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The impact of environmental risk information on beliefs and home insurance decisions☆,☆☆

Giovanni Burro [a], Alessandro Castagnetti [b,*], Alessandra Cillo [c], Giovanni Paolo Crespi [c]

[a] Binghamton University, United States of America
[b] University of Verona, Italy
[c] LIUC University, Italy

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ABSTRACT

Catastrophic events, which are becoming increasingly frequent due to climate change, have significant negative impacts on housing. Yet, decision-makers remain puzzled by the low uptake rates for insurance coverage against these events. In this paper, we investigate whether this phenomenon is driven by individuals having miscalibrated beliefs about the likelihood of such events occurring. Additionally, we examine the impact of an information treatment designed to correct these perceived probabilities. Our experimental results show that participants in the treatment respond as expected, adjusting their beliefs accordingly. Moreover, these belief shifts influence participants' demand for information on the topic and their interest in purchasing insurance. However, a follow-up survey conducted two months after the main experiment reveals that the effects of the treatment are short-lived, dissipating entirely within this period. Moreover, the information treatment shifts estimates about past mortality due to circulatory diseases, which are not closely related to the content of the information treatment, although more modestly. These two insights suggest ways of improving survey design in the field of information provision experiments. Our overall findings provide important insights for policymakers, highlighting the transient nature of the treatment-induced effects.

1. Introduction

Climate change has led to an increase in the frequency and severity of environmental disasters, with rising risks to both people and property. Italy offers a particularly relevant natural case study of these dynamics: in recent years, the country has experienced a notable rise in extreme weather events, including devastating floods, landslides, wildfires, and prolonged droughts. According to Legambiente, a prominent Italian environmental association, Italy recorded 351 natural extreme events in 2024, marking a 485% increase with respect to 2015. The year 2024 also marked the end of a three-year period during which the number of such events consistently exceeded 300 per year. Additionally, ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale, translated

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* Corresponding author.
E-mail addresses: gburro@binghamton.edu (G. Burro), alessandro.castagnetti@univr.it (A. Castagnetti), acillo@liuc.it (A. Cillo), pcrespi@liuc.it (G.P. Crespi).

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as the Higher Institute for Environmental Protection and Research) highlights that the country faces very high risk from extreme natural events. Among the many alarming statistics, it is worth noting that 18.4% of Italy's territory falls within the highest hazard classes for landslides and floods. Despite this increasing exposure, insurance coverage against such risks remains strikingly low. Only a small fraction of Italian homeowners hold any form of such insurance, and among those who do, policies are often partial or inadequate for meaningful recovery. According to a 2024 report by the Italian National Association of Insurance Companies (ANIA), only 6% of homes and 5% of businesses are insured against natural disasters. This is especially puzzling given that real estate accounts for a significant portion of household wealth in Italy, with housing often representing the primary asset for many families.

This disconnect between rising environmental risks and low insurance uptake might underscore a critical gap in risk preparedness. To address this, we examine whether a targeted informational intervention can enhance individuals' understanding of environmental risks and increase their willingness to purchase home insurance. As Kunreuther and Pauly (2004) highlight, when the cost of acquiring risk-related information is high or when individuals perceive the probability of loss as low, they are often deterred from making rational insurance decisions, frequently choosing not to insure against disasters. In light of this, providing accessible and salient information about environmental risks may help overcome these barriers. Given that the effectiveness of such interventions could inform future policy decisions, this research is vital in shaping tools that foster more resilient, financially protected households. The recent policy in Italy mandating disaster insurance for businesses illustrates how governments are beginning to intervene more directly in response to climate risks. However, despite its introduction, the policy has faced repeated delays, primarily due to political and consensus-building challenges, suggesting that policies targeted at private homeowners would be even more difficult to implement.

In this study, we design a survey experiment to test the effectiveness of an informational intervention aimed at improving individuals' understanding of environmental risks and increasing their willingness to consider home insurance. The experiment begins with an initial survey where participants' prior beliefs about the likelihood of natural and catastrophic events impacting Italian properties are assessed. Participants are then randomly assigned to either a treatment or a control group. The treatment group receives detailed information about the likelihood of these events occurring in Italy, including risks from seismic activity, floods, and landslides, while the control group receives no such information. A follow-up survey is conducted to evaluate whether the treatment has influenced participants' attitudes toward purchasing insurance or increasing coverage, as well as their beliefs about these risks.

We find that, on aggregate, participants initially held overly optimistic views about the likelihood of natural disasters impacting homes in Italy, significantly underestimating the risks associated with environmental events. After providing detailed information about the country's environmental risks, participants' perception of national home risk increased significantly, particularly among those with initially low risk beliefs. This belief update strongly influenced their attitudes, leading to a higher perceived appropriateness of actions such as seeking information about risks and insurance policies, as well as requesting insurance quotes. These shifts in attitudes were not only statistically significant but also marked a meaningful change in participants' approach to risk. Although these attitude shifts did not fully translate into immediate behavior change, we observed a notable increase in the likelihood of requesting insurance quotes in the follow-up survey. However, the likelihood of purchasing new insurance or modifying existing coverage did not show a significant change.

Our work also presents relevant methodological contributions to designing surveys in the domain of information experiments. A key feature of our approach is the elicitation of two additional beliefs: one concerning the perceived risk to participants' own homes and another capturing general health-related risk estimates. Including these measures allows us to study how the treatment affects not only national-level risk perceptions, but also how individuals reassess risks that are either personally relevant or unrelated to environmental threats. Moreover, by reassessing these beliefs in a follow-up survey, we are able to examine the persistence of belief changes over time, shedding light on whether the effects of the intervention are sustained or if individuals tend to revert to their original perceptions. Follow-up studies are becoming an increasingly important feature of the information provision literature — see, for example Delavande et al. (2023) and Settele (2022).

Our results show that the information treatment not only increased perceptions of national home risk but also led to a substantial rise in perceived risk to participants' own homes, highlighting a strong and rational spillover from national to personal risk perceptions. We also observe a smaller, though statistically significant, increase in health risk estimates. However, follow-up data collected two months later reveal that these belief changes were not sustained: both national and personal home risk perceptions returned to baseline levels, indicating that while informational interventions can shift beliefs in the short run, their effects may fade away over time.

Overall, our results highlight the potential of targeted informational interventions to significantly shift individuals' perceptions of environmental risk and their attitudes toward concrete protective actions, specifically home insurance. By providing general information about national climate-related threats, we induced substantial change in participants' beliefs about the risk to their own homes — information that is typically unknown to policymakers. This shows that even non-personalized messages can effectively influence insurance-related decision-making. However, we also find spillovers to unrelated risk domains, underscoring the importance of accounting for broader belief shifts when evaluating such interventions. Crucially, these effects fade over time, suggesting that sustained or repeated campaigns are necessary to generate lasting increases in insurance uptake.

Two caveats are in order. First, our work does not have any normative aims in terms of insurance decisions. As previously mentioned, our intervention builds on the observation that housing constitutes a sizable share of Italians' wealth, while climate change poses an increasing threat to residential properties. We therefore study whether, on average, individuals' beliefs and insurance-related decisions are consistent with available information about environmental risk, and how these beliefs and decisions

respond to the provision of such information. At the same time, focusing on beliefs is economically relevant in this setting. Even without taking a stance on optimal insurance choices, understanding how individuals perceive environmental risk – and how these perceptions respond to information – is informative for assessing the role of information frictions in shaping decisions.

Importantly, there is substantial heterogeneity in individual exposure to environmental risk, and for individuals living in genuinely low-risk areas, not purchasing insurance may well be an optimal and informed decision. At the same time, given Italy's geographic characteristics, a substantial share of the population is exposed to non-negligible environmental risk. The fact that elicited beliefs are substantially more optimistic than official statistics suggests that, on average, households may not fully incorporate available information about environmental risk into their expectations. However, this finding does not imply that the observed insurance levels are necessarily suboptimal. To make such a claim, one would need to account for risk and ambiguity preferences, as well as financial constraints. We therefore interpret our results as documenting how information affects beliefs and willingness to take action, without making normative claims about optimal insurance decisions.

The second point is related to this. Beliefs – and, more generally, risk attitudes – are not the only determinants of the decision to purchase an insurance contract. Individual financial factors, as well as their interaction with broader market conditions, also play an important role. As we will discuss in Section 4, participants in our study report low trust in insurance companies' willingness to actually compensate for damages, and they cite the high cost of insurance policies as additional reasons for not purchasing home insurance. In contrast, the belief that the state will intervene in the event of an environmental disaster appears to be less influential. General optimism about environmental risks, and about the likelihood that such risks could affect one's own home, also emerges as an important factor in the decision not to insure. While economic and market conditions undoubtedly matter, they are more difficult to influence. Our study therefore focuses on one specific dimension, which is that of beliefs about environmental risk.

Our study contributes to two main streams of literature. First, it adds to the literature on risk assessment, particularly the assessment of insurance risks and insurance purchase behavior (Camerer & Kunreuther, 1989; Kunreuther, 1996; Shapira & Venezia, 2008). By examining how individuals perceive and update their understanding of environmental risks, our research provides insights into how risk information can influence insurance-related decision-making. More in general, we contribute to research on how climate change influences household behaviors and economic outcomes. The impact of climate change has been observed on how sea-level rise is capitalized into real estate values (Baldauf et al., 2020; Bernstein et al., 2019; Giglio et al., 2021; Keenan et al., 2018; Murfin & Spiegel, 2020) or mortgages (Issler et al., 2019; Ouazad & Kahn, 2019). More in general, natural disasters do have a substantial impact on real estate (Contat et al., 2024). Several factors can influence the choice to get insurance, including cultural reasons (Wharton & Harmatz, 1989) and the investment appeal of insurance (Connor, 1996). On top of these factors, in recent years, extensive research has shown that personal experiences are influential on financial decisions (Malmendier et al., 2020) and attitudes towards risk (Ayton et al., 2020). In particular, experiences of climate related events have been shown to influence beliefs, behavior, and risk attitudes (Abatayo & Lynham, 2020; Anderson & Robinson, 2019; Choi et al., 2020; Dessaint & Matray, 2017; Li et al., 2011; Zaval et al., 2014). A notable example of this is Chang et al. (2018), who find that daily air pollution levels have a significant effect on the decision to purchase or cancel health insurance in a manner inconsistent with rational choice theory. Effects are typically found to be short-lived, as we also observe in our study. Related to insurance behavior but not to climate risks, personal experiences have been shown to influence the demand for long-term care insurance (Tennyson & Yang, 2014) and for income protection insurance (Innocenti et al., 2019). More related to insurance decisions, Gallagher (2014) shows that local flood insurance purchases increase after a local flood and Hu (2022) documents that households increase flood insurance purchases when their geographically distant friends are exposed to flooding events or to campaigns for flood insurance. Close to us, Botzen et al. (2013) show that the way risks are communicated shapes the willingness to pay for flood insurance. However, we focus on probabilistic communication of risk and study how this piece of information impacts different outcome variables, including attitudes and belief changes, as well as behavioral decisions.

Second, our work contributes to the growing body of literature on information provision experiments. These experiments aim to understand how targeted information can alter individuals' attitudes and behaviors. Within the literature on household finance, extant research examines the impact of information provision on retirement savings (Beshears et al., 2015; Dolls et al., 2018). Moreover Bursztyn et al. (2019) examine how moral appeals affect debt repayment. Bursztyn et al. (2014) study the mechanisms underlying peer effects in financial decisions. Bottan and Perez-Truglia (2020) study the causal effect of home price expectations on the timing of home sales using a large-scale field experiment featuring administrative data. Laudenbach et al. (2023) use an information experiment to study the causal effect of subjective beliefs about stock returns on investment choices measured in administrative account data. In the context of the coronavirus pandemic, Hanspal et al. (2021) provide experimental evidence that beliefs about the duration of the stock market recovery shape households' expectations about their own wealth and their planned investment decisions and labor market activity. In the context of insurance choices, Szrek and Baron (2007) experimentally show that an insurance policy receives a higher valuation if offered alongside an almost dominated one with respect to being offered alone, highlighting the role of contextual information features. Regarding the Italian situation, Barigozzi et al. (2024) proved that information can successfully shift women's willingness to engage in difficult and competitive environments. Close to us, Burro et al. (2024) show how personal memories influence the incorporation of advice from financial experts in the context of stock investment. None of these studies dealt with the issue of insurance choices. In our case, we demonstrate that even relatively simple informational interventions can significantly shift beliefs about environmental risks and encourage individuals to consider protective measures like home insurance. Together, these contributions expand our understanding of the mechanisms driving insurance decisions and the role of information in shaping risk management behaviors. In this context, follow-up studies are crucial for assessing the persistence of belief and behavior changes over time, which is essential for evaluating the potential long-term policy relevance of such interventions.

The rest of the paper is structured as follows. Section 2 outlines the experimental design and methodology. Section 3 presents the results, while Section 4 discusses the findings and their implications. Finally, Section 5 concludes with a summary of contributions and policy recommendations.

2. Experimental design

In the following, we describe the survey experiment as well as the follow-up survey. Unlike a laboratory setting with student participants or hypothetical stakes, the study was conducted with real potential consumers for whom home insurance is a relevant and meaningful product. This enhances the external validity of our findings and underscores their relevance for real-world policy and market behavior. The full instructions can be found in the Online Appendix. Ethical approval was granted by Heidelberg University, and the experiment was preregistered at the AEA Registry (https://www.socialscienceregistry.org/trials/14885).

2.1. Main survey experiment

At the outset of the main survey experiment, to ensure conceptual clarity and consistency across responses, participants were presented with a detailed definition of *natural events* and *catastrophic events*. This step was intended to align participants' understanding with the operational definition used in the study, thereby minimizing interpretive variation and enhancing the internal validity of the collected data. This was necessary since they refer to two different types of insurance policies. The insurance policy for natural disasters is a different product with respect to the insurance policy for catastrophic events. We then decided to present participants with a formal definition of the two, as they might be confused in colloquial language.

Prior beliefs. The first section of the survey was designed to elicit participants' prior beliefs about the frequency and distribution of natural and catastrophic events, as well as their broader risk perceptions. This section consisted of three quantitative estimation tasks.

The first belief elicited concerned *Own Home Risk Perception*. Participants were asked to consider a hypothetical sample of 1000 homes similar to their own in terms of geographic area, size, and construction characteristics. They were then asked to estimate how many of these homes would be affected by at least one natural (e.g., hail, hurricanes, storms) and/or catastrophic event (e.g., landslides, earthquakes, floods) over the next five years. This question aimed to capture participants' subjective beliefs about their own exposure to such risks.

The second belief addressed *National Home Risk Perception*. Participants were asked to consider a broader, randomized sample of 1000 homes across Italy and to estimate how many of these, in their opinion, are exposed to medium-to-high risk from at least one of the following: seismic activity, landslides, floods, or coastal erosion. This question was intended to measure broader perceptions of environmental vulnerability at the national level.

The third belief focused on *Mortality Risk Perception*. Participants were asked to consider 1000 individuals randomly selected from those who died in Italy during 2018 and 2019, and to estimate how many of them died due to diseases of the circulatory system. Notice that this is not an estimate of the future but of past mortality. Knowing that Italy is at risk of future environmental disasters might make individuals more pessimistic about access to healthcare in light of an environmental event. However, the treatment should only lead to greater pessimism in this estimate if participants were to also take into account that in the past, access to healthcare could have been restricted by disasters.

Questions were presented in this order on a single screen.[1] To incentivize accuracy, participants were informed that their responses to the second and third belief questions – National Home Risk Perception and Mortality Risk Perception – would qualify for a bonus: the closer their estimates were to expert assessments, the greater the likelihood of receiving an additional reward. Although participants were not informed in advance of the exact thresholds required to earn the incentive, they were told that "the more accurate your answer is compared to the actual value (estimated by experts), the more likely you are to receive an additional incentive". Participants who sought further information at the end of the survey were informed that they would receive a €2.70 bonus for each question if their estimate fell within the range of 750 to 900 for the *National Home Risk Perception* and 300 to 400 for *Mortality Risk Perception*.

Treatment assignment and information provision. In a between-subjects design, half of the participants were assigned to the treatment group. These participants were exposed to an information treatment aimed at providing them with key data about Italy's environmental risk profile. This treatment was designed to enhance participants' understanding of the country's vulnerability to various natural and catastrophic events, particularly in relation to the risks that affect residential properties. The information is derived from an official informational document produced by the Italian National Association of Insurance Companies (ANIA), which in turn relies on multiple official statistical offices such as those reported by ISPRA (The Italian National System for Environmental Protection). The information provided was as follows:

[1] Although presenting questions in a fixed order might raise concerns due to order effects, notice that this was a common feature among the treated and the control subjects. Thus, the only way this could be a concern is if the effect of the treatment was correlated with the order of the questions. Notice, however, that once we elicit posterior beliefs (explained below), the question about National Home Risk Perception only comes after the Own Home Risk one. Hence, we believe that the effect of treatment on National Home Risk Perception (our main variable of interest) could only possibly be attenuated by the fact that the question on Own Home Risk Perception is presented between the information and the belief about this risk.

Italy is one of the European countries with the highest seismic risk, with approximately 40% of residential buildings located in medium- and high-hazard zones. Additionally, Italy is highly vulnerable to hydro-geological issues, with nearly 95% of municipalities facing risks from landslides, floods, and/or coastal erosion. Overall, over 80% of residential buildings in the country are exposed to medium-to-high risk from at least one of these events. It is important to note that a single home can be subject to multiple risks simultaneously.

This information was shared with participants to shape their understanding of the risk landscape in Italy and to encourage more accurate risk estimations in the subsequent belief elicitation tasks. The goal of this treatment was to provide participants with factual data that could guide their estimations, influence their perceptions of the risks affecting the broader national context, and, by extension, their own residences as well.

Posterior beliefs. After the initial elicitation of prior beliefs, participants in the treatment group were asked to respond to the same three belief questions again, now with the intention of capturing their posterior beliefs. This repetition aimed to assess whether and how their beliefs changed after being presented with additional information during the survey.

All participants were also asked to assess their confidence in the beliefs they had provided earlier. Specifically, they were asked to report how confident they were that their estimates regarding *Own Home Risk Perception* and *National Home Risk Perception* fell within an interval of ±50 homes around their estimate.

Risk awareness and insurance perceptions. After the belief elicitation stage, participants were asked to assess their perceptions of the appropriateness of taking actions related to risk awareness and insurance coverage. Specifically, they were asked to rate how appropriate they felt it was to become more informed about the risks of natural or catastrophic events in their municipality and about available insurance policies. Additionally, participants were asked how appropriate they thought it was to take specific actions, such as requesting insurance quotes, increasing coverage limits, or reducing deductibles. These questions aimed to capture participants' attitudes toward risk management behaviors and their willingness to consider insurance-related actions.

All participants were also asked to imagine that their home had been affected by a natural or catastrophic event and to rate the severity of the potential financial damage. This question was designed to assess participants' perceptions of the potential financial consequences of such events.

Control questions. Finally, a set of questions was included to collect demographic, economic, and financial information from the respondents. Specifically:

- Demographics. Demographic questions were included to gather information on participants' age, sex, risk preferences, income, and province of residence. A question also asked participants whether they had experienced any natural or catastrophic events affecting their home, and, if so, what their response was.
- Home characteristics. Questions regarding home characteristics included ownership, value, year of construction, and mortgage status. Similarly, questions addressed whether the home was insured, for which risks, and the factors influencing these decisions.
- Financial literacy. A series of questions assessed participants' general financial knowledge, including their understanding of interest rates, inflation, and basic investment concepts (Lusardi & Mitchell, 2011).
- Insurance literacy. Participants answered questions to evaluate their understanding of key insurance concepts such as premiums, deductibles, and coverage limits (Bongini et al., 2023).

2.1.1. Power analysis

At the conventional level for type I error ($\alpha = 0.05$), we have more than 0.8 power, with our sample, to detect a Cohen's effect size of d = 0.33. This calculation is based on exploratory survey estimates we obtained for our main outcome variable. We assumed a mean estimate of 192 in the control group, with a s.d. equal to 194, in line with exploratory estimates we obtained in a previous exploratory survey, with a general population sample of Italians on Prolific. We assumed the same s.d. for the treatment group. If the information were fully incorporated and moved the estimate to 800, we would clearly be well powered to detect such an effect. However, we believe that we have power to even detect a small effect, corresponding to less than perfect updating to the information we provide. A Cohen's effect size of $d = 0.33$ would correspond to a mean estimate of 255 in the treatment group, with our assumptions. Notice that our estimate for prior beliefs resulted in a slight underestimation of the actual results we obtained in our main survey experiment. However, we conducted a post-hoc power analysis on our main variable of interest (National Home Risk Perception) and this resulted in a post-hoc power of 0.996.

We also performed the following calculation. Let us assume that the mean and standard deviation of prior beliefs are 319.16 and 277.99, respectively, as they ended up being for our treatment group. We ask: with a sample size of 150 (number of treated individuals), at the conventional level for type I error ($\alpha = 0.05$), at which Cohen's effect size do we reach a power equal to 0.8? The answer is for $d \sim 0.2$ (it is for d slightly bigger than 0.2). Hence, we have power to detect a 20% increase. Given that we detected an almost 50% increase, as we later detail in Section 3, we are further reassured that our sample size is suitable for our study.

2.2. Follow-up survey

Two months after the main survey experiment, we conducted the follow-up survey. The questionnaire was designed to assess participants' behaviors, knowledge, and attitudes regarding home insurance, focusing on their engagement with information and decision-making processes.

Beliefs. We asked respondents their Own Home Risk Perception and their National Home Risk Perception. Importantly, as in the main experiment, the National Home Risk Perception question was incentivized using the same incentive mechanism.

Information-seeking behavior. We assessed participants' efforts to gather information on potential risks to their homes and insurance policies in the past two months. Questions addressed the extent to which respondents sought information about adverse events, insurance options, and discussed these topics with family and friends.

Insurance quote requests and purchase/renewal. Several questions examined participants' behavior related to seeking insurance quotes. It included questions about whether they had requested quotes, the factors influencing their decision to do so, and the methods used (e.g., online portals, insurance companies). Follow-up questions explored reasons for not requesting quotes and future intentions to do so. Participants were also asked whether they had purchased or renewed insurance in the last two months. The factors influencing their decision to buy or renew insurance policies were explored, along with reasons for not purchasing or renewing.

Participants' insurance literacy and final question. As for the main experiment, participants were asked to respond to the insurance literacy questionnaire (Bongini et al., 2023). A final question asked participants to provide an open-ended response explaining the factors that determined their estimates for the *Own Risk Perception* they had previously reported, offering qualitative insights.

2.3. Experimental design discussion

Here, we describe some key aspects and the underlying rationale of the experimental design.

Incentives. Two belief questions were incentivized in both the main experiment and the follow-up survey: *National Risk Perception* and *Mortality Risk Perception*. Specifically, respondents could earn €2.70 if each of their answers were sufficiently close to experts' risk assessments. For the *National Risk Perception* question, responses needed to fall within the range of 750 to 900; for the *Mortality Risk Perception* question, the acceptable range was 300 to 400. Although participants were not informed in advance of the exact thresholds required to earn the incentive, they were told that: "the more accurate your answer is compared to the actual value (estimated by experts), the more likely you are to receive an additional incentive". They were also informed that details of the incentive mechanism would be provided at the end of the survey for those interested. This approach was deliberately chosen to simplify instructions and reduce cognitive load. Indeed, as shown by Danz et al. (2022), providing detailed information about incentive schemes – such as binarized scoring rules – can reduce truthful reporting.

Treatment and belief questions. The primary purpose of the treatment was to assess whether providing information influences participants' beliefs and subsequent behavior. To do so, we administered a reliable piece of information regarding the estimated number of Italian houses subject to relevant risks, as described in Section 2.1.

Belief questions were administered prior to any treatment exposure to establish a baseline. In particular, we focused on participants' subjective expectations regarding the likelihood of natural or catastrophic events affecting their own home (Own Home Risk Perception) and homes across the country (National Home Risk Perception). These belief measures served both as outcomes of interest and as mediators of behavioral responses. By measuring beliefs before and after treatment, we can better evaluate treatment effects as they depend, not on the information provided *per se*, but rather on the news effect of that information, as measured by the difference between individuals' prior beliefs and the information received.

A potential downside of designs measuring both priors and posteriors about the same object is that such within-designs potentially lead to stronger experimenter demand effects (De Quidt et al., 2018, 2025). Nevertheless, Haaland et al. (2023) show evidence that eliciting priors does not significantly affect learning rates in different contexts.

Importantly, we also included the *Mortality Risk Perception*, which plays a key role in both the design and analysis. In particular, examining this variable allows us to assess the impact of the treatment related to the information provided, while controlling for other effects such as mood or pessimism induced by the treatment.

Follow-up survey. The follow-up survey was crucial for assessing the persistence and direction of belief updates over time. By measuring the same beliefs weeks after the initial exposure to information, we can evaluate whether belief updates were lasting or transitory. This has important policy implications, particularly in areas such as individuals' preparedness for such risks and engagement in mitigation actions (e.g., insurance uptake), where long-term awareness and accurate risk assessment are essential. Understanding belief persistence helps determine whether brief interventions can have lasting impacts on risk perception and behavior, or whether repeated engagement is necessary to sustain belief changes and decision-making.

3. Experimental results

3.1. Implementation

Sample. We conducted the experiments through an Italian survey company. The main survey experiment took place in November/December 2024, followed by a follow-up survey in February 2025. As agreed with the survey company, the total sample size was 300 for the main experiment and 150 for the follow-up.

Importantly, we focus our analysis on Italian residents with financial wealth between €50,000 and €500,000. This threshold ensures that we consider individuals for whom purchasing home insurance is both financially feasible and behaviorally relevant. In the Italian context, where home-ownership rates exceed 70% and a substantial share of household wealth is held in real estate,

Table 1
Descriptive statistics.
The table reports descriptive statistics (means or shares) for our participants. *Female* is the share of female subjects. *Age* is the reported age of the subjects. *Risk preferences* capture subjects' risk attitudes as elicited through the Dohmen et al. (2011) risk elicitation question. *North*, *Center*, and *South* are binary indicators for Italian macro-areas of residence. *Financial literacy* and *insurance literacy* are the total scores in the respective literacy questionnaires. *Home owner* is a binary indicator for owning the house of residence. *Mortgage* indicates whether the subject has a mortgage on their house. *Construction year* is the year the house was built. *Insurance coverage* represents the number of different risks covered by insurance. *House financial value* includes binary indicators for the estimated value of the house: less than €100,000; between €100,000 and €300,000; between €300,000 and €1 million; and more than €1 million. *Income* includes binary indicators representing the household's annual income: less than €30,000; between €30,000 and €45,000; between €45,000 and €70,000; between €70,000 and €100,000; and more than €100,000. *Financial wealth* is a binary indicator of whether respondents' financial wealth is higher than €200,000.

	N	Mean	SD	Min	Max
Female	300	0.447	0.498	0	1
Age	300	48.467	12.823	20	75
Risk preferences	300	4.98	2.530	0	10
Residence: North	300	0.52	0.500	0	1
Residence: Center	300	0.197	0.398	0	1
Residence: South	300	0.283	0.451	0	1
Financial literacy	300	2.327	0.896	0	3
Insurance literacy	300	2.097	0.978	0	3
Home owner	300	0.947	0.225	0	1
Mortgage	300	0.247	0.432	0	1
Construction year	300	1983.217	31.558	1800	2024
Insurance coverage	300	1.43	0.868	0	3
House financial value: Low	300	0.09	0.287	0	1
House financial value: Medium	300	0.657	0.476	0	1
House financial value: High	300	0.247	0.432	0	1
House financial value: Very high	300	0.007	0.082	0	1
Income: Low	300	0.16	0.367	0	1
Income: Medium-low	300	0.41	0.493	0	1
Income: Average	300	0.31	0.463	0	1
Income: High	300	0.11	0.313	0	1
Income: Very high	300	0.01	0.10	0	1
Financial Wealth	300	0.28	0.450	0	1

Table 2
Descriptive statistics — Prior beliefs.
The table reports descriptive statistics (means) for our participants on the prior belief questions: *National Home Risk Perception*, *Own Home Risk Perception*, and *Mortality Risk Perception*.

	N	Mean	SD	Min	Max
National Home Risk Perception	300	334.403	282.131	0	1000
Own Home Risk Perception	300	225.74	275.27	0	1000
Mortality Risk Perception	300	276.58	245.505	0	1000

this criterion also serves as a relevant proxy for property ownership. As a result, our sample closely aligns with the population for whom home insurance decisions are most meaningful, thereby strengthening the validity and policy relevance of our findings.[2] Additional evidence on the representativeness of our sample, based on a comparison with data from the Survey on Household Income and Wealth (SHIW), is provided in the Online Appendix, where we show that our sample broadly aligns with key observable characteristics of the Italian population, although some differences are observed.

Summary statistics and randomization. Tables 1 and 2 provide summary statistics for our final sample, whereas Table 3 presents balance tests to assess the integrity of the randomization across the two treatment groups. Baseline covariates are well-balanced between the groups. A joint F-test fails to reject the null hypothesis of balance across these covariates ($p = 0.999$). Similarly, prior beliefs are well balanced between the treatment and control groups, with a joint F-test failing to reject the null hypothesis ($p = 0.203$) that there are no systematic differences in baseline beliefs between the groups (Table 4).

[2] Consistent with this interpretation, this sample corresponds to the segment of the population typically considered relevant when evaluating the potential demand for insurance products, as these individuals are more likely to face such decisions in practice, a consideration also confirmed through consultation with industry practitioners.

Table 3
Test of balance.
The table reports a test of balance for the main experiment. Column 4 shows the difference in means between respondents assigned to the treatment and control groups with *p*-values of a *t*-test for differences in means shown in Column 5. The *p*-value of the joint *F*-test is determined by regressing the treatment indicator on the vector of covariates. The *F*-test tests the joint hypothesis that none of the covariates predicts treatment assignment. *Female* is the share of female subjects. *Age* is the reported age of the subjects. *Risk preferences* capture subjects' risk attitudes as elicited through the Dohmen et al. (2011) risk elicitation question. *North*, *Center*, and *South* are binary indicators for Italian macro-areas of residence. *Financial literacy* and *insurance literacy* are the total scores in the respective literacy questionnaires. *Home owner* is a binary indicator for owning the house of residence. *Mortgage* indicates whether the subject has a mortgage on their house. *Construction year* is the year the house was built. *Insurance coverage* represents the number of different risks covered by insurance. *House financial value* includes binary indicators for the estimated value of the house: less than €100,000; between €100,000 and €300,000; between €300,000 and €1 million; and more than €1 million. *Income* includes binary indicators representing the household's annual income: less than €30,000; between €30,000 and €45,000; between €45,000 and €70,000; between €70,000 and €100,000; and more than €100,000. *Financial wealth* is a binary indicator of whether respondents' financial wealth is higher than €200,000.

	All	Treatment	Control	Difference	*p*-value
Female	0.447	0.44	0.453	−0.013	0.817
Age	48.467	49.133	47.8	1.333	0.369
Risk preferences	4.98	4.927	5.033	−0.107	0.716
Residence: North	0.52	0.533	0.507	0.027	0.645
Residence: Center	0.197	0.187	0.207	−0.02	0.664
Residence: South	0.283	0.28	0.286	−0.007	0.899
Financial literacy	2.327	2.32	2.333	−0.013	0.898
Insurance literacy	2.097	2.1	2.093	0.007	0.953
Home owner	0.947	0.953	0.94	0.013	0.609
Mortgage	0.247	0.233	0.26	−0.027	0.594
Construction year	1983.217	1982.973	1983.46	−0.487	0.894
Insurance coverage	1.43	1.433	1.427	0.007	0.947
House financial value: Low	0.09	0.073	0.107	−0.033	0.315
House financial value: Medium	0.657	0.66	0.653	0.007	0.904
House financial value: High	0.247	0.26	0.233	0.027	0.594
House financial value: Very high	0.007	0.007	0.007	0	1
Income: Low	0.16	0.153	0.167	−0.013	0.754
Income: Medium-low	0.41	0.413	0.407	0.007	0.907
Income: Average	0.31	0.293	0.327	−0.033	0.534
Income: High	0.11	0.127	0.093	0.033	0.358
Income: Very high	0.01	0.013	0.007	0.007	0.563
Financial Wealth	0.28	0.32	0.24	0.08	0.124
Joint *F*-test					0.999

Table 4
Test of balance — Prior beliefs.
The table reports a test of balance for prior beliefs in the main experiment. Column 4 shows the difference in means between respondents assigned to the treatment and control groups, with *p*-values from a *t*-test for differences in means shown in Column 5. The *p*-value of the joint *F*-test is determined by regressing the treatment indicator on the vector of covariates. The *F*-test assesses the joint hypothesis that none of the covariates predicts treatment assignment. Prior beliefs are measured by *National Home Risk Perception*, *Own Home Risk Perception*, and *Mortality Risk Perception*.

	All	Treatment	Control	Difference	*p*-value
National Home Risk Perception	334.403	319.16	349.647	−30.487	0.350
Own Home Risk Perception	225.74	204.373	247.107	−42.733	0.179
Mortality Risk Perception	276.58	285.6	267.57	18.04	0.525
Joint *F*-test					0.203

3.2. National risk perception

We now turn to our primary belief measure and examine how respondents updated their risk perceptions following the treatment. As expected, participants in the treatment group increased their *National Home Risk Perception* by 156 points on a 1000-point scale — an increase of 49% (t-test, $p < 0.001$). Fig. 1 illustrates these results.

These results are also consistent with the pattern observed in belief accuracy related to bonus payments. Specifically, in the treatment group, the number of bonuses paid increased from 27 in the prior beliefs to 49 in the posterior beliefs, following the provision of information (t-test, $p<0.001$).

Fig. 1. National Home Risk Perception prior and posterior beliefs.

We further investigate how the treatment changes beliefs depending on individuals' prior beliefs. To do so, we construct a variable that captures the difference between the posterior and prior values of *National Risk Perception*. Fig. 2 shows this change dividing subjects by quartiles of the prior estimates. We find that changes in *National Risk Perception* are not uniform: the effect is largest for respondents with intermediate prior beliefs (in the 51–250 range), smaller for those with very low (0–50) or moderately high priors (251–500 range), and negligible for those who initially held high beliefs (above 500). This pattern is consistent with the notion that individuals who already possess accurate or near-accurate information have less reason to revise their beliefs in response to the information provided. The fact that those who update the most are those in the second quartile is actually consistent with theories of motivated reasoning, which typically predict smaller belief updates when new information conflicts with prior views. This has been well-documented in both experimental (Fryer et al., 2019) and quasi-experimental contexts in climate risk perception (Osberghaus & Fugger, 2022; Zappalà, 2023).

These findings are important as they show that the treatment had an effect on *National Risk Perception*. This underscores the efficacy of the experimental manipulation in altering participants' perceptions. Thus, the results provide a useful foundation for further analyses that will examine how changes in risk perception could affect attitudes and behavior.

3.3. Outcome variables

We now turn to explore the impact of providing information on a broader set of outcome measures, extending beyond risk perceptions. In this section, we also introduce our econometric models to analyze the effects of the treatment on these additional outcomes.

3.3.1. Identification strategy

The findings on belief updating highlight that the treatment primarily operates by shifting beliefs, and not all respondents update to the same extent. Consequently, the analysis in this section focuses not on treatment assignment per se, but on the magnitude of belief change induced by the treatment. Econometrically, this represents a shift from an *intent-to-treat* (ITT) analysis, which estimates the average effect of being assigned to the treatment, to an approach that is conceptually closer to a *local average treatment effect* (LATE). Specifically, we analyze outcomes as a function of the change in beliefs, thereby analyzing not the effect of the treatment but the effect of the change, if present, induced by the treatment. This strategy allows us to more directly assess the behavioral relevance of belief changes, which is central to our research question.

This approach is also appropriate from a policy perspective. Information provision is unlikely to affect all individuals uniformly: its impact will be concentrated among those who initially held inaccurate beliefs and those who respond to it. By regressing the dependent variable on belief changes rather than mere exposure to treatment, our analysis better captures the effects on those that are most responsive to information-based interventions.

We estimate equations of the form:

$$y_i = \Phi\left(\alpha + \beta_1 Update_i + Priors_i'\beta_2 + X_i'\beta_3 + \epsilon_i\right), \tag{1}$$

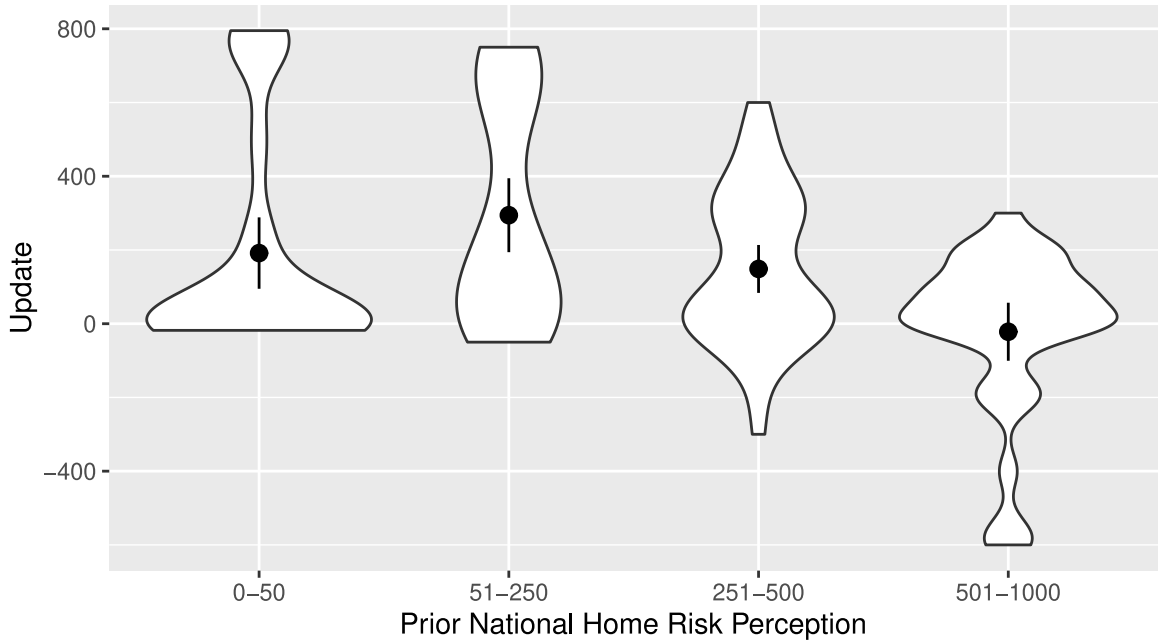

Fig. 2. National Home Risk Perception change depending on prior belief levels. Update is defined as the difference between Posterior beliefs on National Home Risk after the Information Intervention and Prior beliefs on National Home Risk. Groups are defined based on quartiles of the distribution of Prior Beliefs in the Treatment Group.

where i refers to the respondent and y_i denotes the outcome of interest. $Update_i$ captures the change in *National Risk Perception* following the intervention. This is equal to 0 by construction in the control group. We divide it by 100, so an increase of 1 in this variable corresponds to a change of 10 percentage points between the prior and the posterior. $Priors_i$ refers to the elicited prior beliefs at the beginning of the experiment, including *National Risk Perception*, *Own Risk Perception*, and *Mortality Risk Perception*. X_i is a vector of relevant covariates collected in the survey (see Table 1), including socio-demographic characteristics and baseline attitudes. These variables are standard in the literature and are included to account for observable individual heterogeneity that may be related to the main outcomes of interest. ϵ_i is the error term. We estimate an ordered probit model in case the dependent variable can take multiple values and a probit model in case it is binary.

We always report three specifications: one just controlling for belief update, one including prior beliefs, and one including all control variables. Since our main explanatory variable is the belief update, rather than the randomized treatment itself, we view specifications including the full set of controls as our preferred ones, as they account for observable characteristics that may be correlated with both belief updating and the outcomes of interest. At the same time, because $Update_i$ is not randomly assigned, the inclusion of controls can affect both the precision and the magnitude of the estimates. We therefore report all specifications to show how the estimates change with the inclusion of additional controls and to assess the robustness of the results.

3.3.2. Attitudes toward home risk and insurance information-seeking behavior

We now investigate whether changes in beliefs lead to shifts in respondents' attitudes regarding the appropriateness of the following actions:

- Becoming informed about the risks of natural or catastrophic events in their municipality of residence (*seeking risk information*).
- Becoming informed about insurance policies that provide protection against such events (*seeking insurance policies*).
- Requesting a quote for additional insurance coverage for their home beyond current protections (*requesting quotes*).

Responses to these questions are measured on a Likert scale from 1 to 5, where higher values indicate a greater perceived appropriateness of the actions listed above. We thus estimate Eq. (1) using these three outcome variables. Table 5 reports the average marginal effect on the probability of reporting the highest level of appropriateness.

The results indicate that for a shift of 100 points in the belief variable, $Update$, there is an increase of 3.5% in the probability of rating the appropriateness of seeking risk information as very much appropriate ($p < 0.001$). The same 100 points increase in the $Update$ variable corresponds to a 3.2% increase in the probability of rating the appropriateness of seeking insurance policies as very much appropriate ($p < 0.01$). Finally, the same increase in the $Update$ variable corresponds to a 2.5% increase in the probability of rating the appropriateness of requesting insurance quotes as very much appropriate ($p < 0.01$).

Moreover, for those who already possessed insurance policies covering their houses (N = 267), we further asked about the appropriateness of increasing the coverage limit of their policies and reducing the deductible of such policies. The results are

Table 5
Attitudes toward home risk and insurance information-seeking behavior. Ordered Probit. Update is defined as the difference between Posterior beliefs on National Home Risk after the Information Intervention and Prior beliefs on National Home Risk. The variable is divided by 100. We report the average marginal effect on the probability of reporting "Very much" in the Appropriateness Questions. Control Mean is the proportion of respondents reporting "Very much" in the Control Group.

	Dependent variable: Appropriateness of:								
	Seeking risk info			Seeking insurance			Requesting quotes		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Update	0.024*	0.036***	0.035***	0.019	0.031**	0.032**	0.012	0.022*	0.025**
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)
Control Mean	0.293	0.293	0.293	0.340	0.340	0.340	0.287	0.287	0.287
Priors	NO	YES	YES	NO	YES	YES	NO	YES	YES
Controls	NO	NO	YES	NO	NO	YES	NO	NO	YES
Observations	300	300	300	300	300	300	300	300	300
Pseudo-R^2	0.008	0.040	0.092	0.004	0.027	0.059	0.002	0.027	0.071

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

Table 6
Attitudes toward increasing maximum coverage and reducing deductibles. Ordered Probit. Update is defined as the difference between Posterior beliefs on National Home Risk after the Information Intervention and Prior beliefs on National Home Risk. The variable is divided by 100. We report the average marginal effect on the probability of reporting "Very much" in the Appropriateness Questions. Control Mean is the proportion of respondents reporting "Very much" in the Control Group.

	Dependent variable: Appropriateness of modifying:					
	Maximum coverage			Deductible		
	(1)	(2)	(3)	(4)	(5)	(6)
Update	0.012	0.018	0.024*	0.001	−0.002	0.002
	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)
Control Mean	0.209	0.209	0.209	0.201	0.201	0.201
Priors	NO	YES	YES	NO	YES	YES
Controls	NO	NO	YES	NO	NO	YES
Observations	267	267	267	267	267	267
Pseudo-R^2	0.002	0.009	0.051	0	0.008	0.042

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

presented in Table 6. The results indicate that for a shift of 100 points in the belief variable, $Update$, there is an increase of 2.4% in the probability of rating the appropriateness of increasing maximum coverage as very much appropriate (p=0.016). In contrast, their perception of the appropriateness of reducing the deductible of their insurance policies does not change. Estimates without controls are somewhat smaller, suggesting some caution in interpreting the results. In the context of insurance policies covering homes, and related to major risk events, these results make sense, as respondents' priority should be that of covering the full cost of potential damages rather than focusing on reducing the deductible. The Online Appendix contains the presentation of the results from Tables 5 and 6 reproduced using a linear model, assuming that the steps from one level to the next of the appropriateness question are equally spaced. Results are confirmed. Also, the Online Appendix shows the coefficients of the Prior beliefs from Tables 5 and 6. The main message is that those with higher priors, hence those who were more concerned even before our intervention, are those who are more likely to state that seeking information or increasing coverage is appropriate.

While the results just shown focus on the changes in attitudes and perceptions induced by the information treatment, we now explore whether these shifts also lead to actual behavioral changes. To this end, we conducted a follow-up survey two months after the main experiment.[3] This follow-up survey allows us to assess whether the effects of the information treatment persist over time and whether they translate into concrete actions, as self-reported by respondents. Thus, we now analyze the outcomes from the follow-up survey to examine whether the changes in beliefs and attitudes observed earlier have led to sustained behavioral changes. The Online Appendix contains summary statistics that show that the subset of participants who took part in the Follow-up survey does not substantially differ from the subset of participants who did not take part in the Follow-up survey. Notice that assignment to the Follow-up survey is exogenous and not a choice of the participants.

In particular, we examine whether the information provided during the main experiment led to requesting home insurance quotes and purchasing insurance. To analyze these binary outcomes, we estimate Eq. (1) using a probit model. The results are shown in Table 7 where average marginal effects are estimated. The findings highlight that the change in beliefs, induced by the informational

[3] As an additional behavioral margin, at the end of the main survey all participants were given the option to access further information about risks related to natural disasters through a link based on data from the ISPRA database. Take-up was extremely low: we recorded only 4 accesses to the link among control group participants and 2 among treated participants, suggesting that differential take-up across groups was negligible.

Table 7
Behavioral responses: Requesting and purchasing insurance. Probit. Update is defined as the difference between Posterior beliefs on National Home Risk after the Information Intervention and Prior beliefs on National Home Risk. The variable is divided by 100. We report the average marginal effect on the Probability of having requested or purchased insurance. Control Mean is the proportion of respondents requesting a quote or buying an insurance in the control group.

	Dependent variable: Insurance behavior					
	Quote request			Insurance purchase		
	(1)	(2)	(3)	(4)	(5)	(6)
Update	0.003	0.010	0.037*	−0.011	−0.003	0.005
	(0.018)	(0.019)	(0.018)	(0.018)	(0.019)	(0.017)
Control Mean	0.200	0.200	0.200	0.173	0.173	0.173
Priors	NO	YES	YES	NO	YES	YES
Controls	NO	NO	YES	NO	NO	YES
Observations	150	150	149	150	150	149
Pseudo R^2	0	0.013	0.249	0.002	0.011	0.272

Notes: *p < 0.05; **p < 0.01; ***p < 0.001.

intervention, prompted actual information-seeking behavior, as evidenced by a higher likelihood of requesting an insurance quote. Specifically, for a shift of 100 points in the belief variable, $Update$, there is an increase of 3.7% in the probability of requesting a quote (p=0.043). However, this did not translate into a higher likelihood of purchasing a new policy or modifying existing policy conditions.[4] Estimates without controls are somewhat smaller, in line with the patterns observed in Table 6, suggesting some caution in interpreting the results.

3.4. Other relevant findings

We now turn to additional findings concerning the intervention's effects on other belief measures beyond our primary outcomes. We begin by examining participants' perceptions of risk related to their own home and mortality, and then assess whether treatment effects persisted over time.

3.4.1. Effects on own home risk perception and mortality risk perception

A key feature of our design is that we also elicited two additional belief questions: *Own Risk Perception* and *Mortality Risk Perception*. The first is based on responses to the following question: "Think of 1000 homes similar to your usual residence in terms of geographic area, size, and construction characteristics. Over the next 5 years, how many of them do you think will be affected by at least one natural (e.g., hail, hurricanes, storms) and/or catastrophic event (e.g., landslides, earthquakes, floods)?" The second question is: "Think of 1000 people randomly selected from those who died in Italy in 2018 and 2019. How many of them, in your opinion, died due to circulatory system diseases?"

As for *National Risk Perception*, the data reveal significant heterogeneity in perceived exposure to risk at the individual home level, with a mean estimate of 225.740 affected homes, a median of 100, and a standard deviation of 275.270. Interestingly, *Own Risk Perception* is significantly lower than the national perception by 108.663 units (t-test, p < 0.001). This suggests that individuals may exhibit overconfidence in their assessment of their own home's risk relative to the national average. On the other hand, *Mortality Risk Perception* shows an average of around 276.580 out of 1000 deaths attributed to circulatory system diseases (median = 200; SD = 245.505).

Moreover, in the treatment group, we allowed individuals to revise these beliefs following the intervention. We then examine how respondents in the treatment group updated their risk perceptions after receiving the information treatment. As can be seen in Fig. 3, we find that respondents increased their *Own Risk Perception* significantly by 151.213 points, corresponding to a 74% increase (t-test, p < 0.001). For comparison, *National Risk Perception* increased by 156 points, corresponding to a 49% increase. While the effect on *Mortality Risk Perception* is also positive and statistically different from 0 (t-test, p < 0.001), it is much smaller in magnitude: an increase of 41 points, corresponding to only a 14% increase.

These results are important because they demonstrate a significant effect on *Own Risk Perception*, which is expected given that the information treatment targeted national-level home risk and thus should also inform participants about their own home's risk. While a spillover effect on *Mortality Risk Perception* is apparent – even though the treatment focused on national-level risk – it is smaller in magnitude. This suggests that although individuals may update their perceptions of health risk based on information unrelated to it, the effect is less pronounced compared to the more direct impact on home risk. However, in the case of *Mortality Risk Perception*, belief accuracy decreased, although not significantly, between prior and posterior beliefs. Specifically, in the treatment group, the number of bonuses paid decreased from 58 in the prior beliefs to 35 in the posterior beliefs, following the provision of information ($p \sim 0.71$).

[4] In the Online Appendix, we report results from Columns (4)–(6) of Table 7, excluding respondents who indicated "Enough" or Very" when asked how strongly the reason "The natural renewal of the current insurance policy will only take place during the coming months of the year" influenced their decision not to request new quotes.

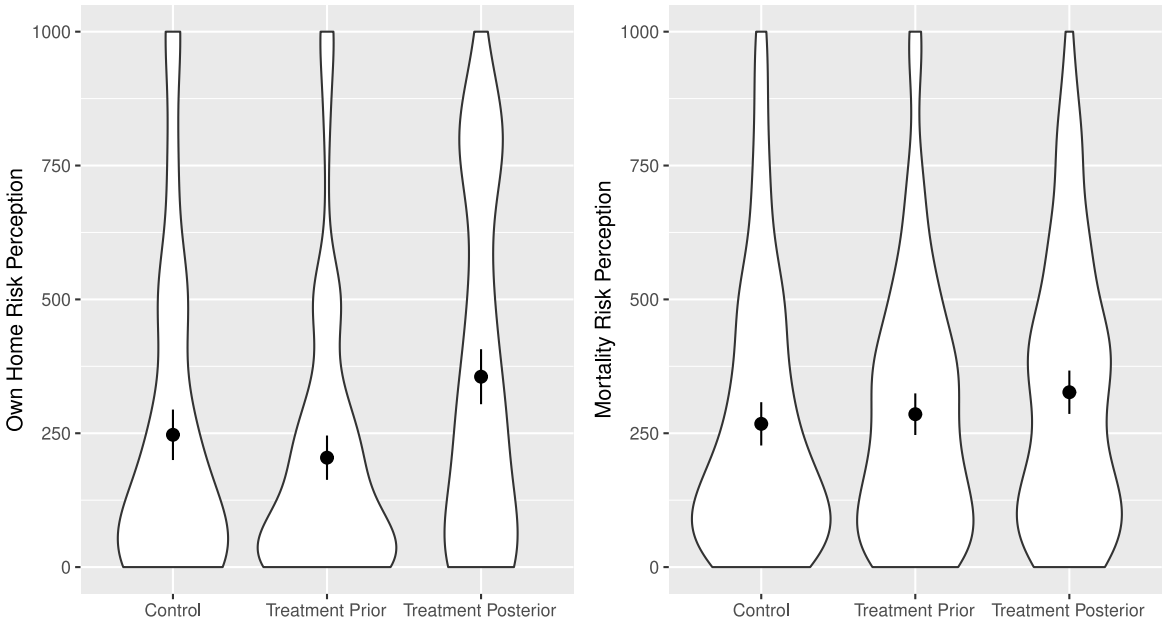

Fig. 3. Own Home Risk Perception and Mortality Risk Perception prior and posterior beliefs.

Table 8
Medium-run effects on beliefs. The dependent variables are the beliefs stated in the Follow-up survey. Prior and Posterior beliefs are measured by National Home Risk Perception, Own Home Risk Perception, and Mortality Risk Perception in the main survey.

	National level risk follow-up			*Own home risk follow-up*		
	(1)	(2)	(3)	(4)	(5)	(6)
Treat	11.000	−0.045	−1.963	−2.456	−0.830	−3.903
	(43.187)	(46.983)	(48.678)	(40.552)	(46.461)	(47.466)
National home risk prior	0.471***	0.450***	0.437**			
	(0.110)	(0.124)	(0.161)			
National home risk posterior			0.017			
			(0.136)			
Own home risk prior				0.261*	0.276*	0.253
				(0.108)	(0.109)	(0.145)
Own home risk posterior						0.029
						(0.123)
Control Mean	254.026	254.026	254.026	162.974	162.974	162.974
Control sd	281.247	281.247	281.247	251.008	251.008	251.008
Controls	NO	YES	YES	NO	YES	YES
Observations	150	150	150	150	150	150
Adjusted R^2	0.142	0.086	0.079	0.094	0.042	0.035

Note: *p < 0.05; **p < 0.01; ***p < 0.001; Robust s.e. in parentheses.

3.4.2. Medium-run effects on beliefs

While the main survey showed that the intervention initially influenced participants' perceptions of risk, the follow-up survey results indicate that these effects are only transitory and fully disappear after two months. Specifically, when considering the questions on *National Risk Perception* and *Own Risk Perception*, no treatment differences are observed: a t-test for difference in means fails to reject the null hypothesis that they differ between the treatment and control groups, with differences of −10.486 (p = 0.823) and −17.298 (p = 0.685), respectively. We also run regression analyses to estimate the impact of the treatment on beliefs while controlling for prior and posterior beliefs as elicited in the main survey. The results are shown in Table 8. These findings indicate that there are no lasting treatment effects. On the other hand, if anything, we find a significant correlation between prior beliefs elicited in the main experiment and those elicited in the follow-up, indicating that participants' original beliefs were persistent over time, while the treatment effects themselves faded away.

It is worth noting that all individuals became more optimistic at follow-up; therefore, the convergence between groups is not driven by the control group becoming more pessimistic. To better understand potential external influences, we consulted the ISPRA database on landslide events. Although some landslides occurred between the two survey waves, they were minor: no fatalities were

reported, and only four individuals were injured (three of them during excursions). We also reviewed publicly available records on floods and earthquakes and found no major events during the same period. However, two major floods took place in September and October 2024, a few months before the first survey wave. This may help explain the relatively higher level of pessimism observed at baseline compared to the follow-up survey.

4. Discussion

This study contributes to the growing field of research focused on better understanding the subjective factors that influence economic decisions and intentions, namely perceptions and beliefs. Specifically, it explores how individuals' perceptions of environmental risks – increasingly important due to climate change – affect their willingness to engage in financial protection behaviors like purchasing home insurance. By utilizing a survey experiment, we provide empirical insights into how informational interventions can shift individuals' risk perceptions and attitudes toward insurance, offering new understanding of how subjective beliefs drive decisions in the face of environmental threats.

4.1. Risk awareness vs. optimal insurance level

The results of our study underscore the significant role that subjective beliefs and perceptions play in shaping individuals' willingness to engage in protective financial behaviors, particularly in the context of environmental risks. Through our survey experiment, we observed that participants significantly updated their risk perceptions after receiving informational content about environmental threats. On average, this belief update was notably stronger among those who initially underestimated home-related risks. Furthermore, these changes in perceptions were linked to increased interest in exploring protective measures, such as requesting insurance quotes. These findings highlight the potential for informational interventions to effectively influence individuals' attitudes toward risk and insurance. As mentioned in the Introduction, we do not take a stance on whether purchasing insurance is desirable, nor whether it is consistent with rational economic behavior at the individual level. Our work originates from the observation that housing constitutes a sizable share of Italians' wealth and that insurance coverage is relatively low. We therefore ask whether, on average, observed beliefs and insurance-related decisions are consistent with available information about environmental risk.

Importantly, there is substantial heterogeneity in individual exposure to environmental risk, and for individuals living in genuinely low-risk areas, not purchasing insurance may well be an optimal and informed decision, even though a large share of the Italian population is exposed to non-negligible risk. Our results should therefore not be interpreted as implying that all individuals underestimate their relevant risk or that higher insurance uptake would necessarily be welfare-improving for all.

A potential concern is that providing national-level information may lead some individuals to revise their beliefs in a direction that does not perfectly reflect the risk to their own home, particularly for those living in genuinely low-risk areas. It is important to note, however, that the information provided in the intervention is based on official national statistics and is therefore factually accurate. In this sense, the treatment does not introduce misleading information but rather provides a common benchmark that individuals can use when forming expectations about their own home risk, or as a trigger to seek further, more localized information. While belief revisions could, in principle, lead some individuals to overestimate the risk to their own home, they could also correct overly optimistic perceptions for others. We therefore interpret our intervention as providing general, truthful information, while acknowledging that it cannot fully account for individual-level heterogeneity in exposure to environmental risk.

We therefore interpret our results as documenting how information affects beliefs and behavior, without making normative claims about optimal insurance decisions.

4.2. Exposure, vulnerability, and other factors influencing insurance decision

Our treatment mentions both the level of exposure and the vulnerability of homes. Now, we try to understand which specific dimension of information drives the treatment effect on *Own Home Risk Perception*. At the end of the survey, we ask a series of questions on reasons not to get insurance. For those who did not get insurance, they were framed as "Regarding the insurance(s) you have not subscribed to, how much did the following factors influence your decision?" For those who had some form of insurance, we asked "Considering the insurance policies you have subscribed to, to what extent do you agree with the following statements?". Then, we asked the rate of agreement with five statements, which were the same in both cases:

1. I believe my home has a low risk of being affected by adverse events.
2. I believe home insurance is too expensive for me.
3. I believe insurers often find ways to avoid paying claims.
4. I believe that if my home were affected, the damage would be financially limited.
5. I believe that if my home were affected, I could rely on emergency public aid.

On top of these questions, we also asked the question "Imagine that the home where you usually reside is affected by a natural or catastrophic event. How severe do you think the financial damage would be?" We performed a Wilcoxon rank-sum test on the distribution of the answers to the six questions and we never reject equality between the treatment and control groups. After translating answers from a qualitative to a numerical scale, we also performed t-tests to check whether the mean differed between

the treatment and the control group and we were never able to reject the null hypothesis of equality. The answer to the last question, in particular, suggests that our treatment mainly worked on the exposure level more than on the vulnerability side. Our treatment shifted the perception of natural or catastrophic events happening but not the perception of their impact.

We use the responses to the five statements above to further investigate why individuals may choose not to purchase insurance. It is clear that risk perception is not the only factor at play. Focusing on the percentage of respondents who express a moderate to high level of agreement with each statement, we find that: (i) approximately 45% of respondents believe their home faces a low risk of being affected by adverse events; (ii) around 43% consider home insurance too expensive; (iii) 59% believe that insurers often find ways to avoid paying claims; (iv) about 35% think that, even if their home were affected, the financial damage would be limited; and (v) only 29% believe they could rely on emergency public aid if their home were affected. These results clearly indicate a low awareness of risk — an aspect our intervention directly addresses. However, they also highlight other important economic and behavioral factors, such as low trust in insurance companies and the perceived high cost of insurance. We consider these factors to be relevant, as they undoubtedly contribute to the low uptake of home insurance among Italians. Nonetheless, they are also more difficult to influence directly. For this reason, our intervention focused on a key yet more malleable factor: beliefs. Interestingly, the belief that the State would provide emergency aid to affected homeowners is not particularly widespread.

4.3. The relevance of general information for individual perceptions

An important contribution of our study is the finding that even general information about *National Risk Perception* – without personalization – can lead individuals to update their beliefs about the own home risk they face. These results align with findings by Hu (2022), who show that individuals learn about their flood risk through social interactions. Participants who were provided with broad, national-level risk information not only adjusted their perceptions of general environmental threats but also reported increased awareness of the personal risks posed to their own homes. This suggests that non-tailored, broad-based informational campaigns can have significant effects on individuals' risk perceptions, a key finding for policymakers. When personalized data or feedback is not available or practical to implement, informational campaigns – delivered through widely accessible channels – may still be an effective tool for driving belief updates and influencing decision-making. This approach offers an efficient and scalable way to improve public awareness and encourage protective behaviors, particularly in contexts where resources for more targeted interventions are limited.

4.4. Methodological considerations

One possible concern is the presence of experimenter demand effects, which we recognize as a valid consideration but one that cannot account for the magnitude of our results.

First, participants were incentivized to provide accurate answers both in the main experiment and in the follow-up survey, with incentives applied to both prior and posterior beliefs. Although it is possible that some participants may have adjusted their responses in line with what they believed the researchers expected, the use of monetary incentives substantially reduces the likelihood of strong experimenter demand effects (this is indeed one of the key recommendations in Haaland et al., 2023). That said, we acknowledge that some degree of demand effect could still be present.

Second, we have carefully considered this concern in light of both our experimental design and the evidence provided in De Quidt et al. (2018). In particular, we can bound the potential role of experimenter demand following the empirical approach discussed in that paper. If we take their "weak demand treatments" (0.13 standard deviations) as a legitimate upper bound for our setting – which most likely overestimates the magnitude of any demand effect in our case – the potential influence of experimenter demand on our belief question would be relatively small. While our estimated effect is on the order of 156, the corresponding upper bound from their study would be around 36, representing at most approximately 23% of our observed effect. Note also that we observe an almost 50% increase in beliefs, and we calculated that we are well powered to detect a 20% increase. Even assuming that 23% of the 50% increase is driven by experimenter demand, we would still be left with a 38.5% increase — well above the 20% threshold our design is powered to detect.

We also discuss relevant methodological aspects. While the methodological approach employed in this study – namely the survey experiment – enabled controlled testing of the intervention's effect on risk perceptions, it also underscores important and relevant limitations. A clear understanding of these limitations, particularly those inherent to information provision experiments and information campaigns more broadly, is crucial for assessing the strengths and boundaries of this approach.

First, while the experiment was able to capture immediate shifts in beliefs and attitudes, the effects were not sustained over time. Follow-up data indicated that changes in risk perceptions had largely reverted to baseline levels after two months, suggesting that short-term interventions may have limited, or even null, long-term effects. This raises questions about the lasting effects of informational interventions and whether repeated exposure or longer-term engagement might be necessary to sustain belief updates and behavioral change.

Second, while the primary informational treatment targeted national-level home risk, we observed spillover effects on other domains of risk perception, notably mortality risk. Although the magnitude of belief updating was smaller for mortality risk compared to home-related risks, the fact that participants revised unrelated estimates in response to an intervention focused on environmental risk highlights the broader cognitive impact of information exposure. This suggests that individuals may generalize new information beyond its intended scope. One possible explanation is anchoring, whereby the salient national home risk statistic may have served as a cognitive reference point, influencing beliefs in adjacent domains like health (Haaland et al., 2023).

Together, these findings highlight the need for cautious interpretation of belief changes in survey experiments and underscore the value of also measuring behavioral intentions and attitudinal shifts. More broadly, they emphasize the importance of assessing and bounding the unintended effects of information interventions beyond the targeted belief domains, as we do here.

5. Conclusion

Climate change is intensifying the frequency and severity of natural disasters, posing growing risks to individuals and properties worldwide. Despite these increasing risks, insurance coverage for environmental disasters remains strikingly low among homeowners in many high-risk regions. While some governments have introduced mandatory coverage for certain sectors, extending such measures to individuals often proves politically and practically challenging. Our study addresses this gap by examining whether a simple, targeted informational intervention can shift risk perceptions and influence attitudes toward home insurance. In doing so, we contribute to efforts aimed at identifying scalable, cost-effective strategies to enhance risk awareness and promote protective financial behaviors in climate-vulnerable settings.

Our results show that many individuals hold overly optimistic beliefs about environmental risks, underestimating the likelihood and severity of disasters. After receiving risk information, participants – particularly those with initially low risk perceptions – significantly updated their beliefs, both at the national and personal levels. This belief shift was associated with greater interest in exploring protective actions, such as requesting insurance quotes. These findings suggest that even general, non-personalized information can trigger meaningful changes in attitudes toward risk and insurance, though the effects diminished over time, and behavior changes (such as purchasing or modifying insurance) remained limited.

These results open several avenues for future research. One priority is exploring how to make belief updates more persistent — whether through repeated interventions, personalized information, or integration with real-time risk tools. Further work is needed to understand how informational treatments interact with psychological, cultural, and institutional barriers to insurance uptake, particularly in contexts where trust in public institutions or insurers is low. Finally, future studies could explore the broader applicability of informational nudges in other risk domains, such as health or economic shocks. Understanding how information influences risk perception and protective behavior has high policy relevance, especially as governments seek low-cost, scalable tools to improve resilience in the face of growing global risks. This is particularly important in contexts where imposing protective measures or mandating insurance coverage is not politically feasible, making voluntary behavioral change through information all the more crucial.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) and Gemini (Google) to enhance the clarity, grammar, and overall quality of the writing. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.joep.2026.102903.

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