Priorities for Preventive Action:
Explaining Americans' Divergent Reactions to 100 Public Risks

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Abstract: Why do Americans' priorities for combating risks like terrorism, climate change, and violent crime often seem so uncorrelated with the dangers that those risks objectively present? Many scholars believe the answer to this question is that heuristics, biases, and ignorance cause voters to misperceive risk magnitudes. By contrast, this paper argues that Americans' risk priorities primarily reflect judgments about the extent to which some victims deserve more protection than others and the degree to which it is appropriate for government to intervene in different areas of social life. The paper supports this argument with evidence drawn from a survey with 3,000 respondents, using pairwise comparisons to elicit novel measures of how respondents perceive nine dimensions of 100 life-threatening risks. Respondents were well-informed about these risks' relative magnitudes – the correlation between perceived and actual mortality was 0.82 – but those perceptions explained relatively little variation in policy preferences relative to judgments about the status of victims and the appropriate role of government. These findings hold regardless of political party, education, and other demographics. The paper thus argues that the key to understanding Americans' divergent reactions to risk lies more with their values than with their grasp of factual information.

The data, code, and any additional materials required to replicate all analyses in this article are available on the American Journal of Political Science Dataverse within the Harvard Dataverse Network, at: https://doi.org/10.7910/DVN/ZSJA25.

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Priorities for Preventive Action

The U.S. government spends over $100 billion per year fighting terrorism, a risk that kills about as many Americans as lightning strikes and accidents involving home appliances (Mueller and Stewart 2016). President Trump has said that one of his primary objectives is reducing violent crime, even though this problem is at historic lows nationwide (Lee 2017). Meanwhile, the looming threat of climate change could cause vast global harm. Extreme weather induced by global warming may already kill more Americans than terrorists do (Mann et al. 2017), yet preventing climate change consistently ranks near the bottom of voters' policy priorities (Egan and Mullin 2017).

What explains Americans' divergent reactions to risk? In particular, why do Americans' priorities for reducing risk often seem so uncorrelated with the danger that those risks objectively present? Many scholars believe the answer to this question is that heuristics, biases, and ignorance cause voters to misperceive risk magnitudes (e.g., Slovic 2000; Loewenstein et al. 2001; Posner 2004; Sunstein 2004; Gigerenzer 2006; Mueller 2006; Gadarian 2010; Slovic 2010; Weber and Stern 2011; Meyer and Kunreuther 2017). Efforts to raise awareness of issues like climate change (IPCC 2015), opioids (Quinones 2016), artificial intelligence (Bostrom 2014), and pandemic disease (Garrett 2000) all assume that voters would assign these issues greater priority if they understood the extent of the damage these problems could cause. By the same token, efforts to combat alarmist views of terrorism (Mueller and Stewart 2016), nuclear power (Weart 2012), and violent crimes committed by immigrants (Nowrasteh 2016) assume that voters would assign these issues less priority if they did not exaggerate the magnitude of those problems. This research connects to a broad literature arguing that misinformation, media bias, and lack of political

knowledge skew the allocation of public resources (Delli Carpini and Keeter 1996; Althaus 1998; Achen and Bartels 2016; Lupia 2016).

Yet scholars possess a limited basis for understanding how misperceptions shape responses to risk. The first section of this paper explains how much of the existing literature on risk attitudes does not explicitly distinguish between factual beliefs and policy preferences, let alone examine the extent to which the former shapes the latter across issues. There are also reasons to believe that voters should be better-informed about risk magnitudes than other kinds of political knowledge. Whereas most politically-relevant facts do not directly impact citizens' daily lives, risk perceptions shape choices about what jobs to pursue, where to live, what to eat, what transportation to use, and what insurance to buy. Variations in risk size are not subtle: they range by many orders of magnitude and citizens can gauge these variations by observing their communities. For example, most Americans know far more people who have been harmed in traffic accidents than those who have been harmed in terrorist attacks. To the extent that voters are more likely to support directing government resources to counterterrorism rather than traffic safety, it is hard to believe this results from the mistaken impression that terrorists kill more Americans than motorists do.

This paper instead argues that Americans' risk priorities reflect value judgments, particularly regarding the extent to which some victims deserve more protection than others and the degree to which it is (in)appropriate for government to intervene in different areas of social life. These subjective beliefs shape the perceived benefits and costs of government spending in ways that go beyond objective metrics like lives saved or dollars spent. The paper backs this argument with evidence drawn from a survey of 3,000 Americans, using pairwise comparisons to elicit novel measures of how respondents perceive nine dimensions of 100 life-threatening risks. In explicitly

distinguishing between respondents' risk perceptions and policy priorities across a large and principled universe of cases, this is the most systematic study of its kind to date.

The data show that respondents accurately perceived the relative magnitudes of life-threatening risks: the correlation between perceived and actual mortality across the 100 risks in this study was 0.82 ($p<0.001$). Yet, consistent with the paper's theoretical argument, perceptions of objective harm explained less variation in respondents' policy priorities than judgments regarding the status of victims and the appropriate role of government. These findings hold regardless of partisanship, education, and other demographics. We will thus see that Republicans and Democrats both hold relatively accurate perceptions of which risks cause more harm than others, but neither affords those perceptions much weight when considering how to allocate public funds.

For example, even though respondents assigned terrorism the third-highest priority among risks covered by the survey, they did not see this problem as being particularly deadly. On this measure, terrorism ranked 51st out of 100 risks, around the same level as bicycle accidents and tornadoes. Instead, respondents said that terrorism was exceptionally unfair to its victims (ranked #2, behind only child abuse) and that governments have special obligations to protect citizens from this danger (again #2, behind only nuclear war). Reasonable people can disagree on these matters, but that is also the point: the judgments that best predict respondents' risk priorities do not lend themselves to clear standards of correctness, and they are conceptually distinct from the heuristics and biases that scholars often use to explain Americans' divergent reactions to risk.

These findings raise further questions about how voters form subjective judgments regarding the status of victims and government's normative obligations. It is possible that those judgments reflect other attributes, or that voters use these judgments to justify policies that they support for other reasons. It is nevertheless important to understand that these are the terms voters use to

defend their risk priorities. The main reason that voters are so concerned with risks like terrorism and violent crime is not because they think these problems are especially common, but because they say these problems are especially objectionable. Should one still see these priorities as misguided, the key to productive discourse likely lies in understanding voters' values rather than contesting their factual beliefs (cf. Douglas and Wildavsky 1982; Gastil et al. 2011; Haidt 2012; Kahan 2015).

Separating risk perceptions and policy priorities

Most of the U.S. federal budget is devoted to protecting citizens from risk. In fiscal year 2016, for example, 30% of federal spending funded health care, 24% supported national security, and 23% financed Social Security.[1] The remaining 23% of federal funds included programs for law enforcement, flood mitigation, fire prevention, unemployment insurance, environmental protection, food assistance, and interest paid on debts accrued from previous risk-reducing expenditures. Understanding how voters' perceptions of risk shape priorities for public spending is thus crucial to understanding how government functions in the United States and in most other developed countries.

Yet scholars do not always draw clear distinctions between risk perceptions and policy preferences. Surveys measuring risk attitudes often focus on understanding which risks "worry" or "concern" respondents to different degrees or why respondents see some dangers as being "riskier" than others (e.g., Finucane et al. 2000; Huddy et al. 2005; Howe et al. 2015; Kahan 2015).

[1] Unless otherwise noted, all figures in this paper regarding mortality and public spending come from U.S. government statistics, documented in Supplementary Sections 11-12.

While these surveys offer crucial insights for understanding risk as a psychological construct, they do not directly capture how respondents perceive objective danger or how they prefer the government to allocate scarce resources.

Polling on terrorism, for instance, consistently shows that roughly half of Americans are "very worried" or "somewhat worried" that someone in their families will be killed in a terrorist attack. Yet most Americans also consistently say that terrorist attacks are "not too likely" or "not at all likely" in the short run, and terrorism typically ranks low in polls asking voters to identify the most important problems facing the country today (Mueller and Stewart 2016, 81-88). "Worrying" about terrorism thus says little, by itself, about respondents' factual perceptions or their policy priorities, let alone how the former shapes the latter.

Voters can also justifiably prioritize risks they know to be objectively small. For example, one of the most contentious issues in contemporary U.S. politics is whether Americans should be allowed to own assault rifles. The political attention this issue receives is disproportionate to the mortality that assault rifles cause, which amounts to roughly 100-200 deaths per year. It is possible that some people feel so strongly about this risk because they overestimate its magnitude (Beckett 2014). But even if gun control advocates understand that assault rifles cause relatively few deaths, they might believe those deaths are so odious that the government should remove assault weapons from circulation. Some voters may also favor assault weapons legislation in order to build momentum towards broader gun control. Showing that voters worry about assault weapons or favor their restriction thus says little about how they perceive the danger that these weapons pose.

These examples demonstrate the need to distinguish risk perceptions from policy preferences in order to understand public responses to risk, and furthermore to separate perceptions of objective harm from subjective beliefs about why some risks deserve greater priority than others. Given the

demands of collecting these data, scholars often focus their research on salient risks like terrorism (Lerner et al. 2003), climate change (Egan and Mullin 2017), and gun ownership (Kahan and Braman 2003). These studies provide rigorous insight into controversial issues – yet precisely because these issues are unusually controversial, they may not reflect how the public sets risk priorities writ large. In order to understand Americans' divergent reactions to risk, researchers must analyze factual beliefs, value judgments, and policy priorities across a universe of cases that can sustain general inference. The next two sections describe a conceptual framework and a survey methodology designed to meet these criteria.

The paper focuses specifically on attitudes towards life-threatening problems, otherwise known as "public risks" (Keeney 1980). This excludes economic risks and programs designed solely for environmental protection, though environmental issues fall within the analysis as they relate to health and safety. This scope condition serves a theoretical purpose, as the next section explains why voters have special incentives and opportunities to gather information about life-threatening matters. Though limiting the analysis to public risk entails some loss of generality, the study still covers a broad range of issues which occupy the majority of U.S. government expenditures.

The paper thus contributes to the study of risk as well as to scholarship on attitudes towards public spending writ large (e.g., Bartels 1991; Hartley and Russett 1992; Jacoby 2000; Rudolph and Evans 2005; Faricy and Ellis 2014). Both literatures aim to understand how voters approach tradeoffs among basic goals like national security, environmental conservation, and public health. With the U.S. budget deficit projected to double within the next decade (Congressional Budget Office 2017), it is increasingly important to understand how voters set priorities for public spending and why they disagree over what these priorities should entail.

Facts, values, and priorities for public spending

If misperceptions of risk magnitudes drive voters' priorities for public spending, then two assumptions must hold. First, the public must misperceive the harm that risks cause. Second, perceptions of harm must play a major role in shaping voters' policy preferences. This section questions both of those claims, arguing that voters should be better-informed about risk magnitudes than other kinds of politically-relevant facts, and explaining why the key to understanding risk priorities likely lies with value judgments rather than factual beliefs.

Why voters should be better-informed about risk magnitudes than other politically-relevant facts

Americans possess a limited grasp of politically-relevant information (Delli Carpini and Keeter 1996; Achen and Bartels 2016; Lupia 2016). Surveys show that a majority of Americans cannot name the Speaker of the House, say how many votes it takes to override a presidential veto, or estimate the size of the federal deficit within two orders of magnitude. The standard explanation for these findings is that most political knowledge does not directly impact citizens' daily lives, and since there is virtually no chance that a single ballot will swing an election, individuals have little incentive to make informed votes (Downs 1957).

There are, however, at least three reasons for expecting voters to be better-informed about public risks than other politically-relevant facts. First, public risks have concrete implications for citizens' daily lives. Though it is hard to see why most people would be materially better-off knowing the name of the Speaker of the House, voters have obvious incentives to maximize their personal health and safety. And while private citizens have no direct control over the size of the budget deficit, they can regulate many aspects of their risk exposure. Rational individuals should

thus place greater value on acquiring information about public risk relative to other forms of politically-relevant knowledge.

Citizens also have more opportunities to gather information about public risk than other kinds of politically-relevant facts. In some areas of politics, citizens' access to information depends largely on media and elites. This dependence fosters bias and manipulation (Page and Shapiro 1992, 355-382), and similar dynamics can shape perceptions of risk (Pidgeon et al. 2003; Sunstein 2004, 89-107; Gadarian 2010). Yet most Americans consult regularly with doctors for the express purpose of gathering unbiased information about health and safety, and citizens can infer risk magnitudes simply by observing their communities. Almost everyone knows more people who have been harmed by cancer, heart disease, or traffic accidents than those who have died from terrorism, earthquakes, or drownings. While these cues are imperfect, they further reflect how risk magnitudes impact voters' personal lives in ways that other forms of political knowledge do not.

The sheer range of risk magnitudes that Americans face should furthermore dilute the impact of factual misperceptions. Even if a voter falsely believed that terrorists kill 10,000 Americans annually, that would remain a small fraction of the mortality caused by risks like air pollution, diabetes, or medical error. Most public risks that kill 10,000 Americans per year receive little political attention, such as infant mortality (23,000 deaths), falling (33,000 deaths), and suicide (45,000 deaths). In order for factual misperceptions to explain the mismatch between risk magnitudes and public spending, those misperceptions must be consistently enormous. This is, of course, possible – but it could also be the case that Americans prefer to spend greater amounts of money fighting terrorism relative to other public risks because they see these dangers as being qualitatively distinct in ways that go beyond actuarial data.

Subjective determinants of risk priorities

There are three main reasons why voters' risk priorities need not correlate with perceptions of objective harm. First, voters may believe that some victims deserve more protection than others. For example, the mortality rate among motorcyclists is far larger than the probability that a randomly-chosen American will be killed by a terrorist. Yet motorcyclists knowingly accept risk, whereas terrorists' victims bear no responsibility for their deaths. It is therefore reasonable to believe that the federal government should prioritize counterterrorism over motorcycle safety, even with the knowledge that terrorism claims many fewer lives.

A substantial volume of research confirms that perceptions of agency shape citizens' willingness to tolerate public risk. Risks that seem inequitably distributed, that cause intense pain and suffering, or that result from malign actions also tend to provoke special concern (Fischhoff et al. 1981; Slovic 2000; Viscusi 2010). From a practical standpoint, we can combine these attributes into judgments about the degree to which risks are *unfair* to their victims.[2] Child abuse, floods, and school shootings are additional cases where voters could see victims as deserving special protection, even if those problems are much less common than risks like smoking, alcoholism, or obesity.

A second reason why voters' risk-reduction priorities may not match perceptions of harm concerns beliefs about the appropriateness of government intervention in different areas of social life. For example, the U.S. Constitution protects the rights of citizens to own firearms. Only the most ardent gun control advocates would therefore ban gun ownership entirely, even though shootings are the third most-common cause of death for American children. Conversely, most

[2] See Haidt (2012) on how perceptions of fairness shape policy preferences more generally.

voters presumably agree that governments possess special obligations to protect soldiers from harm, even in conflicts with relatively few battle deaths, and even though soldiers in an all-volunteer military knowingly accept the risk of combat. Thus, even if voters understand that the number of American children killed by firearms is far larger than the number of American soldiers killed in action – and even if they see the former as being more unfair to its victims than the latter – they might still believe that the federal government should prioritize protecting soldiers over controlling guns.

A second value judgment that can shape voters' risk priorities is thus the degree to which government bears a *responsibility to protect* citizens from some risks over others. Voters may see this responsibility as being especially high in cases where citizens cannot protect themselves from risks without government assistance, as with providing clean drinking water or maintaining safe infrastructure. Voters may also see the government as bearing special responsibilities to protect citizens from risks that have potentially-irreversible consequences (such as climate change) or risks that affect society at large (such as pandemic disease).[3]

It is important to note that the government's "responsibility to protect" citizens from harm is not synonymous with voters' preferences for public spending themselves. For instance, saying that government bears a special responsibility to prevent crime does not mean that law enforcement should occupy huge fractions of the federal budget. In practice, law enforcement is indeed largely delegated to individual cities and states. Similarly, there is no contradiction in arguing that the government bears a special responsibility for maintaining nuclear defenses while also arguing that

[3] These factors also play a major role in studies of "acceptable risk" (Fischhoff et al. 1981; Slovic 2000).

the country should cut the cost of its nuclear arsenal.[4] The reluctance of many voters to support humanitarian interventions abroad provides a particularly vivid example how a perceived responsibility to protect people from harm does not imply willingness to take costly action.

Perceptions of harm, fairness, and governmental responsibility establish a basic framework for describing how the public evaluates risk-reducing programs. Though these factors are not necessarily orthogonal to each other, the purpose of this discussion is to establish that these attributes can vary independently and that each carries distinct policy implications. The degree to which voters actually draw these distinctions in practice – and the extent to which those distinctions actually explain independent variation in voters' risk priorities – are empirical questions which the paper examines below. Supplementary material provides additional analysis of how survey respondents justified their beliefs regarding fairness and responsibility in different ways.[5]

[4] Indeed, this study's respondents ranked nuclear war first out of 100 risks with respect to the responsibility that government bears for protecting its citizens but twenty-first in priorities for public spending, beneath dozens of risks that receive fewer federal resources.

[5] These data show that respondents were more likely to justify judgments of fairness based on victims' control over risk exposure; whether the risk was deliberately inflicted on victims; and whether the risk caused extreme pain and suffering. By contrast, respondents were more likely to say that the government bears responsibility for reducing risks that affect more citizens; when citizens cannot combat risks without public assistance; and when risk-reduction measures do not infringe civil liberties. See Supplementary Section 10.

A third reason why voters' risk priorities may not match their perceptions of harm concerns cost-effectiveness. Even if voters believe that some risk is common, unfair, and within the scope of governmental responsibility, they might assign this problem low priority if they believe that nothing can feasibly be done about it. In practice, however, it is virtually impossible to distinguish perceptions of cost-effectiveness from policy priorities themselves. The preceding discussion has explained how any definition of policy effectiveness based on objective metrics would be too narrow to capture the social utility that voters attach to public spending. Since every voter can make these judgments differently, there is ultimately little conceptual distinction between asking voters to say what resource allocations are most "cost-effective" versus what resource allocations would "do the most good," all things considered. This merely reframes the question of what voters think the optimal use of public funds entails.

The paper's conclusion returns to the question of how scholars might grapple with cost-effectiveness when studying policy preferences. Yet the difficulty of analyzing this issue does not impede testing the paper's main claims. When scholars describe how misperceptions shape risk priorities, they are almost always discussing misperceptions of risk magnitudes, not misperceptions of cost-effectiveness. The argument that Americans live in a "culture of fear" (Glassner 2010) assumes that voters exaggerate threats to their health and safety, while the argument that Americans underprepare for risks like climate change, hurricanes, and pandemics implies that voters underestimate these dangers (e.g., Meyer and Kunreuther 2017). Many of the heuristics and biases that scholars use to explain these misperceptions – such as the availability heuristic (Tversky and Kahneman 1974), the affect heuristic (Loewenstein et al. 2001), probability neglect (Sunstein 2004), and consequence neglect (Posner 2004) – involve mechanisms that distort estimates of risks' objective magnitudes. This section has argued that these misperceptions may in

fact play a relatively limited role in explaining Americans' divergent reactions to risk, suggesting that the key to understanding voters' risk priorities lies more with their values than with their grasp of factual information.

Secondary determinants of risk priorities: disaster potential and long-term growth

So far, this section has described risk "magnitudes" with respect to the harm that risks currently cause. Yet this is not the only consideration that shapes expected cost. For instance, voters might believe that even if terrorists kill relatively few Americans each year, the mere prospect of a major attack warrants special concern. In the case of climate change, voters might believe that even if the United States does not suffer huge costs from global warming right now, failing to stop that problem could have major, long-term consequences. *Disaster potential* and *long-term growth* thus belong in any analysis of how voters establish their risk priorities.

Nevertheless, these factors likely play less of a role in shaping voters' policy preferences than beliefs about the status of victims and the appropriate role of government. The main issue again concerns how risk sizes range across so many orders of magnitude. Take the example of war, an archetypal risk with high disaster potential. Even if major wars are rare, it makes sense that governments devote substantial resources to national security. Yet cancer kills roughly the same number of Americans every year as all the U.S. soldiers who have died fighting all the country's foreign wars combined. Only the most disastrous armed conflicts cause a greater loss of life than cancer on an annual basis, let alone over any sustained period. It is therefore difficult to justify the imbalance of spending between these domains based on health and safety alone, even when assigning substantial weight to low-probability, high-consequence scenarios.

Similarly, few risks have enough growth potential to approach the top of the mortality rankings if they are not there already. Over the past fifteen years, for instance, the number of Americans who die annually from abusing opioids has increased from roughly 15,000 to 35,000. This trend is widely seen as one of the country's greatest health crises. Yet opioids remain less deadly than Alzheimer's disease, bacterial infections, and kidney disorders, none of which receives anywhere near the same level of political attention. Thirty-five thousand deaths is about the annual mortality from firearms – a risk that is also largely concentrated among otherwise-healthy citizens – yet many Americans strongly oppose government intervention to prevent gun violence. Victims of previous spikes in drug fatalities, such as the crack cocaine epidemic in the 1980s, received much less public sympathy than Americans afflicted by opioids today. None of this means that the country's current concern for opioids is misguided, only that this case reflects how Americans' risk priorities appear to depend on judgments that some populations deserve more protection than others, or that the government's responsibility to shield citizens from risk does not correlate with objective danger. The next section describes a survey that tests the extent to which similar patterns characterize Americans' broader reactions to 100 public risks.

Eliciting risk attitudes through pairwise comparisons

The survey analyzed throughout the remainder of this paper elicited risk attitudes through pairwise comparisons, presenting respondents with two randomly-chosen risks at a time and asking them to say which one exceeded the other along a specified dimension. This approach offers several advantages over traditional rating scales.

One such advantage is that pairwise comparisons force respondents to make tradeoffs. Rating scales, by contrast, allow respondents to defer tough choices by saying that multiple items all pose

maximum threat or top priority. Of course, pairwise comparisons only elicit relational judgments: thus, even if respondents perfectly understood which risks caused more harm than others, they could still over- or underestimate the absolute magnitude of these dangers. But subjective rating scales do not solve this problem either. Since assessments of "worry," "concern," and "riskiness" do not lend themselves to clear standards of correctness, these measures also serve primarily to elicit relative rankings. Researchers can only study absolute perceptions of risk by eliciting numeric judgments of objectively-measurable quantities. This is possible for eliciting perceptions of frequency or probability, but not for eliciting the kinds of subjective beliefs that are crucial to this paper's theoretical framework.[6]

We can use these pairwise comparisons to construct indices of aggregate opinion based on the proportion of the time that each risk "wins" head-to-head comparisons against randomly-chosen alternatives. These easily-interpretable measures are guaranteed to have identical means (0.50) and they tend to possess similar variances.[7] Because these indices' means are fixed, they automatically

[6] Moreover, a general tendency to over- or under-estimate risk size could not answer this paper's central question of why Americans' risk priorities often seem so uncorrelated with the dangers that those risks objectively present. If this divergence results from voters misperceiving risk magnitudes, those misperceptions must involve incorrect beliefs about which risks cause more harm than others. As explained below, pairwise comparisons makes it possible to evaluate these beliefs across an unusually-broad universe of cases.

[7] The nine indices described below have standard deviations between 0.15 and 0.21.

control for differences in how respondents define measurement units.[8] Pairwise comparisons eliminate the need to define new rating scales each time the survey analyzes a different dimension of risk. Perhaps most crucially for the purposes of this study, pairwise comparisons minimize cognitive load, allowing researchers to examine a broad range of topics within a single survey.

The universe of cases for this study contained 100 public risks, including all 69 risks that killed at least 1,000 Americans in 2015 according to federal data.[9] It is also important to consider risks that could *plausibly* harm large numbers of Americans, such as war, terrorism, and climate change. Here there is more ambiguity surrounding inclusion criteria, and so the study relied on the enumeration of "catastrophic risks" in reviews by Posner (2004), Sunstein (2007), and Bostrom and Cirkovic (2011).[10] In explicitly distinguishing between risk perceptions and policy priorities across such a broad range of risks, this study offers the most systematic analysis of its kind to date.

The main drawback of pairwise comparisons relative to rating scales is that pairwise comparisons provide limited information about any individual's views. If a respondent indicates that terrorism deserves higher policy priority than climate change, this says little about how she views either risk relative to the ninety-eight alternatives in the reference class. Since pairwise

[8] Even if two respondents have identical perceptions of the probability of terrorism, they might hold different perceptions of what it means for a risk to be "somewhat likely" versus "very likely." This can confound analyses of rating scales, but it will not influence the outcome of pairwise comparisons (Carlson and Montgomery 2017).

[9] Mortality estimates primarily come from the Centers for Disease Control. Supplementary Section 14 provides documentation.

[10] See Supplementary Section 14 for documentation.

comparisons only yield meaningful rankings when aggregated, it is important to demonstrate that aggregation methods do not drive empirical results. The following sections thus present empirical analyses in two stages: first, by characterizing patterns of collective opinion, and then showing how these patterns hold across subgroups of respondents and risks.

Survey design

The survey contained four modules. Each module asked respondents to complete fifteen pairwise comparisons with respect to one of the nine randomly-chosen attributes shown in Figure 1. The content and ordering of these pairs were fully randomized, both within and across modules. There was thus no guarantee that any two respondents would evaluate the same pair of risks, nor that a respondent would assess the same risk in multiple survey modules. This randomization reduced potential for contamination across survey questions, and there is no evidence that such contamination occurred: all findings hold when limiting data to the first module of pairwise comparisons that each respondent completed.

The study's primary dependent variable (*Priority*) reflects respondents' judgments of which risks the U.S. government should spend more total money to reduce.[11] A different version of this question (*Priority-margin*) asked how respondents would prefer the U.S. government to spend an extra $1 billion. These measures were almost perfectly correlated across risks (*corr*=0.95, $p<0.001$).[12] This correlation shows that respondents did not support allocating resources to

[11] Survey instructions emphasized that this referred to spending by the federal government.

[12] As mentioned above, survey indices reflect the proportion of cases in which a risk "beat" randomly-chosen alternatives.

	Index	Question wording
Policy preferences	*Priority*	Which of these risks should the U.S. government spend more money to reduce?
	Priority-margin	If the U.S. government could devote an extra $1 billion to reducing one of these risks, where would you prefer to see that extra money spent?
Primary attributes	*Harm*	Which of these risks caused more harm to Americans last year?
	Mortality	Which of these risks killed more Americans last year?
	Fairness	Which of these risks is more unfair to the people it harms?
	Responsibility	Which of these risks does the U.S. government bear more responsibility for reducing?
Secondary attributes	*Disaster potential*	Which of these risks could cause more harm to Americans in a particularly disastrous year?
	Long-term growth	Which of these risks is more likely to get worse in the future?
	Worry	Which of these risks worries you more?

Figure 1. *Questions used to generate risk indices*

objectively-small risks simply because they believe major expenditures are necessary to keep those risks low. Even after reducing risks like terrorism and homicide to their current levels, respondents still thought that those issues deserved higher priority than other problems that harm more people.

Another survey module asked respondents to say which risks caused more harm to Americans last year (*Harm*), along with the more objective question of which risks killed more Americans last year (*Mortality*). Additional survey modules asked which risks are more unfair to the people they harm (*Fairness*) and which risks the U.S. government bears more responsibility for reducing

(*Responsibility*).[13] The survey measured perceptions of *Disaster potential* by asking respondents to select risks that could cause more harm to Americans in a particularly disastrous year (cf. Slovic 2000, 117), and elicited perceptions of *Long-term growth* by asking which risks are more likely to get worse in the future. Finally, to replicate previous measures of self-reported anxiety, the study asked respondents to say which risks worried them more (*Worry*).[14]

Qualtrics administered the survey online to 3,000 Americans of voting age.[15] Respondents approximated national averages on most key demographics: they were 50% female, 62% white, 16% Hispanic, and 13% black, balanced according to census proportions by age and region, with a median household income of roughly $60,000. The sample skewed slightly liberal, with 27% identifying as Republicans and 36% identifying as Democrats. The sample also had disproportionately high levels of formal education, with 53% of respondents reporting that they held a college degree. Empirical analyses adjust for these imbalances by applying survey weights, but all results hold when analyzing unweighted data.[16]

With 3,000 respondents making 60 pairwise comparisons apiece, and with each pairwise comparison providing information on two risks, the survey produced an average of 400 observations per attribute for all 100 risks in the data set. Median survey completion time was 12.6

[13] Survey instructions again emphasized that this question pertained to the federal government specifically.

[14] Supplementary Section 9 presents correlation matrices.

[15] Supplementary Section 3 presents the full survey instrument and additional logistical details.

[16] Supplementary Section 3 presents details on survey weights, estimated based on gender, race, age, income, census division, and party.

minutes. The data show no signs of survey fatigue: for example, we will see that the accuracy of respondents' mortality rankings did not decline across survey modules.

It is important to emphasize that empirical relationships among this survey's responses are correlational, not causal. Yet the absence of experimental manipulation in the survey does not impede testing the paper's main claims. If respondents reverse-engineered perceptions of harm to match their policy preferences, that should make these perceptions less accurate and more correlated with their risk priorities. By contrast, the next two sections show that respondents held relatively accurate beliefs about which risks cause more harm than others, and yet those beliefs explained relatively little variation in preferences for public spending relative to judgments about the status of victims and the appropriate role of government.

Analyzing perceptions of mortality and harm

Figure 2 plots the survey's *Mortality* index against the (logged) number of deaths that each risk caused in 2015. The correlation between these measures across the 100 risks in the data set is 0.82 ($p<0.001$). If we compare the survey's *Mortality* rankings to the values that this index would have taken had respondents answered every pairwise comparison correctly, the correlation is also 0.82 ($p<0.001$). Figure 3 further demonstrates that respondents' perceptions of mortality almost perfectly matched their rankings of how much harm risks caused overall ($corr=0.94$, $p<0.001$). Gaps between these measures do not appear to reflect unjustified fears so much as sensible judgments about risks that cause substantial economic damage (such as cyberattacks) or that severely impact victims' quality of life (such as post-traumatic stress disorder).

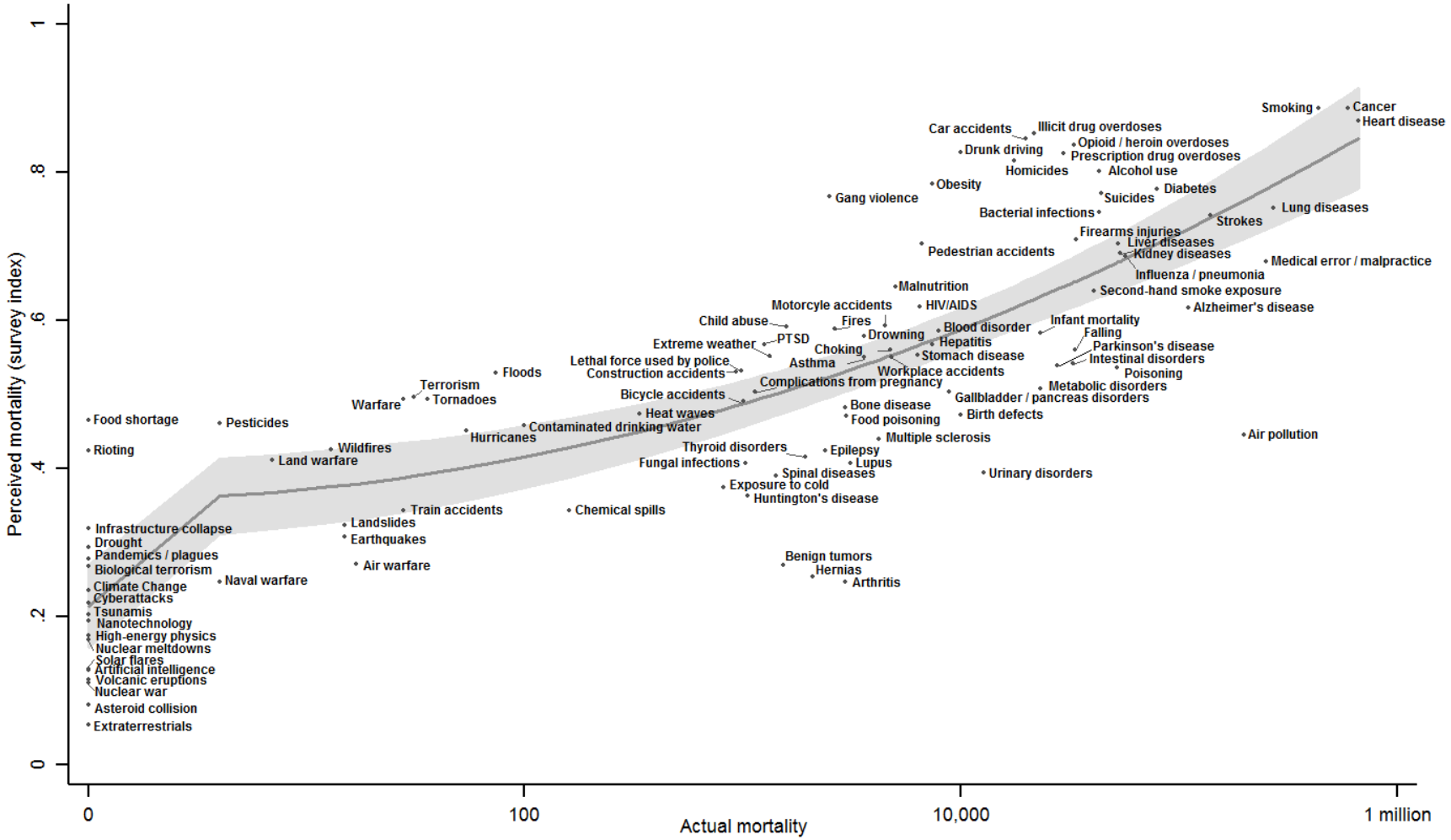

Figure 2. *Perceived versus actual mortality*. Bivariate relationship captured using a fractional polynomial with 95% confidence interval. Mortality statistics reflect 2016 data.

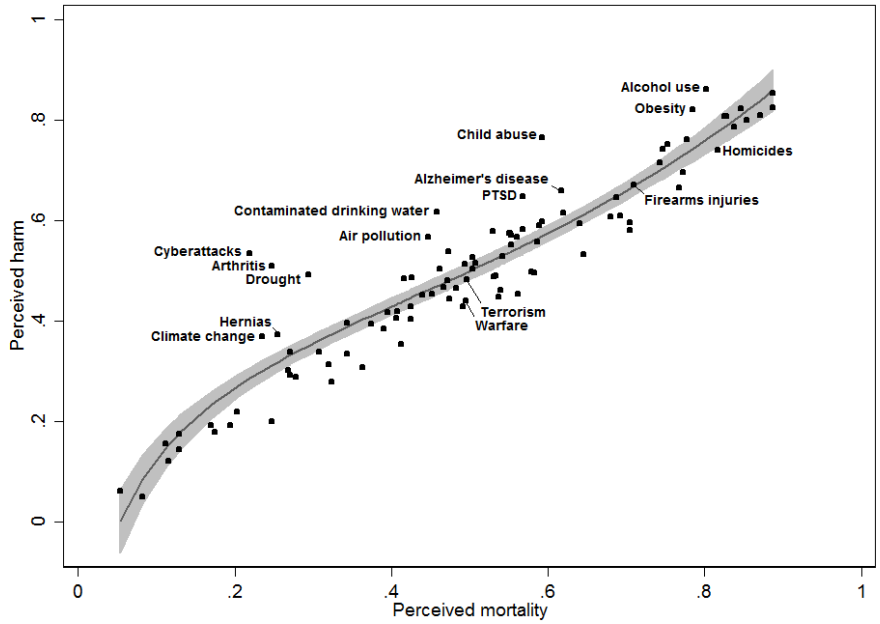

Figure 3. *Perceptions of mortality and harm*. Fractional polynomial (95% interval).

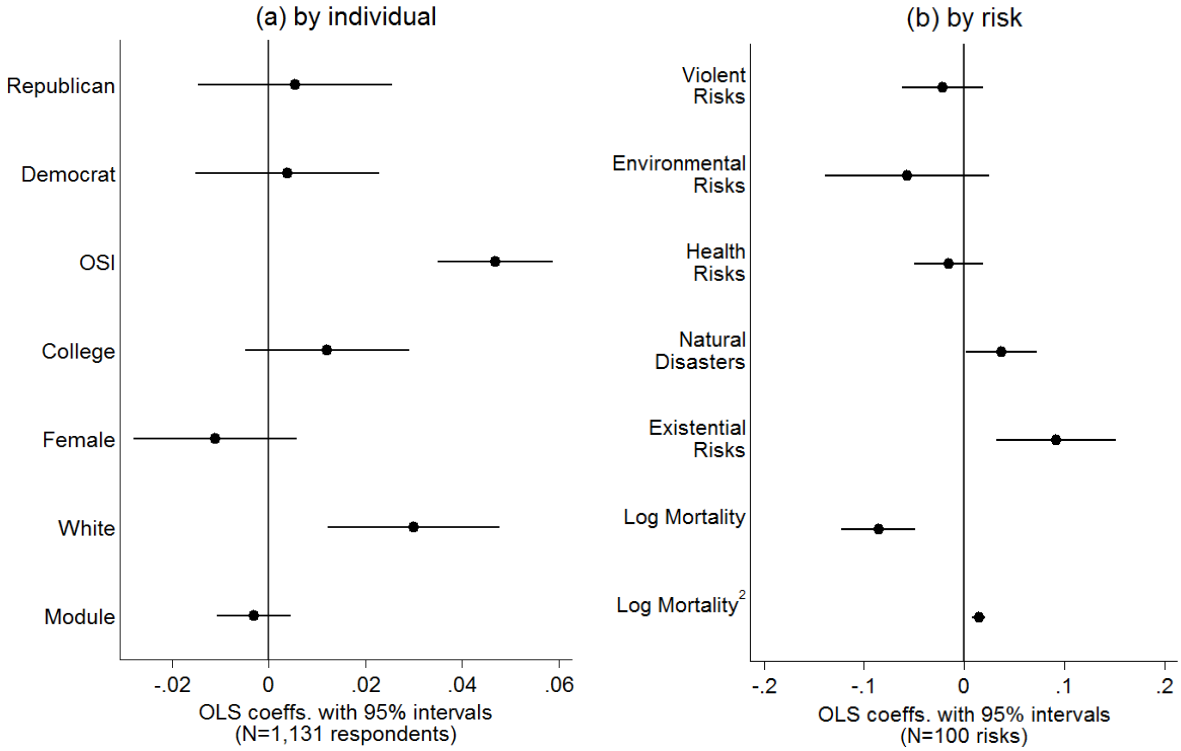

Figure 4. *Heterogeneity in response accuracy*. (a) Predicts proportion of correct answers by respondent. Constant=0.70, adjusted-R^2=0.09. (b) Predicts proportion of correct answers by risk. Constant=0.80, adjusted-R^2=0.54.

Figure 4a shows that the accuracy of respondents' mortality rankings did not substantially vary by demographics, education, or political orientation. This figure presents an ordinary least squares regression with robust standard errors, in which the dependent variable is the proportion of correct answers that each respondent gave when making mortality comparisons. On average, respondents answered 72% of these comparisons correctly (standard deviation 14%). Only 8% of respondents failed to give the right answer at least half of the time.

The accuracy of respondents' mortality rankings appears statistically unrelated to partisanship, gender, and college education. The strongest predictor of response accuracy in Figure 4a is ordinary science intelligence (OSI), a measure reflecting respondents' capacity to employ scientific evidence in everyday decision-making (Kahan 2017). A one-standard deviation increase in OSI predicts a three percentage-point increase in response accuracy, which is just 5% of baseline performance. The last row in Figure 4a further demonstrates that response accuracy was unrelated to the module in which respondents made mortality comparisons. We thus see no evidence of fatigue degrading respondents' performance over the course of the survey.

Figure 4b presents another ordinary least squares regression with robust standard errors, analyzing response accuracy across risks (mean 72%, standard deviation 9%).[17] The model includes indicators for whether each risk fell into five nonexclusive categories. Results show that respondents consistently understood that natural disasters and existential risks cause relatively low

[17] This variable measures the proportion of the time that respondents correctly answered pairwise comparisons involving each risk in the data set.

mortality.[18] By contrast, respondents showed no consistent tendency to provide (in)accurate answers when judging the mortality associated with violent risks, environmental risks, or health risks.

The last two coefficients in Figure 4b capture a U-shaped relationship between response accuracy and actual mortality. As supplementary material describes in more detail, respondents provided their most accurate responses when ranking risks that cause either very high or very low numbers of annual deaths. This is intuitive, as such risks offer starker contrasts to randomly-chosen alternatives. Yet the data also reveal that this relationship does not capture substantial variation. When respondents made pairwise comparisons involving risks that lie at the bottom of this curve (corresponding to risks that cause roughly 1,000 annual deaths) they still gave correct answers 69% of the time, compared to their 72% success rate overall.[19]

Altogether, these results demonstrate that survey respondents essentially equated the harm that public risks cause with mortality; that they could rank these risks according to mortality in a reasonably accurate manner; and that the accuracy of these rankings was relatively consistent across demographics, education, political orientation, and risk type. There is no evidence here of the kinds of major informational deficiencies that scholars often find when measuring the public's grasp of other politically-relevant information. Yet the next section will show that, even if respondents held reasonable perceptions of which risks cause more harm than others, those

[18] "Existential" risks like climate change and nuclear war could cause permanent, large, negative consequences to humanity which can never be undone (Bostrom and Cirkovic 2011).

[19] See Supplementary Section 5, which also analyzes the relationship between response accuracy and media coverage.

perceptions explain little variation in policy priorities compared to judgments about the status of victims and the appropriate role of government.

Analyzing priorities for public spending

Figure 5 presents an ordinary least squares regression with robust standard errors, in which the dependent variable is each risk's score on the survey's *Priority* index. This model includes respondents' rankings of *Harm*, *Fairness*, *Responsibility*, *Long-term growth*, *Disaster potential*, and *Worry*. The model also includes indicators for violent risks, environmental risks, health risks, natural disasters, and existential risks.

Figure 5 shows that respondents' perceptions of which risks cause more harm than others explain relatively little variation in their preferences for public spending (β=0.11, p=0.07). Consistent with expectations, the *Fairness* and *Responsibility* indices are much stronger predictors of respondents' risk priorities (β=0.41 and 0.34, respectively, both p<0.001). *Long-term growth* is the only other survey index that bears a statistically-significant (β=0.18, p=0.03) relationship to *Priority* in this model. Apart from a slight tendency to prioritize combating health risks (β=0.06, p<0.01), respondents did not consistently favor or oppose public spending on specific categories of risk when controlling for other factors. Supplementary material shows that these results are robust to standardizing continuous variables, to transforming survey indices into percentile rankings, to replacing the *Harm* index with perceptions of *Mortality*, and to analyzing data drawn solely from the first set of pairwise comparisons that each respondent completed.[20]

[20] See Supplementary Section 6.

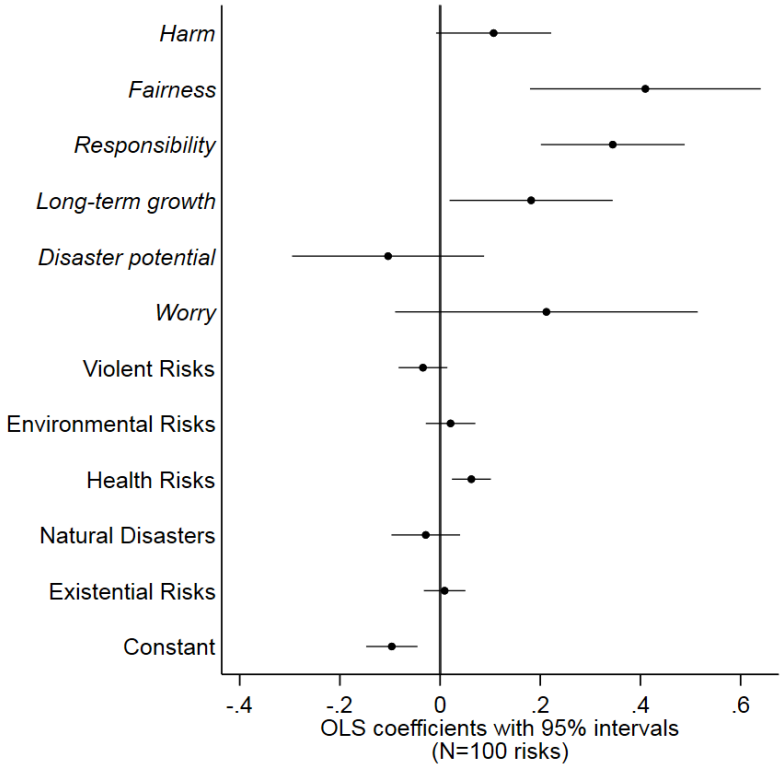

Figure 5. *Predicting risk priorities*. Adjusted-R^2=0.88

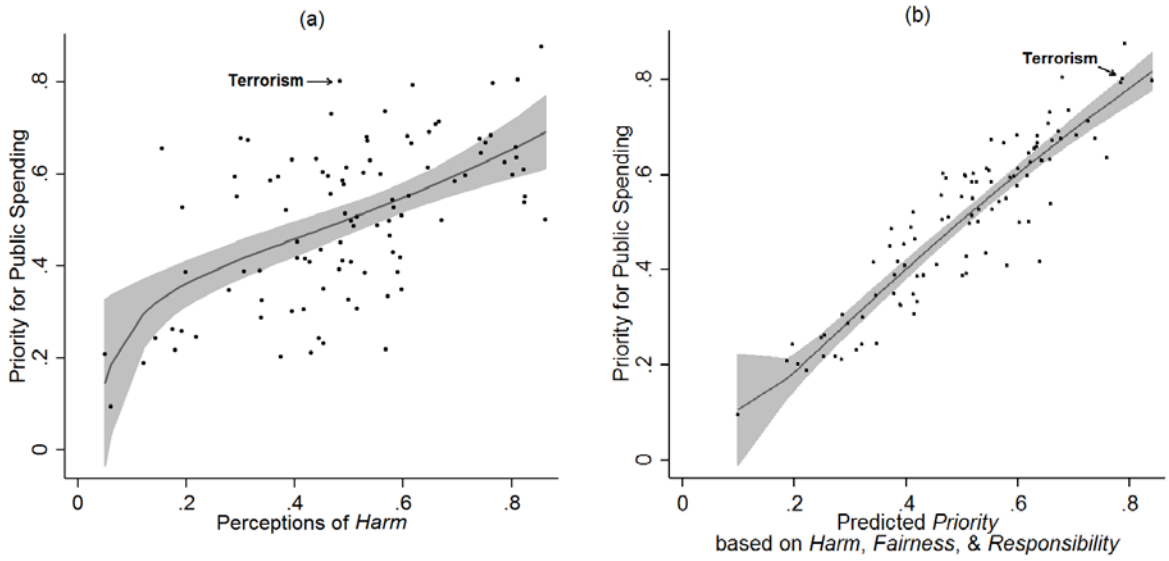

Figure 6. *Risk priorities vs. harm, fairness, and responsibility*. Fractional polynomials with 95% intervals. (a) Adjusted-R^2=0.33. (b) Adjusted-R^2=0.83.

Respondents' perceptions of harm were not correlated with other variables in ways that conceal their predictive value in multivariate regression. Figure 6 shows instead that the *Harm* index is a relatively weak predictor of risk priorities which cannot account for substantial, explainable variance. On the left-hand side of Figure 6, for example, we see that respondents' preferences for public spending on counterterrorism are far higher than what we would predict based on their perceptions of the harm that terrorism causes relative to the other 99 risks in the data set. By contrast, the right-hand side of Figure 6 shows that support for counterterrorism expenditures almost exactly matches expectations once we account for respondents' perceptions of fairness and governmental responsibility.

Exploring heterogeneity in risk priorities

The paper previously explained that one advantage of eliciting risk attitudes through pairwise comparisons is that all survey indices are guaranteed to have means of 0.50. This automatically controls for respondent fixed effects in the analyses that Figures 5 and 6 present. For instance, Democrats might generally see risks as being more unfair to their victims and they could generally be more willing to spend public funds promoting health and safety. But since a tendency to rate risks at different levels on absolute scales will not influence the results of pairwise comparisons, this cannot confound analyses of covariation among the paper's survey indices. The remainder of this section thus explores two other kinds of heterogeneity that are more relevant to understanding why respondents prefer the government to protect them from some risks over others.

The first of these concerns involves *heterogeneity in perceptions*, which is the idea that measures of collective public opinion could conceal systematic variation in respondents' beliefs.

For example, the data reveal a partisan split when evaluating the U.S. government's responsibility for combating climate change (ranked #13 out of 100 risks for Democrats versus #33 for Republicans) and how much priority this risk deserves (#6 for Democrats versus #69 for Republicans). Survey data also show a racial split when assessing the degree to which lethal force used by police is unfair to its victims (#59 for whites versus #15 for non-whites), which again correlates with a large gap in spending preferences (#58 for whites vs. #6 for non-whites). Another concern involves *heterogeneity in conceptual frameworks*, which is the idea that respondents could weight attributes differently when setting their risk priorities. It is especially important to demonstrate that the coefficients in Figure 5 reflect general patterns across survey respondents rather than the views of specific subgroups.

The most straightforward way to address these concerns is to divide the data into subsets and then to replicate the analysis from the ground up. Thus, we can take survey responses provided by Republicans, whites, or any other group of respondents; re-estimate survey indices based on pairwise comparisons drawn from those respondents alone; and replicate the prior analysis of risk priorities. Supplementary material presents such analyses for fifteen respondent subgroups, divided by political party, education, gender, race, ordinary science intelligence, and ideology. Each of these analyses yields findings similar to those presented in Figure 5: perceptions of harm always explain limited variation in respondents' policy preferences compared to judgments of fairness and governmental responsibility.[21]

[21] See Supplementary Section 7.

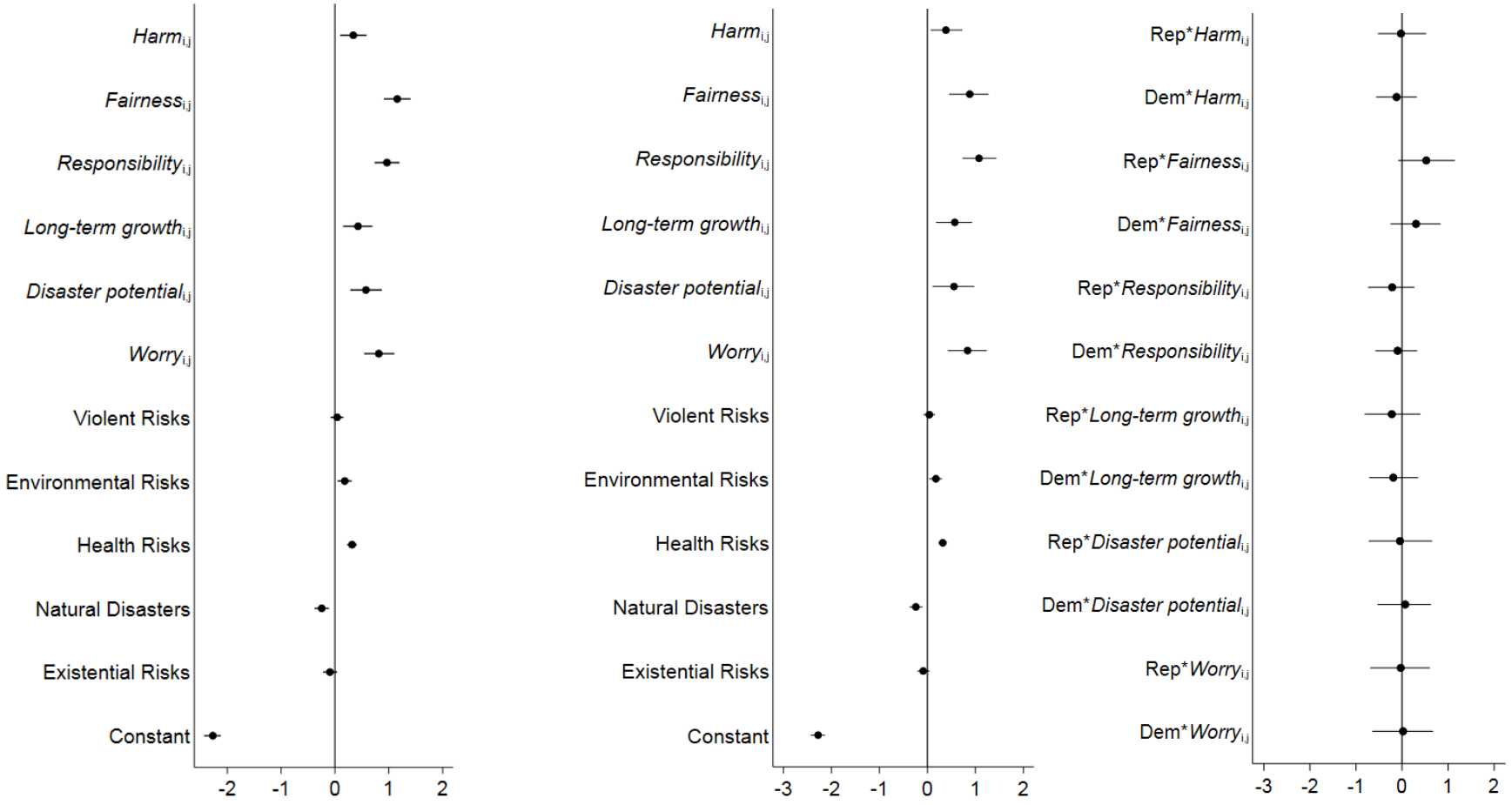

Figure 7. *Exploring heterogeneity in respondents' risk priorities*. Results from 1,500 bootstrap samples, clustered by respondent and stratified by index

The survey data support a more formal demonstration of this point via two-stage logit analysis. The first stage analyzes how risk attitudes vary across respondents based on the six indicator variables specified in Equation 1.[22] This logit model estimates the probability that respondent *i* will select risk *j* over randomly-chosen alternatives along dimension *k*. These predicted probabilities are conceptually similar to the survey indices presented earlier in this paper, which also measure the probability that each risk "beats" randomly-chosen alternatives in pairwise comparisons.

$$[Eq.1] \quad index_{i,j,k} = \widehat{prob}(j \succ \sim j)_{i,k}$$
$$= \text{logit}\,(\, b_{1,j,k} \cdot Republican_i + b_{2,j,k} \cdot Democrat_i + b_{3,j,k} \cdot College_i + b_{4,j,k}$$
$$\cdot HiOSI_i + b_{5,j,k} \cdot Female_j + b_{6,j,k} \cdot White_i + \alpha_{j,k} + \varepsilon_{i,j,k}\,)$$

The second stage in this analysis uses fitted $index_{\text{i,j,k}}$ values to predict the probability that a risk beats randomly-chosen alternatives in pairwise comparisons of *Priority*. This is again conceptually similar to the analysis presented in Figure 5, but rather than using ordinary least squares regression with one observation per risk, this specification enables fitting a logit model to every pairwise comparison in which each risk appeared (N=39,810).[23] Instead of assigning each

[22] The $HiOSI_{\text{i}}$ indicator takes a value of 1 if respondents scored above the mean on ordinary science intelligence.

[23] Thus, if a respondent indicates that terrorism deserved a higher priority for public spending than climate change, we record this as a "1" for terrorism and a "0" for climate change.

risk a single value reflecting collective opinion on dimensions like *Harm* or *Long-term growth*, the $index_{i,j,k}$ terms now capture heterogeneity in respondents' perceptions. Figure 7a presents results estimated from 1,500 bootstrap samples, clustered by respondent and stratified by risk.[24]

Though Figure 7a captures much more granular data than the analysis of collective opinion shown in Figure 5, the results are substantively similar. Perceptions of which risks cause more harm than others remain relatively weak predictors of respondents' policy preferences, while perceptions of fairness and responsibility still carry the largest coefficients among the six survey indices. The confidence intervals in this analysis are now smaller given the increased sample size, and perceptions of disaster potential now predict respondents' risk priorities whereas this term had previously been statistically-insignificant. But these are the only ways in which accounting for heterogeneity in perceptions alters our understanding of respondents' risk priorities.

We can incorporate heterogeneity in conceptual frameworks into this analysis through the use of interaction terms. If Democrats place special weight on perceptions of harm when setting risk priorities, for example, that should result in a positive coefficient on an interaction term combining the $Harm_{i,j}$ index with an indicator for Democratic party identification. The coefficient remaining on the $Harm_{i,j}$ index would then reflect the general relationship between perceptions of harm and risk priorities, over and above any special weight that Democrats assign to this attribute. Figure 7b

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Structuring the data in this way mirrors the analysis of win probabilities in Figure 5, while continuing to guarantee that the dependent variable will have a mean of 0.50.

[24] The bootstrap algorithm thus selects a random sample of respondents with replacement from each survey module before running the 600 regressions that generate the $index_{i,j,k}$ estimates.

extends this logic to include interaction terms for both Democratic and Republican identification, combined with each index used to predict respondents' policy priorities.

All twelve interaction terms shown in Figure 7b fall outside the $p<0.05$ significance threshold.[25] Perceptions of harm remain relatively weak predictors of policy preferences, while perceptions of fairness and responsibility retain the largest and most statistically-significant coefficients among the six survey indices. Supplementary material demonstrates similar results when analyzing interactions based on respondents' education, gender, race, and ideology.[26] This is consistent with the fact that all of the paper's findings hold when analyzing responses provided by each of these subgroups separately.

This does not mean that respondents held identical risk attitudes. As mentioned above, respondents' risk perceptions often contained substantial cleavages along partisan, racial, or other demographic lines.[27] Yet when it comes to this paper's central question of why Americans' risk priorities often seem so uncorrelated with the dangers that those risks objectively present, the data reveal more similarities than differences across respondent subgroups. While most survey respondents held reasonably accurate beliefs about which risks cause more harm than others, few

[25] The most statistically-significant interaction term captures Republicans' perceptions of fairness (p=0.09), which depresses the general coefficient on $Fairness_{i,j}$.

[26] See Supplementary Section 8.

[27] On average, Republicans' and Democrats' risk priorities differed by 12.1 ranks (standard deviation, 11.0). In other words, if Democrats ranked a risk as their fifth-highest priority for public spending, it would be within normal variation for Republicans to rank that risk as their 28th-highest priority for public spending, and vice versa.

assigned these perceptions much weight when setting priorities for public spending. Instead, we have seen that respondents' policy preferences primarily reflect subjective beliefs about fairness and governmental responsibility. Altogether, these results support the argument that the key to understanding Americans' divergent reactions to risk lies more with their values than with their grasp of factual information.

Conclusion

Promoting health and safety is arguably a government's foremost obligation. In the United States and other developed countries, combating risk is also the principal justification for spending government funds. Allocating those funds requires making contentious tradeoffs, as any dollar spent fighting risks like terrorism, violent crime, and climate change cannot be devoted to other problems. Setting these priorities – determining whom to protect and from what – is one of the basic challenges of democratic governance (Douglas and Wildavsky 1982; Viscusi 1992).

By explicitly distinguishing between risk perceptions and policy priorities across 100 public risks, this paper showed that Americans are generally well-informed about which risks cause more harm than others. To the extent that voters' preferences for public spending do not correlate with the danger that these risks objectively present, this does not appear to reflect misperceptions of risk magnitudes in the way that a broad range of scholarship expects. Instead, the paper showed that Americans' risk priorities are best predicted by value judgments like the degree to which some victims deserve more protection than others and the extent to which it is appropriate for government to intervene in different areas of social life.

It is important to take these subjective beliefs seriously both in scholarly analyses and in policy debates. When people disagree in setting policy priorities, they often attribute their opponents' positions to ignorance or misinformation. Thus many Democrats accuse Republicans of exaggerating the risk of terrorism while downplaying the threat of climate change. Republicans, for their part, often accuse Democrats of inflating the risk of gun violence while ignoring threats to national security. In some cases, factual misperceptions may indeed explain voters' preferences for reducing risk. But this paper suggests that those issues are exceptions rather than the norm. Republicans and Democrats both hold relatively accurate perceptions of which risks cause more harm than others, and neither affords those judgments much weight when considering how to allocate public resources.

This does not imply that public education is irrelevant for shaping risk priorities. Even if Americans generally understand which risks cause more harm than others, they might have limited knowledge about the costs and benefits of risk-reducing policies. That would, moreover, be consistent with the paper's claim that citizens should be better-informed about risk magnitudes than other kinds of politically-relevant facts. Yet this paper has also shown that any attempt to evaluate the public's understanding of policy effectiveness should go beyond objective metrics like mortality and quality-adjusted life years, capturing the kinds of value judgments that appear to play larger roles in shaping voters' judgments of which policies are more desirable than others.

The paper's findings raise clear questions about how voters develop the subjective beliefs that shape their policy preferences. What makes some people think that dying in a terrorist attack is more "unfair" than dying from a preventable disease? What makes some people think that governments have more responsibility to avert potential future harm caused by climate change rather than funding proven methods for saving lives today? And how malleable are these

judgments? The answers to these questions have major significance for debates like what it would take to convince the American public to accept lower defense expenditures, to ramp up efforts to combat global warming, or to pursue any other major recalibration in risk priorities.[28]

This paper also provides foundations for further research exploring how public opinion shapes government spending. In some cases – as with terrorism, which ranked third on respondents' spending priorities – federal expenditures align with voters' demands. But that correlation is imperfect. Cancer and heart disease were the top two policy priorities for this survey's respondents. Air pollution placed sixth. Warfare ranked 24th on respondents' risk-reduction priorities, beneath diabetes, prescription drug abuse, and HIV/AIDS. Thus to the extent that the defense budget crowds out spending on health care, that does not appear to be a straightforward function of voters' policy preferences.[29] By advancing a new approach to analyzing those preferences across a broad range of issues, this paper is relevant not just to understanding the public's spending priorities in

[28] Supplementary Section 10 presents a follow-up survey with 500 respondents that provides some initial steps in this direction. It is also important to assess the extent to which these value judgments are stable and coherent: for instance, to what extent these judgments appear susceptible to the kinds of framing effects that often appear in attitudes towards public spending (Druckman 2002). The more stability and coherence these judgments exhibit, the more weight one might be inclined to afford those judgments when setting policy priorities (Page and Shapiro 1992; Diamond and Hausman 1994).

[29] The American National Election Study and the General Social Survey also consistently show that Americans are less supportive of increasing expenditures for defense than for health care, environmental protection, and many other public goods.

their own right, but also for understanding how and why the federal budget reflects some of these priorities more than others.

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Appendix

The following table presents weighted survey data. Each cell contains a risk's ranking (1-100) along with the proportion of pairwise comparisons the risk "won" with respect to a given attribute.

Risk	Priority	Priority-margin	Harm	Mortality	Fairness	Respon-sibility	Disaster potential	Long-term growth	Worry
Air pollution	6 (0.74)	10 (0.71)	38 (0.57)	63 (0.45)	21 (0.61)	6 (0.81)	23 (0.64)	7 (0.74)	16 (0.65)
Air warfare	46 (0.55)	65 (0.43)	87 (0.29)	83 (0.27)	48 (0.50)	15 (0.70)	44 (0.55)	42 (0.55)	42 (0.52)
Alcohol use	55 (0.50)	63 (0.44)	1 (0.86)	10 (0.80)	86 (0.33)	48 (0.51)	18 (0.66)	17 (0.67)	63 (0.46)
Alzheimer's disease	9 (0.71)	2 (0.82)	20 (0.66)	27 (0.62)	8 (0.73)	54 (0.49)	46 (0.54)	23 (0.64)	6 (0.73)
Arthritis	60 (0.49)	48 (0.53)	48 (0.51)	87 (0.25)	75 (0.41)	91 (0.26)	81 (0.35)	59 (0.44)	58 (0.47)
Artificial intelligence	88 (0.26)	86 (0.30)	95 (0.17)	96 (0.13)	93 (0.26)	69 (0.39)	97 (0.25)	75 (0.38)	90 (0.30)
Asteroid collision	97 (0.21)	94 (0.23)	100 (0.05)	99 (0.08)	94 (0.26)	83 (0.30)	85 (0.33)	99 (0.18)	95 (0.25)
Asthma	61 (0.46)	57 (0.48)	34 (0.57)	41 (0.55)	76 (0.41)	79 (0.32)	63 (0.44)	51 (0.49)	87 (0.35)
Bacterial infections	22 (0.64)	23 (0.63)	14 (0.74)	16 (0.75)	33 (0.56)	38 (0.55)	6 (0.71)	16 (0.67)	12 (0.70)
Benign tumors	87 (0.29)	81 (0.35)	82 (0.34)	84 (0.27)	91 (0.30)	77 (0.33)	92 (0.28)	86 (0.32)	82 (0.38)
Bicycle accidents	96 (0.21)	95 (0.21)	69 (0.43)	54 (0.49)	92 (0.29)	93 (0.23)	88 (0.31)	92 (0.29)	92 (0.28)
Biological terrorism	14 (0.68)	9 (0.72)	86 (0.30)	85 (0.27)	9 (0.73)	5 (0.83)	9 (0.70)	8 (0.74)	9 (0.71)
Birth defects	26 (0.63)	13 (0.70)	41 (0.54)	57 (0.47)	5 (0.74)	44 (0.54)	59 (0.45)	40 (0.55)	40 (0.53)
Blood disorders	33 (0.60)	25 (0.62)	39 (0.56)	31 (0.59)	37 (0.55)	67 (0.40)	50 (0.52)	50 (0.50)	26 (0.58)
Bone diseases	43 (0.56)	33 (0.60)	61 (0.47)	55 (0.48)	43 (0.53)	70 (0.39)	72 (0.40)	81 (0.34)	50 (0.51)
Cancer	1 (0.88)	1 (0.89)	2 (0.86)	2 (0.89)	3 (0.81)	32 (0.61)	3 (0.73)	14 (0.70)	1 (0.84)
Car accidents	48 (0.54)	37 (0.59)	4 (0.82)	5 (0.85)	25 (0.60)	40 (0.54)	13 (0.68)	34 (0.60)	10 (0.71)
Chemical spills	25 (0.63)	43 (0.57)	75 (0.40)	77 (0.34)	20 (0.63)	8 (0.79)	42 (0.56)	44 (0.53)	25 (0.58)
Child abuse	4 (0.80)	6 (0.76)	11 (0.77)	29 (0.59)	1 (0.88)	14 (0.71)	17 (0.67)	25 (0.63)	4 (0.76)
Choking	93 (0.23)	98 (0.18)	64 (0.45)	36 (0.56)	85 (0.34)	94 (0.22)	89 (0.30)	98 (0.21)	70 (0.44)
Climate change	38 (0.59)	53 (0.51)	79 (0.37)	89 (0.24)	78 (0.40)	28 (0.65)	61 (0.45)	11 (0.72)	46 (0.52)
Complications from pregnancy / childbirth	32 (0.60)	34 (0.60)	45 (0.53)	49 (0.50)	32 (0.56)	58 (0.45)	71 (0.40)	78 (0.37)	65 (0.45)
Construction accidents	69 (0.41)	84 (0.31)	55 (0.49)	46 (0.53)	73 (0.41)	52 (0.50)	64 (0.43)	69 (0.40)	85 (0.35)

Risk	Priority	Priority-margin	Harm	Mortality	Fairness	Respon-sibility	Disaster potential	Long-term growth	Worry
Contaminated drinking water	5 (0.79)	5 (0.78)	23 (0.62)	61 (0.46)	4 (0.75)	3 (0.84)	2 (0.75)	26 (0.62)	8 (0.72)
Cyberattacks	17 (0.67)	21 (0.64)	42 (0.53)	90 (0.22)	34 (0.55)	4 (0.83)	28 (0.62)	3 (0.81)	19 (0.61)
Diabetes	11 (0.68)	8 (0.73)	12 (0.76)	12 (0.78)	40 (0.54)	47 (0.51)	30 (0.61)	13 (0.70)	18 (0.63)
Drought	52 (0.51)	52 (0.52)	53 (0.49)	81 (0.29)	42 (0.53)	49 (0.51)	25 (0.63)	24 (0.64)	48 (0.51)
Drownings	82 (0.33)	91 (0.26)	51 (0.50)	33 (0.58)	80 (0.39)	75 (0.34)	74 (0.39)	88 (0.31)	69 (0.45)
Drunk driving	23 (0.64)	24 (0.63)	7 (0.81)	7 (0.83)	6 (0.74)	30 (0.64)	4 (0.73)	32 (0.60)	5 (0.75)
Earthquakes	83 (0.33)	75 (0.38)	81 (0.34)	80 (0.31)	47 (0.51)	81 (0.31)	45 (0.55)	54 (0.47)	78 (0.40)
Epilepsy	67 (0.42)	51 (0.53)	74 (0.40)	66 (0.42)	58 (0.48)	89 (0.29)	91 (0.28)	96 (0.26)	83 (0.36)
Exposure to cold	86 (0.30)	88 (0.29)	76 (0.39)	74 (0.37)	88 (0.33)	80 (0.32)	80 (0.36)	91 (0.29)	93 (0.25)
Extraterrestrials	100 (0.10)	100 (0.12)	99 (0.06)	100 (0.05)	100 (0.12)	92 (0.24)	100 (0.13)	100 (0.12)	100 (0.10)
Extreme weather	81 (0.33)	73 (0.39)	36 (0.57)	39 (0.55)	74 (0.41)	76 (0.34)	16 (0.67)	9 (0.72)	27 (0.57)
Falling	94 (0.22)	96 (0.20)	37 (0.57)	37 (0.56)	96 (0.23)	99 (0.17)	82 (0.35)	93 (0.29)	74 (0.42)
Fire exposure / smoke inhalation	75 (0.39)	82 (0.34)	30 (0.59)	30 (0.59)	59 (0.47)	56 (0.47)	47 (0.53)	68 (0.40)	38 (0.54)
Firearms injuries	56 (0.50)	67 (0.41)	18 (0.67)	18 (0.71)	45 (0.52)	25 (0.66)	26 (0.63)	30 (0.61)	44 (0.52)
Floods	47 (0.54)	49 (0.53)	33 (0.58)	47 (0.53)	31 (0.56)	45 (0.53)	24 (0.63)	36 (0.59)	61 (0.47)
Food poisoning	72 (0.39)	70 (0.40)	59 (0.48)	58 (0.47)	55 (0.49)	43 (0.54)	65 (0.43)	76 (0.37)	64 (0.46)
Food shortage	7 (0.73)	4 (0.78)	60 (0.47)	59 (0.47)	14 (0.66)	10 (0.74)	8 (0.70)	22 (0.65)	43 (0.52)
Fungal infections	68 (0.41)	74 (0.39)	71 (0.42)	70 (0.41)	87 (0.33)	74 (0.35)	68 (0.41)	73 (0.39)	75 (0.41)
Gallbladder / pancreas disorders	71 (0.41)	58 (0.48)	50 (0.50)	50 (0.50)	66 (0.44)	86 (0.30)	83 (0.35)	84 (0.32)	59 (0.47)
Gang violence	8 (0.71)	18 (0.66)	19 (0.67)	14 (0.77)	12 (0.69)	11 (0.73)	11 (0.69)	15 (0.68)	15 (0.69)
Heart disease	2 (0.81)	3 (0.79)	6 (0.81)	3 (0.87)	17 (0.64)	36 (0.55)	1 (0.76)	10 (0.72)	3 (0.77)
Heat waves	91 (0.24)	87 (0.29)	67 (0.44)	56 (0.47)	90 (0.31)	87 (0.29)	37 (0.59)	27 (0.62)	79 (0.40)
Hepatitis	50 (0.53)	31 (0.61)	31 (0.58)	35 (0.57)	49 (0.50)	51 (0.50)	55 (0.48)	48 (0.51)	36 (0.54)
Hernias	98 (0.20)	97 (0.19)	78 (0.37)	86 (0.25)	98 (0.21)	100 (0.17)	99 (0.19)	97 (0.24)	96 (0.24)
High-energy physics experiments	95 (0.22)	78 (0.36)	94 (0.18)	93 (0.17)	95 (0.24)	62 (0.41)	94 (0.26)	85 (0.32)	98 (0.22)
HIV/AIDS	19 (0.67)	26 (0.62)	24 (0.62)	26 (0.62)	23 (0.61)	31 (0.63)	35 (0.59)	63 (0.43)	24 (0.60)
Homicides	15 (0.68)	12 (0.70)	15 (0.74)	9 (0.82)	10 (0.70)	17 (0.69)	10 (0.70)	12 (0.72)	13 (0.70)

Risk	Priority	Priority-margin	Harm	Mortality	Fairness	Respon-sibility	Disaster potential	Long-term growth	Worry
Huntington's disease	74 (0.39)	55 (0.50)	85 (0.31)	75 (0.36)	54 (0.49)	78 (0.33)	95 (0.26)	87 (0.32)	86 (0.35)
Hurricanes	78 (0.35)	77 (0.36)	63 (0.45)	62 (0.45)	57 (0.49)	96 (0.22)	38 (0.58)	49 (0.51)	66 (0.45)
Illicit drug overdoses	34 (0.60)	38 (0.59)	9 (0.80)	4 (0.85)	65 (0.45)	29 (0.65)	19 (0.66)	4 (0.78)	45 (0.52)
Infant mortality	28 (0.61)	29 (0.61)	52 (0.50)	32 (0.58)	16 (0.65)	33 (0.58)	78 (0.36)	77 (0.37)	39 (0.53)
Influenza / pneumonia	29 (0.61)	32 (0.61)	22 (0.65)	22 (0.69)	60 (0.47)	39 (0.55)	7 (0.70)	39 (0.55)	34 (0.55)
Infrastructure collapse	16 (0.67)	39 (0.58)	84 (0.31)	79 (0.32)	38 (0.54)	12 (0.72)	34 (0.59)	28 (0.61)	30 (0.56)
Intestinal disorders	77 (0.39)	54 (0.50)	44 (0.53)	42 (0.54)	70 (0.42)	73 (0.36)	60 (0.45)	61 (0.44)	31 (0.56)
Kidney diseases	44 (0.55)	16 (0.67)	25 (0.61)	21 (0.69)	51 (0.50)	64 (0.41)	53 (0.50)	47 (0.51)	22 (0.60)
Land warfare	39 (0.59)	46 (0.55)	80 (0.35)	69 (0.41)	35 (0.55)	20 (0.68)	43 (0.56)	33 (0.60)	51 (0.50)
Landslides	80 (0.35)	89 (0.28)	89 (0.28)	78 (0.32)	82 (0.38)	68 (0.40)	66 (0.42)	65 (0.42)	89 (0.32)
Lethal force used by police	42 (0.58)	59 (0.48)	54 (0.49)	45 (0.53)	39 (0.54)	13 (0.71)	58 (0.45)	52 (0.49)	54 (0.49)
Liver diseases	53 (0.51)	44 (0.56)	28 (0.60)	20 (0.70)	67 (0.43)	60 (0.44)	56 (0.48)	38 (0.56)	20 (0.61)
Lung diseases	18 (0.67)	14 (0.68)	13 (0.75)	15 (0.75)	46 (0.51)	55 (0.48)	21 (0.65)	41 (0.55)	17 (0.64)
Lupus	62 (0.45)	56 (0.50)	73 (0.40)	71 (0.41)	52 (0.50)	88 (0.29)	87 (0.31)	82 (0.33)	84 (0.36)
Malnutrition	13 (0.68)	11 (0.71)	43 (0.53)	24 (0.65)	24 (0.60)	16 (0.70)	41 (0.57)	45 (0.53)	53 (0.50)
Medical errors / malpractice	12 (0.68)	30 (0.61)	26 (0.61)	23 (0.68)	7 (0.74)	27 (0.66)	36 (0.59)	43 (0.54)	14 (0.69)
Metabolic disorders	54 (0.51)	50 (0.53)	46 (0.51)	48 (0.51)	56 (0.49)	65 (0.40)	67 (0.41)	46 (0.52)	57 (0.47)
Motorcycle accidents	79 (0.35)	90 (0.27)	27 (0.60)	28 (0.59)	84 (0.36)	72 (0.36)	75 (0.38)	72 (0.39)	76 (0.41)
Multiple sclerosis	31 (0.60)	22 (0.63)	65 (0.45)	64 (0.44)	36 (0.55)	71 (0.37)	73 (0.39)	80 (0.34)	72 (0.43)
Nanotechnology	89 (0.26)	83 (0.33)	93 (0.19)	92 (0.19)	99 (0.21)	61 (0.43)	98 (0.23)	89 (0.30)	97 (0.23)
Naval warfare	76 (0.39)	66 (0.42)	91 (0.20)	88 (0.25)	79 (0.40)	22 (0.68)	57 (0.46)	67 (0.41)	73 (0.42)
Nuclear meltdowns	49 (0.53)	47 (0.55)	92 (0.19)	94 (0.17)	29 (0.58)	9 (0.78)	40 (0.58)	64 (0.43)	29 (0.56)
Nuclear war	21 (0.66)	27 (0.62)	96 (0.15)	98 (0.11)	11 (0.70)	1 (0.86)	5 (0.72)	31 (0.61)	7 (0.73)
Obesity	30 (0.61)	41 (0.58)	5 (0.82)	11 (0.78)	81 (0.39)	46 (0.52)	15 (0.67)	6 (0.76)	35 (0.54)
Opioid / heroin overdoses	27 (0.63)	28 (0.61)	10 (0.79)	6 (0.84)	68 (0.43)	18 (0.69)	20 (0.66)	2 (0.82)	32 (0.56)
Pandemics / plagues	37 (0.59)	35 (0.59)	88 (0.29)	82 (0.28)	15 (0.66)	19 (0.69)	22 (0.65)	37 (0.57)	23 (0.60)
Parkinson's disease	36 (0.60)	20 (0.65)	62 (0.46)	43 (0.54)	22 (0.61)	66 (0.40)	77 (0.36)	57 (0.45)	47 (0.51)
Pedestrian accidents	65 (0.43)	71 (0.40)	32 (0.58)	19 (0.70)	50 (0.50)	59 (0.45)	70 (0.40)	70 (0.40)	49 (0.51)
Pesticides	57 (0.50)	68 (0.40)	49 (0.50)	60 (0.46)	28 (0.58)	24 (0.66)	48 (0.53)	60 (0.44)	62 (0.46)

Risk	Priority	Priority-margin	Harm	Mortality	Fairness	Respon-sibility	Disaster potential	Long-term growth	Worry
Poisoning	64 (0.44)	76 (0.38)	66 (0.45)	44 (0.54)	30 (0.57)	37 (0.55)	49 (0.53)	74 (0.38)	41 (0.52)
Post-traumatic stress disorder (PTSD)	10 (0.69)	15 (0.67)	21 (0.65)	34 (0.57)	18 (0.64)	23 (0.67)	54 (0.50)	21 (0.65)	55 (0.48)
Prescription drug overdoses	20 (0.66)	17 (0.66)	8 (0.81)	8 (0.83)	62 (0.45)	21 (0.68)	14 (0.67)	5 (0.77)	28 (0.57)
Rioting	70 (0.41)	72 (0.40)	70 (0.43)	67 (0.42)	27 (0.59)	26 (0.66)	52 (0.50)	20 (0.66)	52 (0.50)
Second-hand smoke exposure	66 (0.42)	64 (0.43)	29 (0.60)	25 (0.64)	13 (0.67)	34 (0.57)	51 (0.51)	53 (0.48)	71 (0.44)
Smoking	45 (0.55)	61 (0.45)	3 (0.82)	1 (0.89)	72 (0.42)	35 (0.56)	27 (0.62)	58 (0.45)	68 (0.45)
Solar flares	92 (0.24)	93 (0.23)	97 (0.14)	95 (0.13)	97 (0.22)	82 (0.31)	86 (0.32)	79 (0.37)	94 (0.25)
Spinal diseases	51 (0.52)	42 (0.57)	77 (0.38)	73 (0.39)	61 (0.45)	63 (0.41)	84 (0.34)	90 (0.29)	67 (0.45)
Stomach diseases	59 (0.49)	62 (0.44)	40 (0.55)	38 (0.55)	69 (0.42)	84 (0.30)	62 (0.44)	55 (0.47)	37 (0.54)
Strokes	35 (0.60)	19 (0.66)	16 (0.71)	17 (0.74)	26 (0.59)	57 (0.46)	31 (0.61)	29 (0.61)	11 (0.71)
Suicides	41 (0.58)	40 (0.58)	17 (0.70)	13 (0.77)	71 (0.42)	53 (0.50)	33 (0.59)	19 (0.66)	33 (0.55)
Terrorism	3 (0.80)	7 (0.75)	58 (0.48)	51 (0.50)	2 (0.84)	2 (0.85)	12 (0.69)	1 (0.84)	2 (0.78)
Thyroid disorders	63 (0.45)	69 (0.40)	57 (0.48)	68 (0.42)	77 (0.41)	90 (0.28)	90 (0.30)	62 (0.44)	80 (0.40)
Tornadoes	84 (0.31)	80 (0.35)	47 (0.51)	53 (0.49)	41 (0.53)	97 (0.21)	39 (0.58)	56 (0.46)	60 (0.47)
Train accidents	73 (0.39)	79 (0.36)	83 (0.34)	76 (0.34)	64 (0.45)	50 (0.51)	76 (0.38)	94 (0.28)	91 (0.30)
Tsunamis	90 (0.25)	92 (0.24)	90 (0.22)	91 (0.20)	53 (0.50)	85 (0.30)	79 (0.36)	71 (0.39)	88 (0.34)
Urinary disorders	85 (0.31)	85 (0.31)	72 (0.42)	72 (0.40)	89 (0.32)	95 (0.22)	93 (0.27)	83 (0.33)	77 (0.41)
Volcanic eruptions	99 (0.19)	99 (0.14)	98 (0.12)	97 (0.12)	83 (0.37)	98 (0.20)	96 (0.25)	95 (0.28)	99 (0.21)
Warfare	24 (0.63)	36 (0.59)	68 (0.44)	52 (0.49)	19 (0.63)	7 (0.80)	29 (0.61)	18 (0.67)	21 (0.61)
Wildfires	40 (0.59)	45 (0.56)	56 (0.49)	65 (0.43)	44 (0.52)	42 (0.54)	32 (0.60)	35 (0.60)	56 (0.48)
Workplace accidents	58 (0.50)	60 (0.47)	35 (0.57)	40 (0.55)	63 (0.45)	41 (0.54)	69 (0.41)	66 (0.41)	81 (0.38)