$$DV \sim 1 + Source * Verbal\ Likelihood * Context + (1 + Context + Source \mid Participant),$$

where *DV* is the dependent variable (likelihood rating, binary travel decision, confidence level, binary decisions to share information, and share likelihood ratings), and 1 corresponds

to a constant. Furthermore, the notation '*Source * Verbal Likelihood * Context'* is a shorthand for including both the main effects as well as interactions for these three variables, while *Context* + *Source* | *Participant* refers to individual-level context and source effects.

We then used the `tidyverse` (Wickham et al., 2019), `emmeans` (Lenth, 2020), and `tidybayes` packages (Kay, 2020) to extract and plot both the medians and 95% highest posterior density intervals (see Figures 2–6; see Kay, 2020 for more details on creating plots using `emmeans` and `tidybayes`). Follow-up analyses were also conducted using the contrast function in `emmeans` to examine main effects as well as the differences between sources, examined separately for the two contexts and for each level of verbal likelihood. Due to the large number of dependent variables and contrasts, within this paper we focus only on the key findings. However, we direct interested readers to the supplementary materials which contain tables and figures showing the results for all contrasts. Medians and 95% highest posterior density intervals (HPD) for main effects which are not displayed on the graphs are reported within the text. The data and analysis code for this study are freely available at: https://osf.io/ws63f/

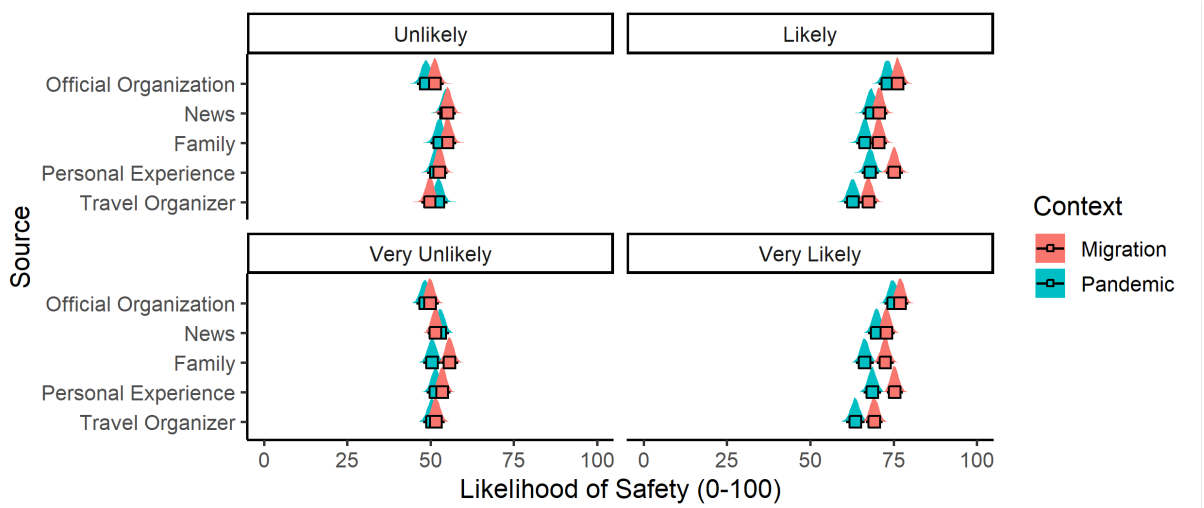
Likelihood of Safety and Travel Decisions

Results of the model for *likelihood of safety* ratings are displayed in Figure 2 (see also Table S1 and Figure S1). Contrasts revealed that there was an overall main effect of context, with higher *likelihood of safety* ratings for the migration vignette (*Mdn* = 62.70, HPD [61.30, 63.80]) compared to the pandemic vignette (*Mdn* = 59.80, HPD [58.20, 61.20]). When told that it was *likely* or *very likely* to be safe to travel, participants generally gave higher *likelihood of safety* ratings if the information came from official organizations. This was true for all sources in the pandemic context. However, in the migration context, there was overlap in the *likelihood of safety* ratings based on information from an official organization and someone with personal experience. In the migration (but not the pandemic) context,

participants also generally gave higher *likelihood of safety* ratings when told it was *likely* or *very likely* safe to travel by someone with personal experience, but this was not found for all contrasts. Additionally, participants gave lower *likelihood of safety ratings* when told that it was *likely* or *very likely* to be safe by the travel organizer than when told the same information by the other sources. When told that it was *unlikely* or *very unlikely* safe to travel, participants generally gave lower *likelihood of safety* ratings when the information came from an official organization (although not for all contrasts). In combination with the findings for *likely* and *very likely*, these results may suggest that participants were most influenced by information from the official organization because it led to the most distinct responses.

Figure 2

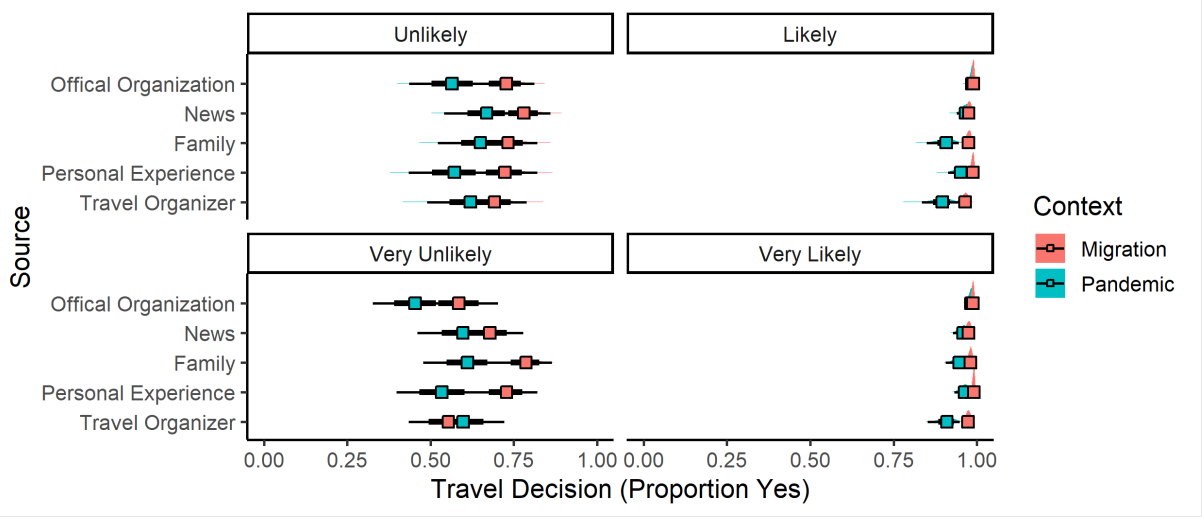
Distributions of Likelihood of Safety Judgments



Note. Squares represent medians, inner bars represent 66% highest posterior density intervals, and outer bars represent 95% highest posterior density intervals.

Figure 3

Distributions of Travel Decisions



Note. Squares represent medians, inner bars represent 66% highest posterior density intervals, and outer bars represent 95% highest posterior density intervals.

Results for travel decisions (see Figures 3 and S2 and Table S2) showed generally similar patterns to those for *likelihood of safety* ratings, with considerable overlap between sources, particularly when participants were told that travel was *unlikely* or *very unlikely* to be safe. Again, a main effect of context was observed, with participants indicating greater willingness to travel in the migration context (*Mdn* = 0.838, 95% HPD [0.807, 0.870]) than the pandemic context (*Mdn* = 0.765, 95% HPD [0.723, 0.808]). As Figure 3 shows, this was particularly pronounced when participants were told that it was *unlikely* or *very unlikely* to be safe to travel. When told that it was *likely* or *very likely* to be safe, participants were very willing to travel in both contexts (all medians >90%), although there was again greater willingness in the migration context (all medians >95%). Although they were generally the most willing to travel when told that it was safe by an official organization, contrasts showed this was not reliably higher than for the other sources, possibly due to a ceiling effect (for more information on ceiling effects, see Taylor, 2010). Again, people were also less willing

to travel when the travel organizer told them it was *likely* or *very likely* to be safe than when told this information by the other sources, although this was not found for all contrasts.

For both *likelihood of safety* ratings and travel decisions, there are also clear findings regarding the role of the verbal likelihood descriptor words. As Figures 2 and 3 make clear, in both contexts, the directionality (positive or negative) of the verbal descriptor had a large impact on the ratings and decisions made, with *likely* and *very likely* leading to higher ratings and greater willingness to travel than *unlikely* and *very unlikely*. However, the modifier word *very* had hardly any impact on either positive or negative verbal descriptors, with the distributions of *likelihood of safety* ratings and travel decisions for each source almost perfectly overlapping for *unlikely* and *very unlikely*, and for *likely* and *very likely*.

Sharing Decisions and Confidence

The results for sharing information (see Figure 4) and sharing likelihood ratings (see Figure 5) show that regardless of source or verbal likelihood, in both contexts, participants were very willing to share the information and their likelihood ratings with a fellow traveler in a similar situation to themselves, although this was slightly higher in the migration (*Mdn* = 0.972, 95% HPD [0.961, 0.981]) than the pandemic context (*Mdn* = 0.948, 95% HPD [0.933, 0.963]). Although willingness to share was very high, there were also main effects of source with people less willing to share information that came from a family member than information from the other sources (except the travel organizer; for full details see Table S3 and Figure S3). Participants were also more willing to share information that said it was very unlikely to be safe to travel than any of the other verbal likelihoods, range *diff* = −0.018-−0.010, but there was no difference in willingness to share for the other verbal likelihoods.

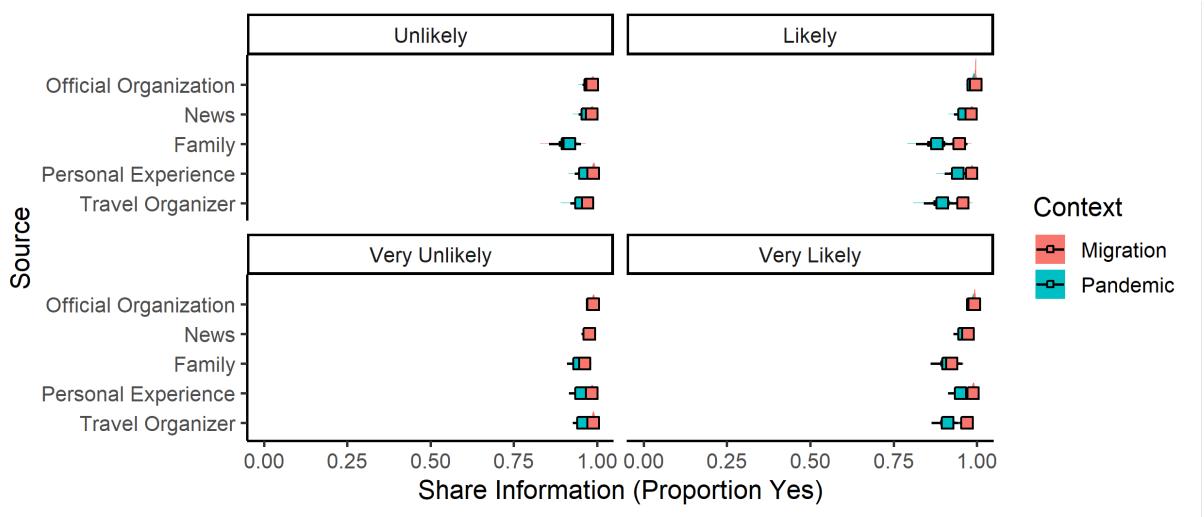
Similarly, willingness to share likelihood ratings was high for all sources and verbal likelihoods in both contexts but was again less likely after receiving information from a

family member than all other sources except the travel organizer, range *diff* = 0.014-0.022 (see Table S4 and Figure S4).

We found that confidence levels (regarding the accuracy of their likelihood ratings) were remarkably consistent across verbal likelihood and source, with participants giving confidence ratings of roughly 75 out of 100 in almost all conditions (see Figures 6 and S5 and Table S5). However, we again found that official organizations differed from the other sources, with participants giving higher confidence ratings for their likelihood ratings when told that it was *likely* or *very likely* safe to travel (and also for *unlikely* in the pandemic context). Because of the consistently high willingness to share likelihood ratings and lack of variability in confidence ratings, we did not examine whether higher confidence led to greater willingness to share likelihood ratings.

Figure 4

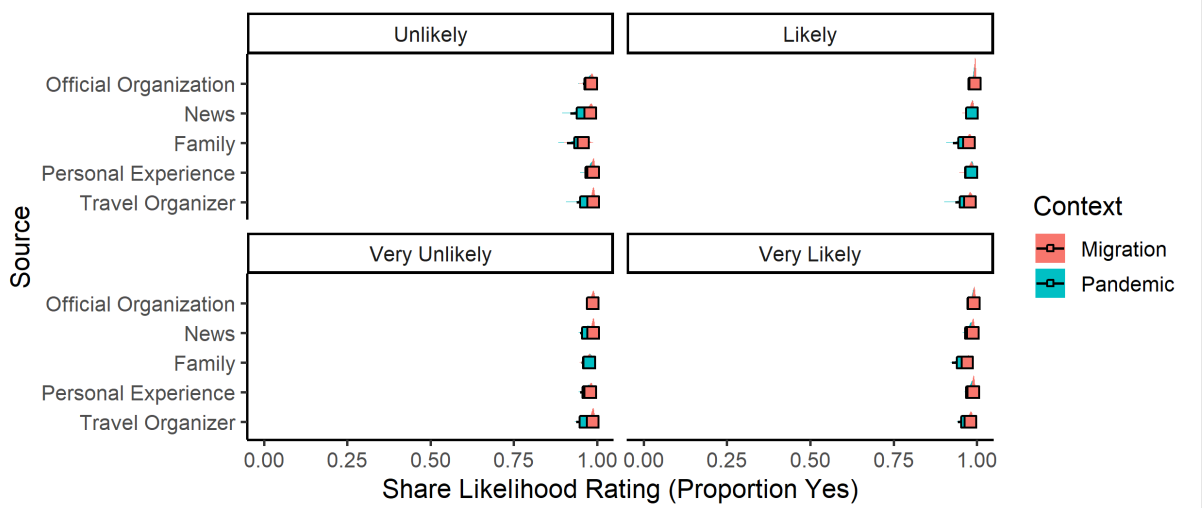
Distributions of Decisions to Share Information



Note. Squares represent medians, inner bars represent 66% highest posterior density intervals, and outer bars represent 95% highest posterior density intervals.

Figure 5

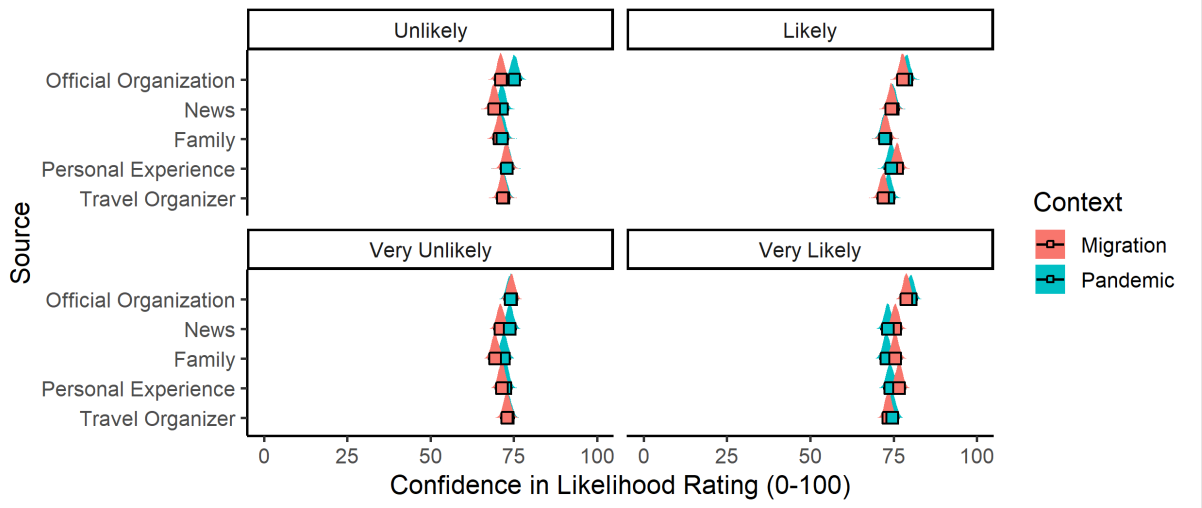
Distributions of Decisions to Share Likelihood Judgments



Note. Squares represent medians, inner bars represent 66% highest posterior density intervals, and outer bars represent 95% highest posterior density intervals.

Figure 6

Distributions of Confidence Ratings for the Likelihood of Safety Judgments



Note. Squares represent medians, inner bars represent 66% highest posterior density intervals, and outer bars represent 95% highest posterior density intervals.

Overall Likelihood Ratings and Travel Decisions

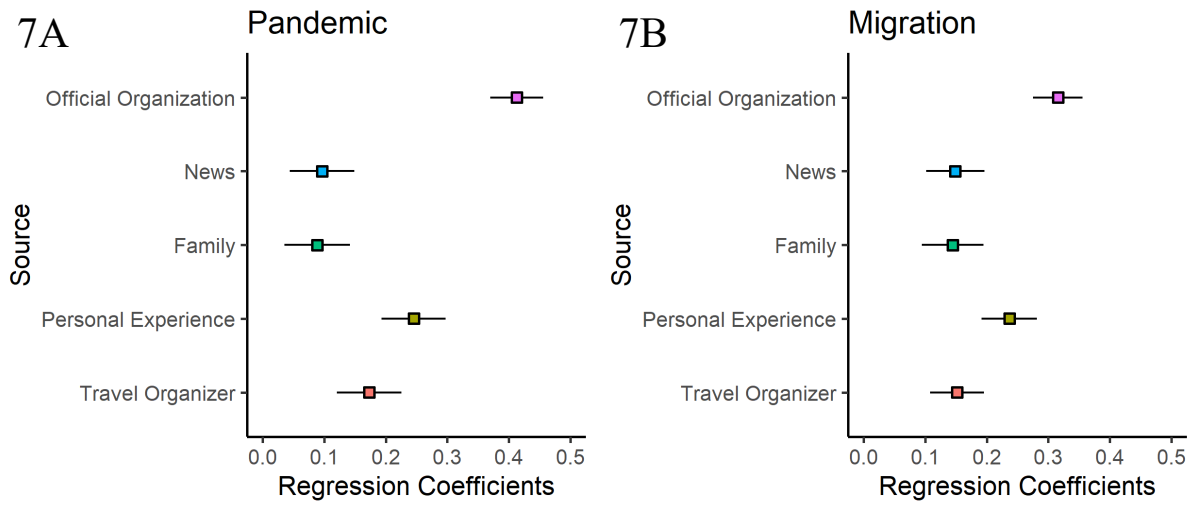
In addition to examining the judgments and decisions made after receiving each piece of information, we also analyzed the overall likelihood ratings and travel decisions that were made after receiving the information from all five sources. For overall likelihood ratings we estimated four separate linear regression models. Firstly, for both contexts separately, we predicted the overall likelihood ratings using the likelihood ratings from each of the five sources as predictors (see Figure 7). Secondly, for both contexts separately, we again predicted overall likelihood ratings but instead using the yes/no travel decisions made after each source as predictors (see Figure 8). We predicted the overall likelihood ratings using the yes/no travel decisions to test whether participants choosing to travel (or not) was related to the overall *likelihood of safety* ratings they provided and whether this relationship was stronger for some sources. Unsurprisingly, results for all regressions showed that the overall likelihood ratings were well predicted by the judgments and decisions made after each source, range Fs(5, 1000) = 142.9-487.5, all ps < .001, range Adj. R^2 = .41-.71. Additionally, the judgments and decisions for every source were significant predictors of the overall judgment made, suggesting that information from all sources contributed to the overall judgments. For the pandemic context, in both regressions, information from official organizations was by far the strongest predictor (as demonstrated by the 95% CI not overlapping with other sources). In the migration context, information from official organizations was again the strongest predictor. However, the 95% CI overlapped with information from someone with personal experience (but not any of the other sources).

Similarly, for overall yes/no travel decisions we again predicted the overall decision using separate logistic regressions for each context. In the first regression, likelihood ratings for each source were used as predictors (see Figure 9) and in the second regression yes/no travel decisions for each source were used as predictors (see Figure 10). Overall travel

decisions were well predicted by the likelihood ratings and travel decisions made for each individual source, range $\chi^2(5) = 373.88\text{-}584.04$, all $ps < .001$, range McFadden pseudo $R^2 = .32\text{-}.46$. Additionally, the judgments and decisions made for most sources were significant predictors of the overall travel decisions, except for the likelihood rating made after receiving information from a family member in the pandemic context. Judgments and decisions made after receiving information from an official organization were also again the strongest predictors of the overall travel decisions. However, there was overlap in the 95% CIs for information from official organizations and from those with personal experience when predicting overall travel decisions.

Figure 7

Regressions Predicting Overall Likelihood Rating Using Likelihood Ratings for Each Source in the Pandemic (Figure 7A) and Migration (Figure 7B) Contexts



Note. Predictors were scaled by subtracting the mean and dividing by two SD to make them more directly comparable to binary predictors (Gelman, 2008)

Figure 8

Regressions Predicting Overall Likelihood Rating Using Yes/No Travel Decisions for Each Source in the Pandemic (Figure 8A) and Migration (Figure 8B) Contexts

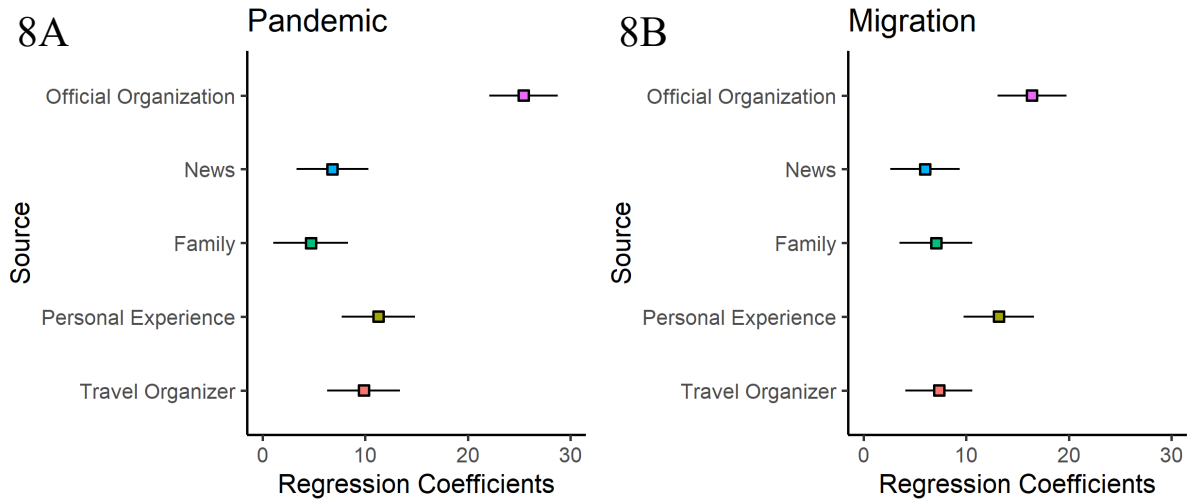
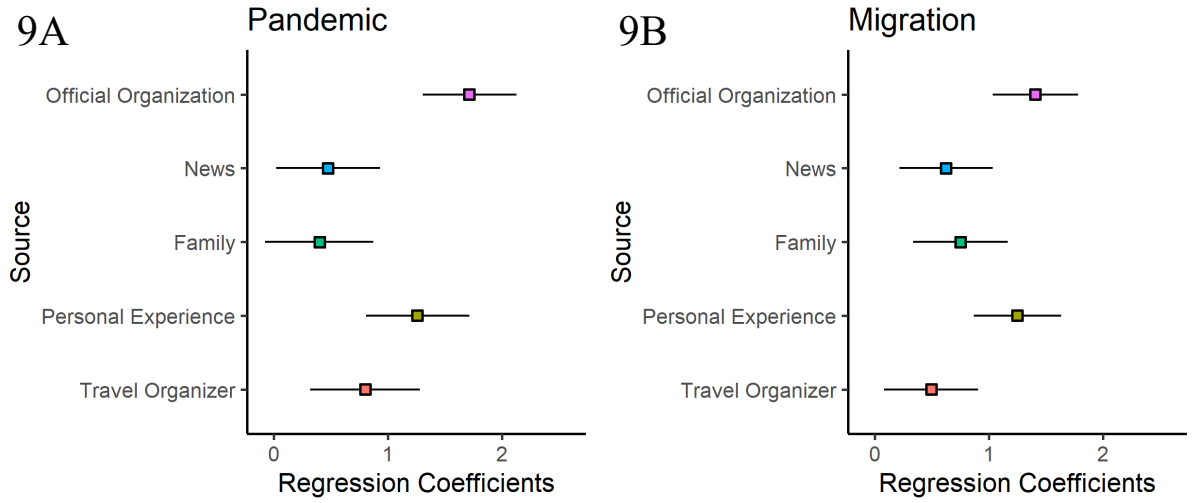


Figure 9

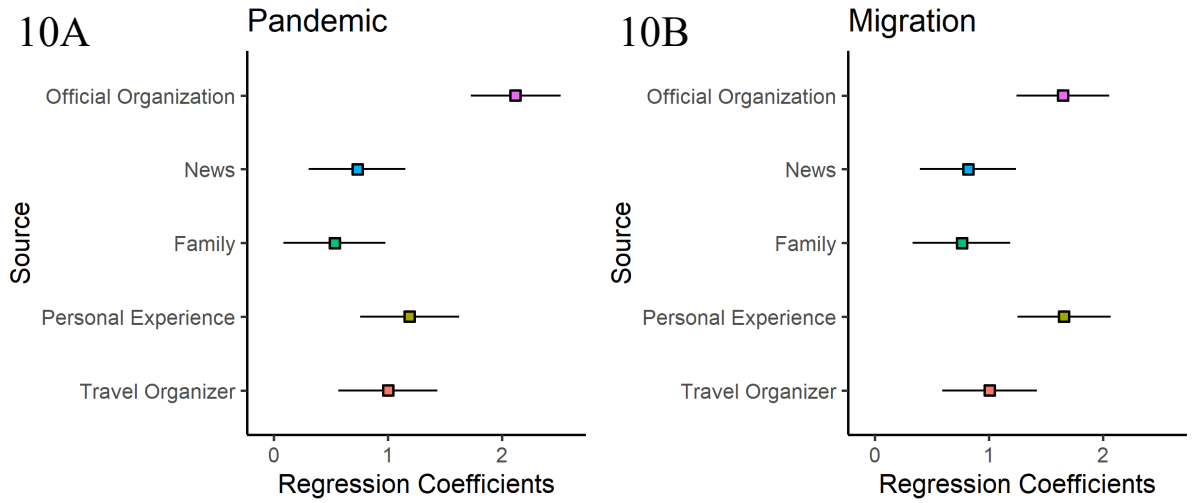
Regressions Predicting Overall Yes/No Travel Decisions Using Likelihood Ratings for Each Source in the Pandemic (Figure 9A) and Migration (Figure 9B) Contexts



Note. Predictors were scaled by subtracting the mean and dividing by two SD to make them more directly comparable to binary predictors (Gelman, 2008)

Figure 10

Regressions Predicting Overall Yes/No Travel Decisions Using Yes/No Travel Decisions for Each Source in the Pandemic (Figure 10A) and Migration (Figure 10B) Contexts



Overall trust judgments for the five sources were also analyzed in a one-way ANOVA, which revealed a significant difference in trust levels between the sources, $F(3.16,3173.52) = 262.40$, $p < .001$, $\eta_p^2 = .21$. Trust levels were highest for people with personal experience ($M = 75.40$, $SD = 15.56$), followed by official organizations ($M = 72.51$, $SD = 19.99$), family members ($M = 72.28$, $SD = 20.00$), news articles ($M = 67.32$, $SD = 20.90$), while the travel organizers were trusted the least ($M = 54.10$, $SD = 27.82$). Follow up pairwise comparisons using *t*-tests with a Holm correction for multiple comparisons revealed that all differences were significant at $p < .001$, except for the difference in trust between official organizations and family members, with $p = .75$.

Discussion

Overall, there are three key takeaway messages regarding the role of source and verbal likelihood in how people judge the *likelihood of safety* and make travel decisions. Firstly, across the various analyses presented, the clear pattern that emerged was that information from official organizations was the most influential for judgments of the

likelihood of safety and travel decisions, particularly within the pandemic context. However, we found that although official organizations were the most influential source, participants were influenced by all the sources when making their overall judgments and decisions. The second key finding is related to the impact of the verbal likelihood expressions and how those expressions may be translated into different numerical terms depending on the information source and context. The third key finding was that people's judgments are insensitive to the modifier word *very*. These three sets of findings are discussed in more detail next, before presenting the general conclusions from the study.

Importance of the Source of Information for Judgments About Safety

The finding that the official organization was the most influential is consistent with the prior literature on the impact of source expertise (Chaiken & Maheswaran, 1994; Petty et al., 1981; Pilditch et al., 2020; Pornpitakpan, 2004; Tobin & Raymundo, 2009). This is a potentially encouraging finding as it suggests that people will listen to groups with relevant expertise when they are making judgments and decisions about safety. However, participants were also strongly influenced by people with relevant personal experience, especially for the migration context.

Most prior research on the impact of source has focused on how opinions and/or attitudes are influenced by arguments from different sources (Briñol & Petty, 2009). The current study extends that research into the domain of risk communication and judgments and decisions about personal safety. We also found that differences in the *likelihood of safety* judgments and travel decisions between the official organization and other sources were more pronounced when participants were told that it was *likely* or *very likely* to be safe to travel. One potential explanation for this finding is that people are generally concerned about traveling during the pandemic or making a migrant journey. Therefore, being told it is *unlikely* safe to travel influences travel decisions to a similar extent regardless of source

because it is consistent with their prior. In contrast, when receiving information that it is *likely* or *very likely* to be safe to travel, which is inconsistent with their prior belief, participants' behavior is influenced only when the information comes from an official organization.

With respect to our first research question, unlike previous research (Clark & Maass, 1988; Feldman, 1984; Sechrist & Milford-Szafran, 2011; Sechrist & Young, 2011; Suhay, 2015), we did not find much evidence to support social connectedness as an important source factor. Information from a family member was not any more influential or persuasive than information from other sources, suggesting that, at least for these specific safety contexts, people prefer to receive information from official sources. However, it may be that the degree to which social connectedness influences the persuasiveness of a source varies depending on the specific area. That is, for information regarding safety and risk, people may prefer to rely on official organizations or those with personal experience (cf. Dunsch et al., 2019). However, in other areas, such as forming political beliefs or social attitudes, social connectedness may play a greater role (e.g., changing racial attitudes; Sechrist & Young, 2011).

Even though participants were the most influenced by and confident about their judgments and decisions based on information from an official organization, this was not the most trusted source; participants indicated that they trusted people with personal experience the most. Some previous research has highlighted that trust in a source can be more important than expertise (McGinnies & Ward, 1980). However, official organizations were the second most trusted source category and our results indicate that, provided they are considered reasonably trustworthy, expert sources can be highly influential on judgments and decisions. Nonetheless, people with personal experience were also generally a highly persuasive information source. There was no significant difference in the extent to which likelihood

judgments based on information from people with personal experience versus official organizations predicted overall travel decisions. However, the influence of people with personal experience should be interpreted with caution because judgments and decisions based on information from such people were not consistently better predictors than for the other sources.

Regarding our second research question, we found that although the information from an official organization was consistently the most influential for the overall judgments and decisions made, all the sources were significant predictors of the overall judgments and decisions made. These findings are consistent with previous research that has found that participants consider information from all (expert) sources when forming overall judgments but also weight the source depending on factors such as accuracy rather than treating all sources as equivalent (Budescu et al. 2003; Budescu & Rantilla, 2000; Budescu & Yu, 2006; 2007; Yaniv & Milyavsky, 2007). Our results suggest that when presented with information from diverse sources, participants do consider all the sources for their overall judgments and were able and willing to combine information from multiple sources to form an overall judgment. This suggests that within both research contexts and everyday life, it is important to consider all potential sources of information that people may receive about a topic because they all may impact overall judgments and/or decisions made. However, participants assigned extra weight to information from official organizations, operationalized within the current study as the World Health Organization (in the pandemic context) and the United Nations Refugee Agency (in the migration context). This may suggest that participants assume these sources are more likely to be accurate or to be basing the information that they are conveying on more pieces of information than the other sources.

Regarding our third research question, results for the sharing of information and likelihood ratings showed that in almost all circumstances people were willing to share the

information and their *likelihood of safety* ratings with another traveler in similar circumstances to themselves. However, people were generally less willing to share information from a family member for all levels of the verbal likelihood. This finding for sharing information from a family member may reflect a general tendency for people to consider this information more private than information from other sources (Petronio & Child, 2020).

Context-Specific Numerical Interpretations of Verbal Likelihood Descriptions

Even though the *likelihood of safety* ratings and willingness to travel decreased when any of the sources stated that it was *unlikely* or *very unlikely* to be safe to travel, participants still gave *likelihood of safety* ratings of approximately 50% and generally expressed willingness to travel, particularly in the migration context. This finding is somewhat inconsistent with previous research into how people interpret guidelines, which has found that although people do not necessarily interpret verbal descriptors of likelihood in the way intended by guidelines, they still rated *unlikely* and *very unlikely* as below 50% likelihood (Budescu et al., 2014; Wintle et al., 2019). Wintle et al. (2019) used verbal likelihood statements taken from publicly available US intelligence reports and found median likelihood judgments for both *very unlikely* and *unlikely* were below 25%. However, Budescu et al. (2014) used sentences from IPCC reports containing verbal likelihood statements and found that participants rated *very unlikely* and *unlikely* as both fairly close to 50% (medians for both in the 40–45% range). In the current study, we asked participants about the likelihood of their own safety. Consequently, personal optimism bias (Bottemanne et al., 2020) may have led participants to give higher ratings because they were biased towards thinking that negative events will not happen to them.

Differences between these studies in the numerical likelihood ratings that participants assign to the same verbal likelihood descriptors may also suggest that participants were being

influenced by contextual cues (Brun & Teigen, 1988; Weber & Hilton, 1990; Wogalter et al. 1999). It may be that because we asked about the *likelihood of safety*, participants thought that even terms such as *unlikely* or *very unlikely* to be safe were not indicative that they were actually more likely to be unsafe than safe. Within the contexts of a pandemic and a risky migrant boat journey, many sources would strongly advise against travel and describe it as unlikely to be safe, even if the chances of actual injury, illness, or death are considerably lower than 50%. For example, many sources would strongly advise against engaging in an activity that had a 10% risk of causing serious injury, even though there is a 90% likelihood that one will be safe. Participants interpreting information in this way is consistent with pragmatic accounts of communication and the idea that people infer the motivations of those communicating risk (Collins & Hahn, 2018; Juanchich et al., 2012).

The degree of personal relevance and prior knowledge for the different scenarios used may also influence the interpretations of verbal likelihood descriptors. For example, Weber & Hilton (1990) found that within a medical setting, participants' interpretations of verbal likelihood descriptors were impacted by their personal perceptions of the base rate of the event occurring. In the current study, we focused on travel during a pandemic and taking a boat across the sea as part of a migration journey. Participants may not have had pre-existing base rates for these contexts because a worldwide pandemic is a rare event that most people are unlikely to have ever experienced before. The participants in our study, recruited from the general population, are also unlikely to be familiar with taking a boat as part of a forced migration journey. However, both of these contexts refer to highly emotive issues that have received considerable media attention. Therefore, participants may have had prior beliefs about the risks and likelihood of safety present in both contexts.

If participants imagined themselves as a forced migrant attempting to reach a safe country, then this may explain the greater willingness to travel in the migration context.

Specifically, they may see this as a more desperate circumstance with higher stakes, and, therefore, they may be willing to travel even in the face of great risk. Additionally, by taking a dangerous boat journey, a forced migrant may also be reducing other risks because they are moving from an unsafe environment to a safer country. In contrast, traveling during a pandemic involves an increased risk of negative outcomes without reducing other risks.

No Impact of the Modifier Word 'Very' in the Verbal Likelihood Description

Across all dependent variables, including the key measures of *likelihood of safety* ratings and travel decisions, participant responses did not differ in their responses for *likely* versus *very likely* or for *unlikely* versus *very unlikely*. Consistent with previous research, our findings highlight the difficulty of communicating likelihoods using verbal descriptors and suggests that people may be unlikely to interpret verbal descriptors of likelihood in the way intended by a communicator (Beyth-Marom, 1982; Budescu et al., 2014; Honda & Yamagishi, 2006; 2009; Wintle et al. 2019). In their review, Moxey and Sanford (2000) highlighted that effects of modifier words such as *very* are not consistently found, particularly when participants only make a single judgment for a single verbal likelihood descriptor. However, within our study, most participants would have seen some pieces of information that contained the term 'very' and some which did not, so it is somewhat surprising that no effects emerged given participants had the opportunity to (at least implicitly) make contrasts between the verbal likelihood descriptors. This further highlights the difficulty of accurately communicating using verbal likelihood descriptors. Our results show that even when participants see the terms *very likely* and *likely* or *very unlikely* and *unlikely* within the same study, these terms are still sufficiently vague and imprecise that participants do not distinguish between them when making judgments and decisions.

There are several pre-existing recommendations for addressing issues with the interpretation of verbal likelihoods, including various formats that can be used to display

numerical likelihoods alongside verbal descriptors such as in a reference table, or in brackets (Budescu et al., 2014; Wintle et al., 2019). Therefore, to increase the clarity of interpretation and usefulness of communications regarding safety risks, it may be beneficial to include numerical likelihoods in addition to, or even instead of, verbal descriptions of likelihood. Barnes (2016) found that adding numerical probabilities to Canadian intelligence reports improved the quality of analytical judgments made. This result suggests that including numerical probabilities can work effectively in practice in areas where verbal likelihood descriptors have traditionally been relied on. Such additions would need to consider potential issues with the understanding of risk and uncertainty (e.g., Spiegelhalter, 2008), 'statistical literacy' more broadly (e.g., Gal, 2002), and follow good practice in communicating probability (e.g., Spiegelhalter, 2017) to achieve the desired outcomes.

Limitations

There are several important caveats for our findings on how participants combine and integrate information from multiple sources. First, we found that official organizations are the most influential, but this result may vary depending on the specific organizations chosen. In the current study, we chose to use well respected international organizations for the official organizations. These organizations need to diplomatically navigate the sometimes-conflicting interests of their member states, and as such, may be seen as relatively impartial. However, the findings may not generalize to other types of official organizations, such as a national government, particularly if those organizations are highly politicized. Indeed, even international organizations, if they were to become increasingly political, may end up being less influential (De Vries et al., 2021; Ecker-Ehrhardt, 2014; Peters et al., 2020).

Another important aspect of our study to consider is that participants were explicitly making judgments and decisions after being presented with information from each source. This differs considerably from how people usually interact with information that they

encounter in the real-world, where source information may be received at different points in time. Presenting all the source information prior to participants' decisions may have increased the likelihood that they would consider and use information from all of the sources when making their overall judgments and decisions. Finally, it is also important to note that the results presented are based on a single study. Therefore, even though there was a large sample size and the study was preregistered, the findings should be considered somewhat tentative until they are independently replicated and further research is conducted.

General Conclusions

Overall, our results make clear that judgments and decisions were highly influenced by official organizations when that information was positive (i.e., indicated participants were more likely to be safe) and that people were more willing to share information that comes from official sources. We found that the way participants responded to information indicating they were *likely* or *very likely* to be safe differed depending on the source. This result highlights that the source of verbal likelihood information can interact with the specific verbal likelihood information conveyed. The source can also differentially impact the way that people interpret and share that information. These findings also suggest that people will give additional weight to sources that have relevant expertise, knowledge, and advice about pandemics. Moreover, they suggest that official organizations are an effective source for communicating guidelines and safety information. However, it is important to note that the greater influence of official organizations may depend on the specific institutions involved, with some being less persuasive (e.g., if they are seen as politicized or polarizing). Although official organizations were the most influential, we also found that all sources of information influenced overall judgments and decisions, so it may be important to be aware of the extent to which other sources are communicating information that is inconsistent with evidence-based recommendations. Additionally, the results for verbal likelihood descriptors show that

people do not discriminate well between different levels of emphasis regarding communication of safety. Therefore, care should be taken when communicating pandemic-related risk, because people will likely focus primarily on the directionality of the message without considering the level of likelihood or emphasis surrounding the message when calibrating their judgments and decisions.

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How Safe is this Trip? Judging Personal Safety in a Pandemic Based on Information from Different Sources: Supplementary Material

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Table S1

Emmeans Contrasts for Main Effects on Likelihood of Safety Judgments

Contrast	Estimated Difference	Lower 95% HPD	Upper 95% HPD	N Overlap
Migration - Pandemic	2.89	1.66	4.20	
Family - News	-0.78	-1.79	0.22	
Family - Official Organization	-1.18	-2.27	-0.07	*
Family - Personal Experience	-0.80	-1.86	0.19	
Family - Travel Organizer	2.86	1.81	3.87	*
News - Official Organization	-0.41	-1.51	0.69	
News - Personal Experience	-0.01	-1.04	0.98	
News - Travel Organizer	3.63	2.52	4.59	*
Official Organization - Personal Experience	0.39	-0.72	1.39	
Official Organization - Travel Organizer	4.04	2.92	5.15	*
Personal Experience - Travel Organizer	3.65	2.62	4.68	*
Likely - Unlikely	17.47	16.47	18.44	*
Likely - Very Likely	-1.14	-2.10	-0.20	*
Likely - Very Unlikely	18.26	17.29	19.32	*
Unlikely - Very Likely	-18.62	-19.57	-17.60	*
Unlikely - Very Unlikely	0.80	-0.24	1.77	
Very Likely - Very Unlikely	19.40	18.43	20.42	*

Table S2

Emmeans Contrasts for Main Effects on Travel Decisions

Contrast	Estimated Difference	Lower 95% HPD	Upper 95% HPD	N Overlap
Migration - Pandemic	0.073	0.034	0.112	
Family - News	-0.001	-0.032	0.035	
Family - Official Organization	0.038	0.002	0.072	*
Family - Personal Experience	0.018	-0.019	0.052	
Family - Travel Organizer	0.048	0.011	0.082	*
News - Official Organization	0.039	0.001	0.074	*
News - Personal Experience	0.019	-0.020	0.053	
News - Travel Organizer	0.048	0.012	0.088	*
Official Organization - Personal Experience	-0.021	-0.056	0.019	
Official Organization - Travel Organizer	0.010	-0.028	0.048	
Personal Experience - Travel Organizer	0.029	-0.006	0.070	
Likely - Unlikely	0.287	0.240	0.340	*
Likely - Very Likely	-0.007	-0.017	0.003	
Likely - Very Unlikely	0.346	0.294	0.398	*
Unlikely - Very Likely	-0.294	-0.345	-0.243	*
Unlikely - Very Unlikely	0.059	0.014	0.107	*
Very Likely - Very Unlikely	0.354	0.301	0.406	*

Table S3

Emmeans Contrasts for Main Effects on Decisions to Share Information

Contrast	Estimated Difference	Lower 95% HPD	Upper 95% HPD	N Overlap
Migration - Pandemic	0.023	0.011	0.037	
Family - News	-0.048	-0.071	-0.026	*
Family - Official Organization	-0.063	-0.086	-0.041	*
Family - Personal Experience	-0.044	-0.066	-0.022	*
Family - Travel Organizer	-0.026	-0.048	-0.004	*
News - Official Organization	-0.015	-0.030	-0.003	*
News - Personal Experience	0.004	-0.013	0.020	
News - Travel Organizer	0.022	0.006	0.040	*
Official Organization - Personal Experience	0.019	0.004	0.033	*
Official Organization - Travel Organizer	0.037	0.022	0.054	*
Personal Experience - Travel Organizer	0.018	0.001	0.036	*
Likely - Unlikely	-0.008	-0.018	0.003	
Likely - Very Likely	-0.004	-0.015	0.007	
Likely - Very Unlikely	-0.018	-0.028	-0.008	*
Unlikely - Very Likely	0.004	-0.006	0.014	
Unlikely - Very Unlikely	-0.010	-0.019	-0.001	*
Very Likely - Very Unlikely	-0.014	-0.023	-0.005	*

Table S4

Emmeans Contrasts for Main Effects on Decisions to Share Likelihood Ratings

Contrast	Estimated Difference	Lower 95% HPD	Upper 95% HPD	N Overlap
Migration - Pandemic	0.009	-0.001	0.019	
Family - News	-0.014	-0.025	-0.004	*
Family - Official Organization	-0.023	-0.036	-0.011	*
Family - Personal Experience	-0.017	-0.029	-0.007	*
Family - Travel Organizer	-0.010	-0.022	0.001	
News - Official Organization	-0.009	-0.019	0.001	
News - Personal Experience	-0.003	-0.013	0.006	
News - Travel Organizer	0.004	-0.006	0.015	
Official Organization - Personal Experience	0.005	-0.004	0.015	
Official Organization - Travel Organizer	0.013	0.002	0.024	*
Personal Experience - Travel Organizer	0.008	-0.003	0.018	
Likely - Unlikely	0.008	0.001	0.015	*
Likely - Very Likely	0.000	-0.005	0.006	
Likely - Very Unlikely	0.001	-0.004	0.007	
Unlikely - Very Likely	-0.007	-0.014	-0.001	*
Unlikely - Very Unlikely	-0.007	-0.014	-0.000	*
Very Likely - Very Unlikely	0.001	-0.005	0.006	

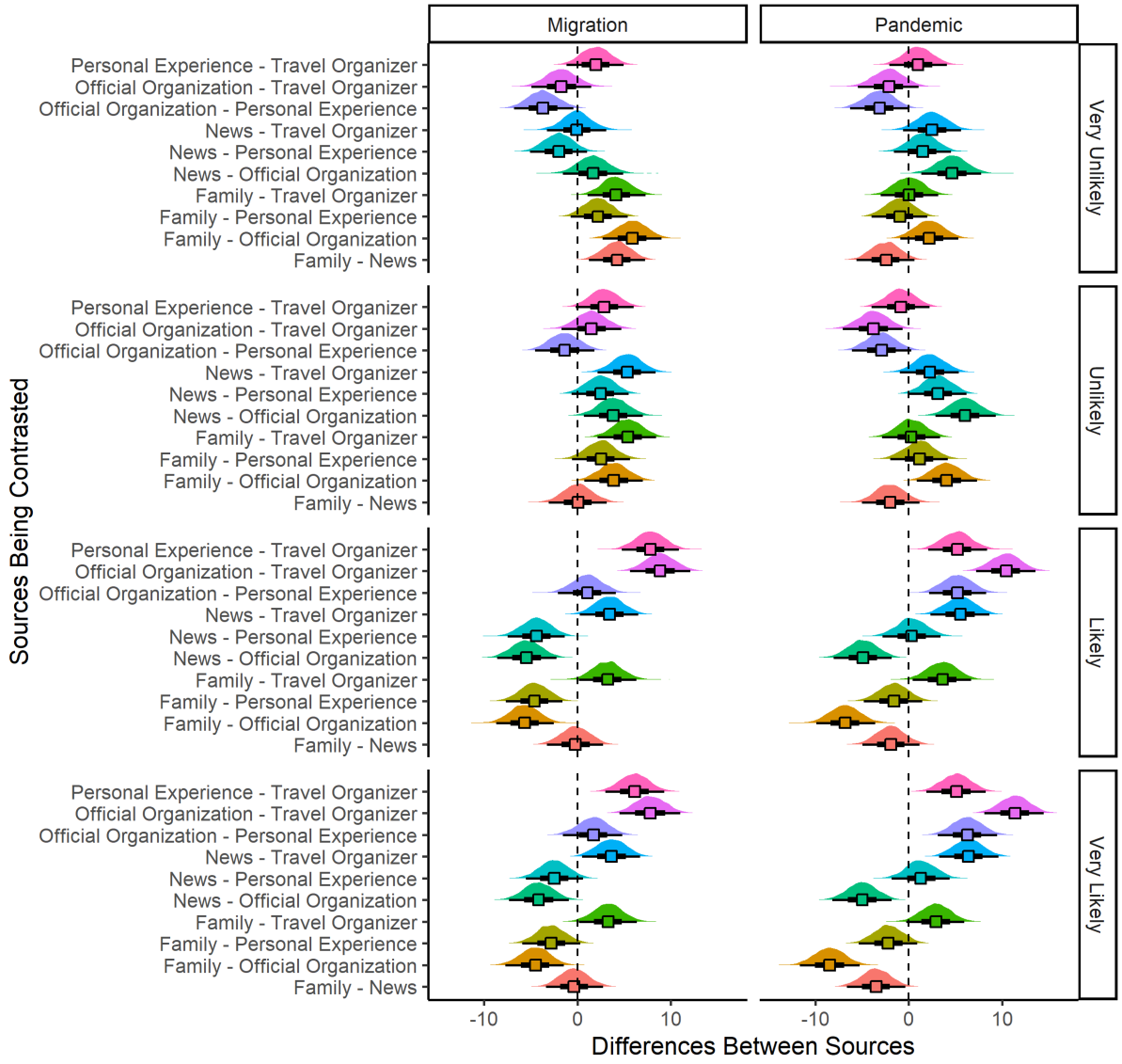
Table S5

Emmeans Contrasts for Main Effects on Distributions of Confidence Ratings for the Likelihood of Safety Judgments

Contrast	Estimated Difference	Lower 95% HPD	Upper 95% HPD	N Overlap
Migration - Pandemic	-0.51	-1.44	0.38	
Family - News	-0.81	-1.64	0.16	
Family - Official Organization	-4.18	-5.16	-3.21	*
Family - Personal Experience	-1.72	-2.60	-0.88	*
Family - Travel Organizer	-0.82	-1.71	0.07	
News - Official Organization	-3.36	-4.30	-2.39	*
News - Personal Experience	-0.91	-1.84	-0.04	*
News - Travel Organizer	-0.01	-0.89	0.95	
Official Organization - Personal Experience	2.46	1.49	3.45	*
Official Organization - Travel Organizer	3.36	2.36	4.39	*
Personal Experience - Travel Organizer	0.89	-0.05	1.75	
Likely - Unlikely	2.81	1.90	3.59	*
Likely - Very Likely	-0.86	-1.73	-0.02	*
Likely - Very Unlikely	2.18	1.33	3.01	*
Unlikely - Very Likely	-3.66	-4.48	-2.78	*
Unlikely - Very Unlikely	-0.61	-1.46	0.24	
Very Likely - Very Unlikely	3.03	2.18	3.90	*

Figure S1

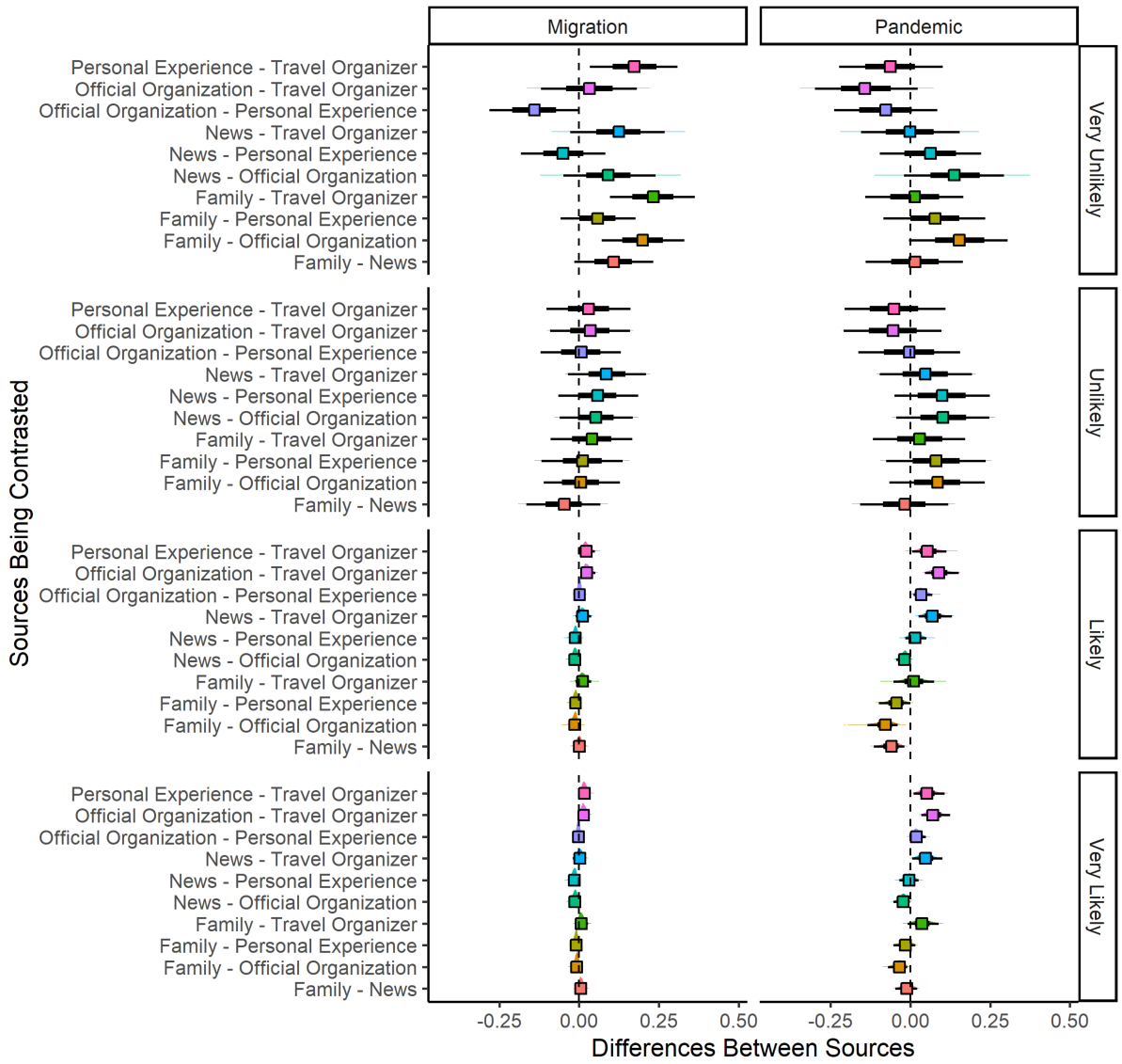
Emmeans Contrasts Between Sources for Likelihood of Safety Judgments



Note. Squares represent medians, inner bars represent 66% highest posterior density intervals, and outer bars represent 95% highest posterior density intervals.

Figure S2

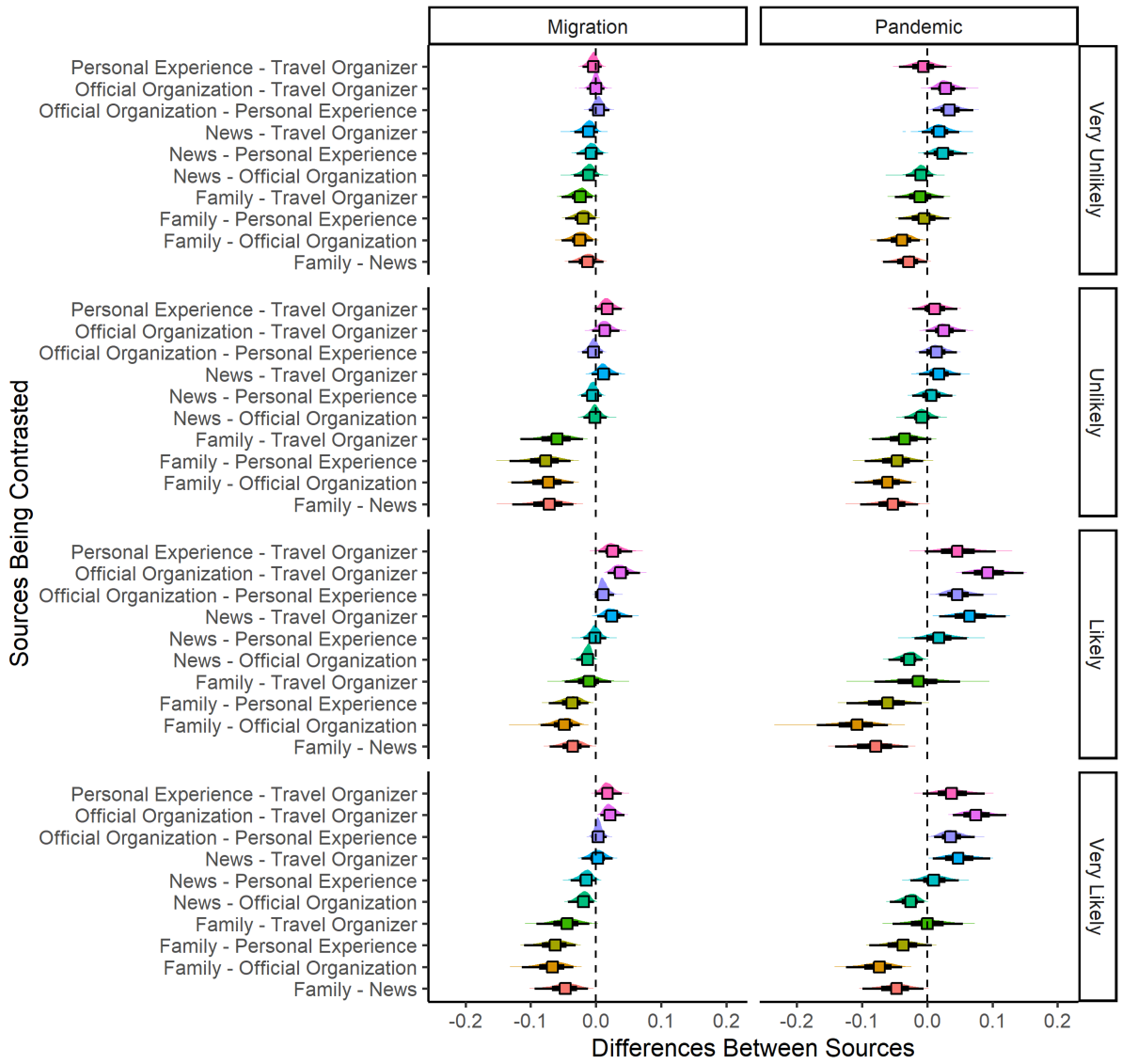
Emmeans Contrasts Between Sources for Travel Decisions



Note. Squares represent medians, inner bars represent 66% highest posterior density intervals, and outer bars represent 95% highest posterior density intervals.

Figure S3

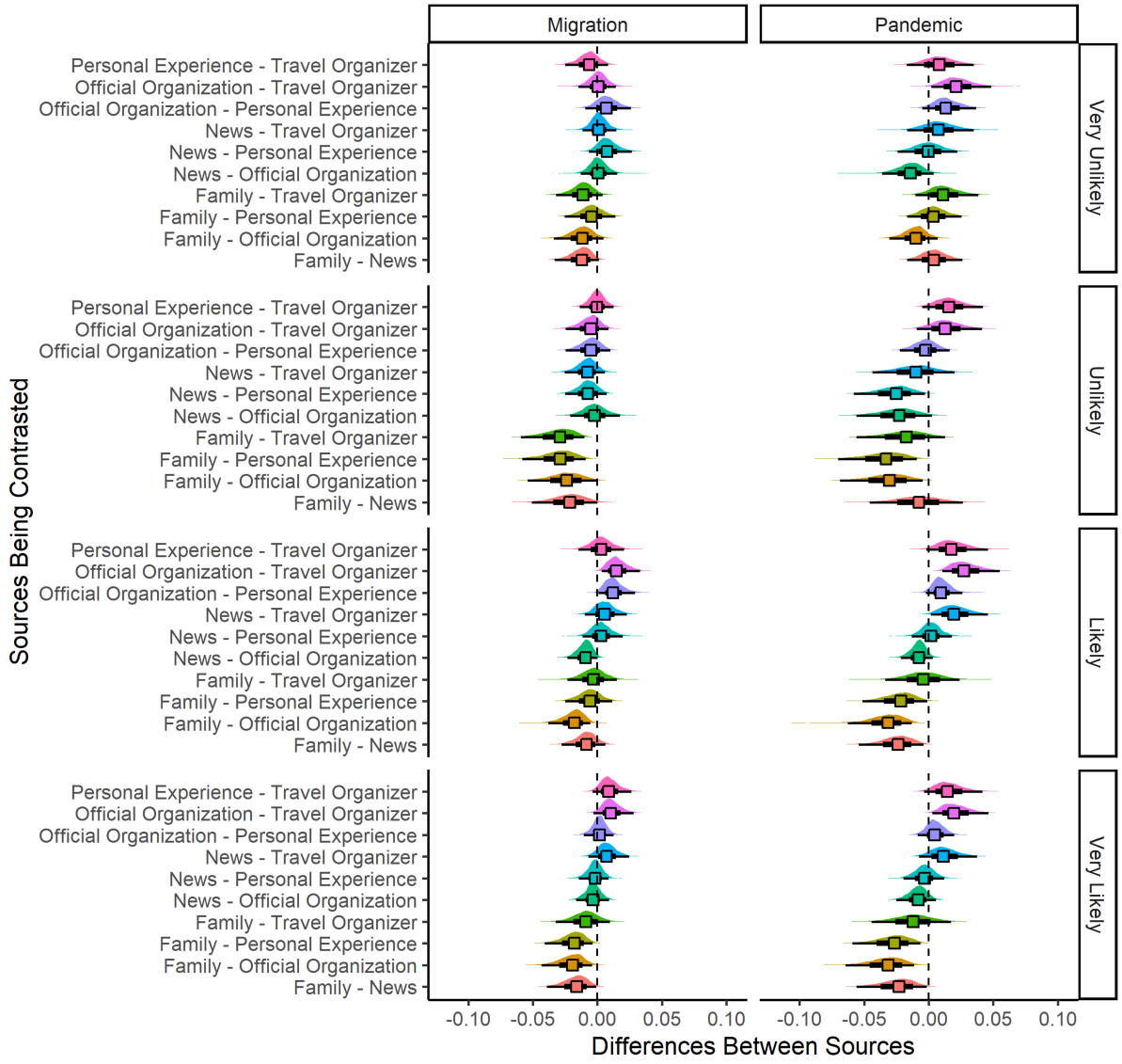
Emmeans Contrasts Between Sources for Decisions to Share Information



Note. Squares represent medians, inner bars represent 66% highest posterior density intervals, and outer bars represent 95% highest posterior density intervals.

Figure S4

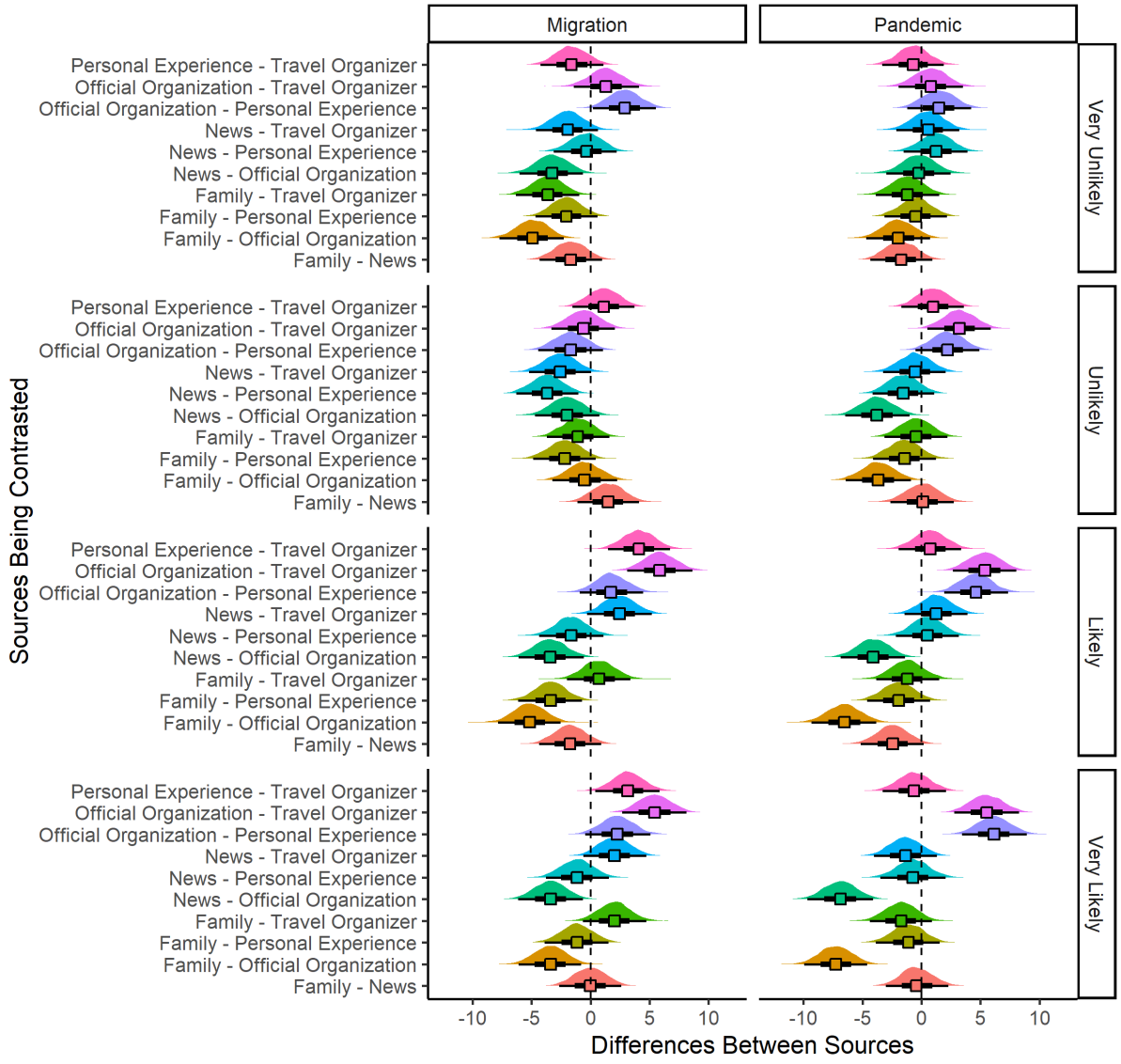
Emmeans Contrasts Between Sources for Decisions to Share Likelihood Ratings



Note. Squares represent medians, inner bars represent 66% highest posterior density intervals, and outer bars represent 95% highest posterior density intervals.

Figure S5

Emmeans Contrasts Between Sources for Confidence Ratings for the Likelihood of Safety Judgments



Note. Squares represent medians, inner bars represent 66% highest posterior density intervals, and outer bars represent 95% highest posterior density intervals.