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Abstract

Information can trigger unpleasant emotions. As a result, individuals might be tempted to willfully ignore it. We experimentally investigate whether increasing perceived control can mitigate strategic ignorance. Participants from India were presented with a choice to receive information about the health risk associated with air pollution and later asked to recall it. We find that perceived control leads to a substantial improvement in information retention. Moreover, perceived control mostly benefits optimists, who show both a reduction in information avoidance and an increase in information retention. This latter result is confirmed with a US sample. A theoretical framework rationalizes these findings.

JEL classification: D83, I15, Q53
Keywords: information avoidance; information retention; perceived control; motivated cognition; air pollution

From the vast expanse of the internet to casual family dinners and billboard ads on the streets, our daily lives are filled with an array of information with varying degrees of pleasantness. For instance, most of us dislike receiving distressing news related to our environment or personal well-being, such as a looming economic recession, reports of a violent conflict in our vicinity, the unfolding of a pandemic, or the threat of climate change. Because interacting with such unsettling information can leave us feeling uneasy and anxious, we might find ourselves deliberately ignoring it, even though it has the potential to enhance our decision-making process. Strategic ignorance can manifest in two primary ways. The first and more intuitive approach is to prevent information to be encoded in the brain by actively avoiding the information. We refer to such behavior as information avoidance. However, avoidance might not always be possible, and in such instances, people may resort to selectively forgetting unpleasant information after

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being exposed to it. We refer to such behavior as selective information retention.[1]

Information ignorance is commonly observed in settings where individuals have limited to no control over the realization of outcomes. Examples include medical testing for untreatable diseases, genetic conditions, but also the not yet known realization of past events, such as yesterday's financial portfolio returns during a market decline, job evaluations, or teaching ratings when the outcome seems bleak. Nevertheless, information ignorance can also manifest in situations where the outcomes lie in the future, preventive actions are possible, but the awareness of their existence and/or effectiveness is limited. In this context, *perceived control* – the belief that one's actions can influence a specific outcome – might be lower than actual control.[2] Prime examples come from the health domain, where numerous diseases can be treated, or their impacts alleviated, if detected early. Yet, individuals are often reluctant to undergo medical screening.

In this paper, we test whether an increase in perceived control can reduce strategic ignorance of distressful information. We first present a simple theoretical framework to illustrate how perceived control can affect information avoidance and information retention. In the model, individuals hold a prior belief about the realization of an event that reduces their utility. While they can take a costly preventive action to reduce the impact of the negative event, individuals vary with respect to the level of perceived control they have over the impact of their actions. Building on previous work (see Caplin and Leahy, 2001; Kőszegi, 2003; Oster, Shoulson and Dorsey, 2013; Schwardmann, 2019), we assume that individuals derive anticipatory utility from their beliefs about the severity of a negative event before it unfolds, and subsequently experience realized utility once the event occurs. The trade-off between these two components of the total utility determines an individual's decision to acquire or avoid (respectively remember or forget) the information. Increasing perceived control can affect the optimal decision. For instance, optimistic individuals may offset some of the utility loss resulting from the occurrence of a negative event by maintaining high anticipatory utility through information ignorance. Increasing perceived control can shift this trade-off: if the utility impact of the negative event can be reduced, there is less need for willful ignorance by optimists.

We conduct an experiment with an Indian sample (N=2,036) to examine the influence of perceived control on the ignorance of information about the detrimental health effects of air pollution. In the treatment group, we increase participants' perceived control by listing various

[1] Strategic information attendance can take five main forms, as comprehensively reviewed in Golman, Hagmann and Loewenstein (2017), namely (1) *physical avoidance* (e.g., Dana, Weber and Kuang, 2007; Exley and Kessler, 2021), (2) *strategic inattention* (e.g., Sims, 2003; Caplin and Dean, 2015; Amasino, Pace and van der Weele, 2021), (3) *biased processing* (e.g., Eil and Rao, 2011; Glaeser and Sunstein, 2013; Möbius et al., 2014; Peysakhovich and Karmarkar, 2016; Sunstein et al., 2016), (4) *self-handicapping* (e.g., Berglas and Jones, 1978; Ishida, 2012), and (5) *forgetting* (e.g., Zimmermann, 2020; Huffman, Raymond and Shvets, 2022).

[2] The psychological literature outlines two components of perceived control: an individual's internal locus of control and self-efficacy. While the internal locus of control describes an individual's belief that personal actions can generally be used to control outcomes, self-efficacy describes the belief that one personally has the means or abilities to implement these actions (Bandura, 1994).

simple yet effective measures that can be used to protect one's own health against outdoor and indoor air pollution. We first measure information avoidance by eliciting participants' preference to receive information about the average regional loss of life expectancy due to air pollution. Their preference was then implemented with a 60% probability. We then measure information retention by asking participants, who were randomly assigned to receive the information, to recall it.

We opted to focus on information about the health risk of air pollution for several reasons. First, the adverse health effects of air pollution are considered a major global health burden. According to the World Health Organization (WHO) in 2021, about 6.7 million deaths worldwide are attributable to ambient and household air pollution every year. How people attend to information about the health risks of air pollution therefore carries important policy implications. Second, health information appears especially prone to being avoided (Kőszegi, 2003; Oster, Shoulson and Dorsey, 2013; Schwardmann, 2019). In particular, attitudes toward air pollution and its effect on own health are oftentimes characterized by indifference or denial (Bickerstaff and Walker, 2001; Muindi et al., 2014).[3] And third, the topic offers scope to improve perceived control. There are various effective and to some extent also inexpensive ways in which individuals can protect their health from air pollution, including face masks, air purifiers, or the proper ventilation of indoor areas (Carlsten et al., 2020).

Both information avoidance and imperfect recall are present in our data: 8% of participants in the control group prefer to avoid the information and about 27% of participants who received the information cannot recall it. The treatment – which successfully increases perceived control – significantly reduces selective information retention. Participants in the treatment group are about 25% less likely to forget the information than their counterparts in the control group, reducing selective information retention in our sample from 27% to under 20%. In contrast, we find no evidence of a treatment effect on information avoidance in the aggregate sample. Guided by our theoretical framework, we additionally explore the heterogeneity in participants' prior beliefs about the air quality in their home district. In line with the model, we find that the treatment significantly reduces information avoidance and improves information retention for the most optimistic participants. These findings suggest that information ignorance is especially problematic and perceived control particularly helpful for those that are ex-ante oblivious of the underlying problem.

The findings from our Indian sample highlight the potential of increasing perceived control to encourage tending to distressing information in settings where air pollution is notably severe and poses significant health risks. Nevertheless, in regions characterized by lower air pollution levels and less severe health consequences, the impact of perceived control may be less pronounced, as suggested by our theoretical framework. To investigate this matter, we replicate

[3]Particularly in developing countries, the consistently low demand for environmental quality in the face of ever more severe environmental catastrophes is puzzling (Greenstone and Jack, 2015; Pattanayak, Pakhtigian and Litzow, 2018; Greenstone, Lee and Sahai, 2021; Balietti, Budjan and Eymess, 2023).

the experiment with participants from the US (N= 2,272), where air pollution is comparatively lower, but nonetheless above official recommendations and significantly detrimental to health (see for example Deryugina et al., 2019, on the sizable mortality effects of air pollution in the US). While our treatment manipulation successfully increases perceived control in the US sample as well, we do not find any treatment effect on neither information avoidance, nor participants' ability to recall the information in the aggregate. Nonetheless, we confirm our previous finding that the treatment leads to a substantial enhancement in information retention for individuals with optimistic prior beliefs.

Altogether, our findings provide substantial evidence that perceived control can be an effective tool to improve attendance to information – and particularly information retention – among optimists, even in contexts where the underlying threat is comparatively lower but nonetheless highly relevant.

This paper contributes to the literature threefold. The main contribution is to provide direct evidence on the role that perceived control can play in reducing strategic information ignorance. We study its impact on two forms of selective attendance to information. First, we bring empirical evidence on the effect of perceived control on information avoidance, so far only provided by sparse contributions from the social psychology literature (*e.g.*, Trope, Gervey and Bolger, 2003). In the economic literature, we are aware of no study that directly measures the effect of perceived control, although a few studies show indirect support for a positive correlation. Theoretical contributions by Kőszegi (2003) and Schwardmann (2019) predict that information avoidance of medical diagnoses decreases in the extent to which a disease can be treated. Empirical support for these predictions is provided by studies documenting an increase in the share of participants willing to get tested when a treatment is available (*e.g.*, Yaniv, Benador and Sagi, 2004).[4] In addition, we study the role of perceived control with respect to selective information retention. There is robust empirical evidence that individuals strategically forget information that has negative valence (see Amelio and Zimmermann (2023) for a review).[5] To the best of our knowledge, our study is the first to investigate whether perceived control affects selective information retention.

[4]Without a focus on information acquisition and processing, the economics literature has so far focused on how an internal locus of control correlates with different economic behaviors, ranging from applications in labour (Coleman and DeLeire, 2003; Caliendo, Cobb-Clark and Uhlendorff, 2015; Caliendo et al., 2022), health (Kesavayuth et al., 2020; Churchill et al., 2020), development (Buddelmeyer and Powdthavee, 2016; Abay, Blalock and Berhane, 2017; Churchill and Smyth, 2021), and risk-taking and financial decisions (Pinger, Schäfer and Schumacher, 2018; Fehr and Reichlin, 2022).

[5]For instance, Zimmermann (2020) finds that individuals who receive negative feedback about their results in an intelligence test are more likely to forget it after one month compared to individuals who receive positive feedback. Other examples include Li (2013) who find that betrayed trustors in a trust game recall less accurately the outcome of the game compared to trustors who benefited from an altruistic decision from their trustee. Saucet and Villeval (2019) show that dictators in a dictator game are more likely to remember their altruistic than their selfish decisions. These empirical findings are consistent with theoretical models showing that individuals can strategically suppress undesirable signals (Bénabou and Tirole, 2002; Gottlieb, 2014) or wrongly recollect them as good signals (Chew, Huang and Zhao, 2020).

Second, this paper studies information avoidance and selective information retention jointly in one experiment. This approach is valuable in that it directly facilitates the investigation of whether these two forms of willful ignorance act as complements and/or substitutes. The literature typically assumes complementarity between the two in the sense that selective information retention is treated as a last resort when information cannot be avoided (see Golman, Hagmann and Loewenstein, 2017, and references therein). We find support for this relationship as information retention is lower among individuals who stated a preference against receiving the information but were randomly assigned to see it. Moreover, we find substantial rates of forgetting also among those participants that prefer to receive the information in the first place, especially when it contradicts prior beliefs. This suggests that selective information retention can also act as a substitute for information avoidance. By documenting both substitutability and complementarity, we argue that studying information avoidance and selective retention separately may lead to an underestimation of the extent of willful ignorance.

Third, we demonstrate that information avoidance and selective information retention are a relevant concern also with respect to aggregate-level information. A large share of the existing literature is primarily concerned with information that is directly applicable to the individual that consumes it. In particular, negative feedback on personal intelligence or beauty, teacher ratings, private financial outcomes, and medical test results are prominent instances of information that is often overlooked (*e.g.*, Eil and Rao, 2011; Möbius et al., 2022). With our experiment, we contribute to an expanding body of literature that examines attitudes towards aggregate-level information, where accurate individual estimates are not accessible (*e.g.*, Carrillo and Mariotti, 2000; Loewenstein and O'Donoghue, 2006; Kahan et al., 2012).

Our findings carry significant policy implications for tackling willful ignorance in situations where perceived control is low. A recent prominent example is the outbreaks of pandemics, like COVID-19, which have highlighted how limited perceived control over infectious diseases can lead to widespread fear, uncertainty, and difficulties in implementing effective public health measures (*e.g.*, Kaplan and Milstein, 2021). Similarly, the increasingly urgent issue of climate change is infamous for its tendency to be ignored (King, 2004; Norgaard, 2011; Zappalà, 2023) as individuals and communities may feel a lack of control over the broader consequences of environmental degradation and extreme weather events. Furthermore, the growing wealth gap and economic disparities can lead to reduced perceived control for disadvantaged populations. The preference for remaining uninformed about growing inequality could potentially account for the limited support for redistributive public policies aimed at addressing the issue, as documented in various studies (Kuziemko et al., 2015; Hoy and Mager, 2021; Fehr, Mollerstrom and Perez-Truglia, 2022). Our results suggest that the key for lasting behavioral change in the face of such mounting challenges is not only in raising awareness, but also in enhancing individuals' ability to cope with threats.

I. Theoretical Framework

We propose a simple model to illustrate the role of perceived control on information acquisition and information retention, building on work by Kőszegi (2003), Oster, Shoulson and Dorsey (2013), and Schwardmann (2019). Consider an individual whose utility is negatively impacted by an exogenous event Z. While the individual cannot directly influence the realization of Z, she can undertake a mitigating action $a \in [0,1]$ to reduce the impact of Z on her utility. The utility function is given by:

$$U(a, \gamma, Z) = -(1-\gamma a)Z - a^2 C, \tag{1}$$

where taking action a is costly, as represented by the convex cost function a^2C, with $C > 0$.[6] Utility is decreasing in the severity of the negative event Z, with $\frac{\partial U(a,\gamma,Z)}{\partial Z} = -(1-a\gamma) < 0$. The individual's level of perceived control is denoted by $\gamma \in [0,1]$. It represents the belief about the extend to which action a can mitigate the impact of Z.

The individual chooses action a to maximize her utility, conditional on event Z and her perceived control γ. The optimal a will be chosen at the level where its marginal benefits equal its marginal costs:

$$a_Z^* = \operatorname*{argmax}_a U(a, \gamma, Z) = \frac{\gamma}{2C} Z. \tag{2}$$

Equation (2) illustrates that the optimal level of action a_Z^* increases in the magnitude of the event Z and decreases in the implementation cost C. Moreover, a_Z^* increases in the individual level of perceived control γ. Conditional on Z, the utility level at the optimum a_Z^* is then given by $U(a_Z^*, \gamma, Z) = -Z + \frac{\gamma^2}{4C} Z^2$.[7]

A. Information avoidance

We assume now that the realization of event Z has occurred, but its impact on the individual's utility will only be experienced at a future date. Further, the individual does not currently know the realized value of the event Z, but is acquainted with its expected value $\mathbb{E}[Z]$. Similar to Oster, Shoulson and Dorsey (2013), we assume that the individual can choose to hold a belief π about the expected value of Z, which can differ from the true $\mathbb{E}[Z]$.[8] We do not make any assumptions about how these beliefs are formed, considering them as determined by exogeneous factors.

[6] The assumption corresponds to a setting where reducing the effects of Z becomes more costly at an increasing rate as a increases, typical in settings of pollution reduction, climate change mitigation, medical treatments, etc.

[7] As a is bounded by $[0,1]$, the utility level at the optimum a_Z^* is given by $U(a_Z^*, \gamma, Z) = -Z + \gamma Z \min\{\frac{\gamma}{2C}Z, 1\} - \left(\min\{\frac{\gamma}{2C}Z, 1\}\right)^2 C$. For simplicity, we assume that a_Z^* is always within the action space of the individual, implying that we only consider cases where the condition $C > \frac{Z}{\gamma}$ holds.

[8] In contrast to Oster, Shoulson and Dorsey (2013), we do not assume that the belief π is formed at the same time when action a is decided. Instead, we assume π to be a prior belief, formed by the individual before considering to acquire information about the true Z.

Consider a horizon with two time periods. At time $t = 0$, the individual has the opportunity to acquire information about the true value of Z at no material cost.[9] Let $d \in \{0, 1\}$ denote the decision to learn the true Z, with $d = 1$ as information acquisition and $d = 0$ as information avoidance. Conditional on her information acquisition decision, the individual chooses the optimal action a^*. If the individual chooses to know the true value of Z ($d = 1$), she will implement action $a^*_Z = \underset{a}{\operatorname{argmax}}\, U(a, \gamma, Z)$. In contrast, if the individual chooses not to learn the true Z ($d = 0$), she will base her decision on the prior belief π and set $a^*_\pi = \underset{a}{\operatorname{argmax}}\, U(a, \gamma, \pi)$. At time $t = 1$, the impact of event Z on the individual's utility is realized.

We follow a key assumption in the literature: until the event Z occurs, individuals incur *anticipatory utility* from holding certain expectations about their future utility level (Caplin and Leahy, 2001; Kőszegi, 2003; Oster, Shoulson and Dorsey, 2013; Schwardmann, 2019). At $t = 0$, the individual experiences a level of anticipatory utility that depends on her information acquisition decision. At $t = 1$, the impact of Z materializes and the individual experiences *realized utility*. Table 1 illustrates the anticipatory and realized utilities incurred for the decision to acquire ($d = 1$) or avoid the information ($d = 0$) at each time period.[10]

Table 1 – Information acquisition and incurred utility.

Timeline:	$t = 0$	$t = 1$
Decision type:	Info acquisition and Action a	
Incurred utility:	Anticipatory utility	Realized utility
$d = 1$	$U(a^*_Z, \gamma, Z)$	$U(a^*_Z, \gamma, Z)$
$d = 0$	$U(a^*_\pi, \gamma, \pi)$	$U(a^*_\pi, \gamma, Z)$

At time $t = 0$, the individual decides whether or not to learn the true value of Z, by maximizing her total expected utility, as given by the sum of the expected anticipatory and realized utilities. The individual will choose to acquire information about the true Z if her total expected utility from doing so is higher than her total expected utility from maintaining belief π. Let Δ^{IA} denote the difference in total expected utilities between the case of information acquisition and information avoidance. Then, Δ^{IA} will be given by:

$$\begin{aligned}
\Delta^{\text{IA}} &= \Big(\mathbb{E}[U(a^*_Z, \gamma, Z)] - U(a^*_\pi, \gamma, \pi)\Big) + \Big(\mathbb{E}[U(a^*_Z, \gamma, Z)] - \mathbb{E}[U(a^*_\pi, \gamma, Z)]\Big) \\
&= \left(1 - \frac{\gamma^2}{2C}\mathbb{E}[Z]\right)\pi - \left(\mathbb{E}[Z] - \frac{\gamma^2}{2C}\mathbb{E}[Z^2]\right) \qquad (3)
\end{aligned}$$

[9] A model extension to account for a positive cost of learning the true value of Z is straightforward. However, such an extension does not have implications for our analysis of the role of perceived control on the decision to acquire or avoid information about Z, as the cost itself would not be a function of γ.

[10] In line with Bénabou and Tirole (2002), a key assumption we make is that individuals take the information acquisition decision without being aware of the possibility to forget the information once received.

Equation (3) is linear and increasing in the prior belief π.[11] Importantly, it shows that for individuals who hold pessimistic beliefs about the expected value of Z, *i.e.*, $\pi > \mathbb{E}[Z]$, it is always optimal to acquire information.[12] In contrast, for individuals who are optimistic, *i.e.*, $\pi < \mathbb{E}[Z]$, there exists an indifference point where the total expected utility of learning the true Z is equal to the total expected utility of remaining ignorant. Let π^{IA}_{ind} denote the indifference point in prior beliefs. Using Equation (3), π^{IA}_{ind} can be derived as:

$$\pi^{IA}_{ind} = \frac{\mathbb{E}[Z] - \frac{\gamma^2}{2C}\mathbb{E}[Z^2]}{1 - \frac{\gamma^2}{2C}\mathbb{E}[Z]} \tag{4}$$

Optimistic individuals with prior beliefs below the indifference point are better off by avoiding information about Z. In contrast, optimistic individuals with prior beliefs above the indifference point are better off by acquiring information about Z.[13]

The role of perceived control. Equation (4) illustrates that the indifference point π^{IA}_{ind} above which information acquisition is optimal depends on the individual level of perceived control γ. Thus, a change in perceived control can affect the share of individuals that decide to acquire information about Z. To assess the direction of this effect, we compute the first derivative of π^{IA}_{ind} with respect to γ:

$$\frac{\partial \pi^{IA}_{ind}}{\partial \gamma} = -\frac{\frac{\gamma}{C} SD[Z]^2}{\left(1 - \frac{\gamma^2}{2C}\mathbb{E}[Z]\right)^2} \leq 0 \tag{5}$$

where $SD[Z]$ is the standard deviation of Z. Equation (5) shows that, as perceived control increases, the indifference point of prior beliefs above which information acquisition is optimal decreases. Consequently, we expect a larger share of individuals to chose to acquire information as perceived control increases. Note that because the indifference point always lies below $\mathbb{E}[Z]$, the effect of perceived control on aggregate information acquisition in a given population will be driven by optimistic individuals. In contrast, pessimistic individuals will always choose to acquire the information as, for them, the value of Δ^{IA} is invariably positive. Following this theoretical result, we formulate the following prediction:

Prediction 1 *All other things equal, an increase in perceived control will have a positive effect on the likelihood to acquire information in a given population.*

[11] The slope of the function is positive, with $\left(1 - \frac{\gamma^2}{2C}\mathbb{E}[Z]\right) \geq 0$, as $\frac{\gamma^2}{2C}\mathbb{E}[Z] \in [0, 1]$.

[12] Let $\pi = \mathbb{E}[Z] + \epsilon$, with $\epsilon > 0$. Then, $\Delta^{\text{IA}} = \frac{\gamma^2}{2C}(\mathbb{E}[Z^2] - \mathbb{E}^2[Z]) + \epsilon(1 - \frac{\gamma^2}{2C}\mathbb{E}[Z]) \geq 0$, as $\mathbb{E}[Z^2] - \mathbb{E}^2[Z] > 0$ by Jensen's inequality, and $1 - \frac{\gamma^2}{2C}\mathbb{E}[Z] > 0$ with $\frac{\gamma^2}{2C}\mathbb{E}[Z] \in [0, 1]$.

[13] The sign of π^{IA}_{ind} is given by the sign of the intercept of the linear Equation (3). First, if $\mathbb{E}[Z] - \dfrac{\gamma^2}{2C}\mathbb{E}[Z^2] < 0$, then $\pi^{IA}_{ind} < 0$. In such a case, it follows that $\Delta^{\text{IA}} > 0$ for all individuals, no matter their prior beliefs. Second, if $\mathbb{E}[Z] - \dfrac{\gamma^2}{2C}\mathbb{E}[Z^2] > 0$, $\Delta^{\text{IA}} < 0, \forall \pi \in [0, \pi^{IA}_{ind})$ and $\Delta^{\text{IA}} > 0, \forall \pi > \pi^{IA}_{ind}$.

Empirically, the magnitude of the aggregate effect of perceived control on information acquisition in a given population will depend on the distribution of individual prior beliefs, that is, the relative share of individuals with optimistic vs. pessimistic prior beliefs. Additionally, the effect of perceived control will be lower when the cost of mitigation C is higher. Finally, the effect of perceived control depends on the first and second moments of the distribution of the true Z. This implies that an increase in perceived control is expected to have a larger effect on information acquisition in situations where the expected value of the true Z is larger and/or its standard deviation is higher.

Illustrative example. Figure 1 illustrates the relationship between prior beliefs π and the expected utility gain from acquiring information Δ^{IA}, for two different levels of perceived control, with $\gamma_2 > \gamma_1$. In both cases, Δ^{IA} is linear and increasing in the prior belief π. When γ increases, the slope of Δ^{IA} decreases, and the indifference point represented by the intersection of Δ^{IA} with the x-axis shifts to the left. This illustrates that information avoidance stops being the optimal action for individuals with a progressively lower (more optimistic) prior. The bell-shaped curve depicts a distribution of prior beliefs in the population. As perceived control increases and the indifference point moves to the left, an additional share of optimistic individuals (illustrated by the gray area under the curve) experience a positive Δ^{IA} and consequently prefer receiving the information over not receiving it.

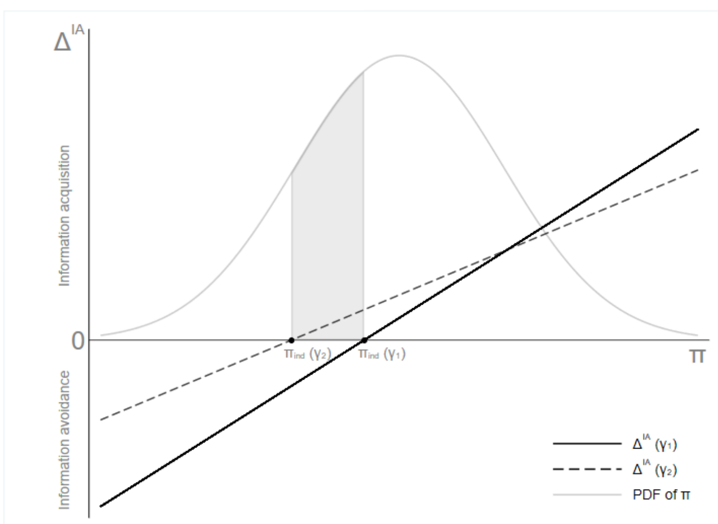

Figure 1 – The value of acquiring information for different levels of prior beliefs, by level of perceived control.

Notes: This figure illustrates the difference in total expected utility between the case of acquiring information or maintaining prior beliefs, following Equation 3 in the main text. Two cases are presented. First, the black solid line depicts a case of low perceived control (γ_1). $\Delta^{\mathrm{IA}}(\gamma_1)$ intersects the x-axis at the indifference point $\pi_{ind}(\gamma_1)$. Second, the dashed line depicts the case of high perceived control (γ_2). $\Delta^{\mathrm{IA}}(\gamma_2)$ intersects the x-axis at the indifference point $\pi_{ind}(\gamma_2)$. The indifference point in the case of high perceived control lies to the left of the indifference point in the case of low perceived control, *i.e.* $\pi_{ind}(\gamma_2) < \pi_{ind}(\gamma_2)$, where $\gamma_2 > \gamma_1$. The bell-shape curve depicts the distribution of prior beliefs in the population. As perceived control increases from γ_1 to γ_2, a larger share of the population (illustrated by the gray area) will be better off by learning the true value of Z rather than avoiding it.

B. Information retention

Next, we consider the scenario where the individual receives information about the true level of Z, regardless of her own choices. The individual can now choose to either remember or forget this information. We assume that an individual who remembers the true level of Z will implement the corresponding optimal action a^*_Z. In contrast, if the individual forgets the true Z, she reverts to her prior belief π and implements the corresponding action a^*_π. We assume that self-deception is costly, such that the individual utility decreases by $K > 0$ when the true value of Z is forgotten.

Let $R \in \{0; 1\}$ be the individual's decision to either remember ($R = 1$) or forget ($R = 0$) the true level Z. We assume that the act of remembering or forgetting takes place at time $t = 0$, while realized utility is incurred at $t = 1$. Table 2 illustrates the anticipatory and realized utilities experienced in each of the two situations.

TABLE 2 – INFORMATION RETENTION AND INCURRED UTILITY.

Timeline:	$t = 0$	$t = 1$
Decision type:	Info retention and Action a	
Incurred utility:	Anticipatory utility	Realized utility
$R = 1$	$U(a^*_Z, \gamma, Z)$	$U(a^*_Z, \gamma, Z)$
$R = 0$	$U(a^*_\pi, \gamma, \pi) - K$	$U(a^*_\pi, \gamma, Z)$

In contrast to the case of deciding between information acquisition and avoidance presented in Section I.A, here, the individual compares actual utility values instead of expected ones. The total utility difference between remembering or forgetting is denoted by Δ^{IR}, and it is given by:

$$\begin{aligned} \Delta^{\text{IR}} &= \Big[U(a^*_Z, \gamma, Z) - U(a^*_\pi, \gamma, \pi)\Big] + \Big[U(a^*_Z, \gamma, Z) - U(a^*_\pi, \gamma, Z)]\Big] + K \\ &= \left(1 - \tfrac{\gamma^2}{2C} Z\right)\pi - \left(Z - \tfrac{\gamma^2}{2C} Z^2 - K\right) \end{aligned} \tag{6}$$

Equation (6) is linear and increasing in the prior belief π. Hence, for a given Z, there is a unique point π^{IR}_{ind} at which the individual is indifferent between remembering and forgetting the information. π^{IR}_{ind} is given by:

$$\pi^{IR}_{ind} = \frac{Z - \frac{\gamma^2}{2C} Z^2 - K}{1 - \frac{\gamma^2}{2C} Z} \tag{7}$$

Individuals with prior beliefs below the indifference point π^{IR}_{ind} are better off forgetting the true Z and maintaining their belief π, as $\Delta^{\text{IR}} < 0, \quad \forall \pi < \pi^{IR}_{ind}$. In contrast, individuals with prior beliefs above the indifference point π^{IR}_{ind} are better off remembering the true Z, as $\Delta^{\text{IR}} > 0, \quad \forall \pi > \pi^{IR}_{ind}$. Importantly, information retention is the optimal strategy for all individuals with pessimistic prior beliefs, *i.e.*, $\Delta^{\text{IR}} > 0$ for all $\pi > Z$.

The role of perceived control. Increasing perceived control affects the position of the indifference point π_{ind}^{IR} and thereby the share of individuals that get more utility from remembering the true Z as opposed to forgetting it. Its first derivative with respect to γ is given by:

$$\frac{\partial \pi_{ind}^{IR}}{\partial \gamma} = \frac{-\frac{\gamma}{C} ZK}{\left(1 - \frac{\gamma^2}{2C} Z\right)^2} \leq 0 \tag{8}$$

Equation (8) shows that an increase in perceived control decreases the indifference point above which remembering the true Z is optimal. We formulate the following prediction about the role of perceived control on information retention:

Prediction 2 *All other things equal, an increase in perceived control will have a positive effect on the likelihood to retain the information in a given population.*

Empirically, the magnitude of this effect in the aggregate sample is expected to be population-specific. In line with Equation (8), we expect the effect to depend on the baseline level of perceived control of each individual, the actual level of the negative event, the cost of implementing the mitigating action, as well as the cost of self-deception.

II. Materials and Methods

A. Experimental Design

We present an experiment to investigate the role of perceived control in affecting individuals' decisions to acquire and memorize information about the impact of air pollution on their life expectancy, thereby testing the theoretical predictions from Section I. We first exogenously manipulate participants' perceived control by providing half of them with information about preventive measures that can be implemented to guard off against air pollution exposure (*high perceived control* treatment, hereafter HPC). To study information avoidance, we ask participants whether they prefer to receive information about the average number of life-years lost due to air pollution in their home district. We randomly implement this preference with 60% probability. To study information retention, participants who received the information are then incentivised to recall the number of life-years lost from air pollution. Below, we provide a more detailed description of the experimental procedure.

Perceived control treatment. The treatment variation was introduced after all participants received general information about air pollution. A random half of participants received information about private measures to protect themselves against air pollution exposure (the HPC treatment, see Figure 3). To ensure that participants engaged with the information, they were asked to provide a short summary of these protective measures and were only allowed to proceed in the experiment after correctly answering a comprehension question. Participants in the control group skipped this step, not receiving information about protective measures.[14] To test whether the treatment successfully increased perceived control, we measured participants' perceived control both via the general perceived control questionnaire (Pearlin and Schooler, 1978) adapted to the context of air pollution, and via the one-item measure by Trope, Gervey and Bolger (2003). Both measures were elicited at the end of the experiment.

Information structure. At the core of the experiment, participants were given the opportunity to receive information about the average life expectancy loss due to constant exposure to the level of air pollution in their home district. Specifically, after being informed about how the level of air pollution in the participant's home district compares to the WHO recommendation, we explained how it translates into an average life expectancy loss due to air pollution.[15] Figure 2 illustrates an example information page for a participant from Kolkata.

We chose to communicate the information about the aggregate health risk in the form of loss of life expectancy for two main reasons. First, air pollution tends to be communicated in terms of the concentration of pollutants in the air which – assuming a layperson's understanding – is not quantifiable into the associated health risk in a straightforward manner. In contrast, a conversion to the expected loss of life expectancy provides a tangible interpretation. Second, the information regarding the loss of life expectancy is not only highly relevant but also notably distressing. That is, although information about the loss of life expectancy may trigger emotional discomfort and lead to information avoidance or selective retention, it can also serve as a compelling factor to motivate behavioral changes. Customizing the information to the participant's home district aims to further increase relevance.

Preference for information. To measure information avoidance, participants were given the opportunity to receive information about the average loss of life expectancy in their home district due to air pollution, as described above. Specifically, participants were asked to indicate whether they would prefer to receive information about the average loss of life expectancy in their home district due to air pollution.[16] To prevent self-selection issues from the choice of acquiring information being endogenous, participants were informed that their choice would be implemented with a 60% chance. This feature of the design ensures that the information was also shown to a share of participants that indicated a preference not to receive it.

[14]To investigate whether an increase in perceived control reduces strategic ignorance compared to the typical day-to-day level, we intentionally refrained from showing any information to participants in the control group. This decision was made to avoid potential confounding effects that could arise from exposing the control group to other (even irrelevant) information, which might interfere with the specific effect we are interested in studying.

[15]The information is based on regional yearly average $PM_{2.5}$ estimates in the raster data by Hammer et al. (2020). We then follow Ebenstein et al. (2017) for a conversion to a loss in life expectancy.

[16]Because participants were not provided with an alternative piece of information, it is possible that some of them indicated that they prefer not to receive any information to save time. If this is the case, we could overestimate the share of information avoidance. However, because this feature of the design is the same across treatments, it does not affect our ability to make between-treatment comparisons.

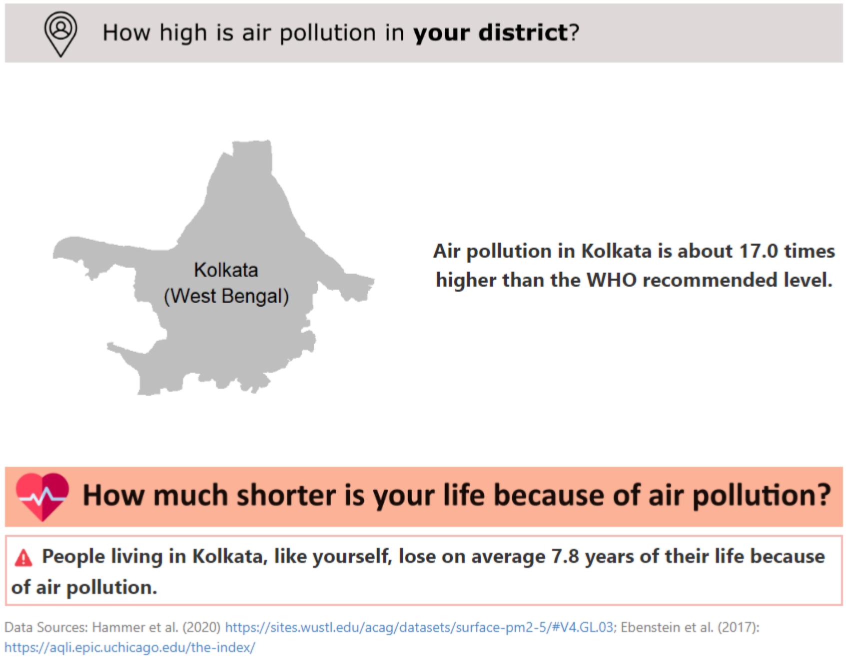

Figure 2 – Example of an information screen displayed to participants in the experiment.

Notes: This figure illustrates an example of an information page that was displayed to experiment participants from the Kolkata district in West Bengal (India). The image shows the outline of the map of participant's home district (in gray). The displayed text includes a comparison of air pollution levels in the participant's home district with the WHO recommendation, as well as information about the associated average loss of life expectancy.

Figure 3 – List of protection measures against air pollution displayed to respondents in the treatment group.

Notes: This image displays the information presented to participants in the treatment group. The selection of protective measures follows Carlsten et al. (2020).

Information retention. As a second main outcome of interest, we asked participants who received information about the average loss of life expectancy in their home district to recall the information. The recall task was incentivized by rewarding participants for perfectly recalling the number of life years lost (to the first decimal place) with 40 Indian Rupees (INR), *i.e.*, about USD 0.50. Imperfect recall within an error margin of ± 0.5 years was rewarded with INR 20. If participants were off by more than 0.5 years, they did not receive any reward. Between the information acquisition and the information recall tasks, participants worked on a real effort task for two minutes. The effort task was set as an incentivized coin counting exercise in which participants earned a fixed piece-rate of INR 2 for correctly counting the number of coins in a randomly generated image. The short delay generated by the task provided participants with an opportunity to strategically forget or misremember the information about the average loss of life expectancy due to air pollution in their home district if they wished to do so. Participants who did not receive the information also undertook the coin counting task.

Procedures. After obtaining participants' informed consent, the online experiment started with an entry questionnaire on demographics, including age, gender, self-reported income, household size, education level as well as the district of residence. The participant's residence is particularly important for personalizing the information on the average loss of life expectancy later in the experiment.

Afterwards, all participants received general information on air pollution, including a list of main sources, associated illnesses, how air pollution is measured, the WHO recommendation of $5\mu g/m^3$ $PM_{2.5}$, how excessive exposure can generally be converted into an average loss of life expectancy, and that there are approximately 1.7 million pre-mature deaths per year due to air pollution in India, as estimated by Pandey et al. (2021). To encourage attention, participants were asked to answer comprehension questions throughout. Moreover, they were asked about their prior belief about air quality in their home district (on a scale from 1 – "worst air quality" to 10 – "best air quality") as well as how worried they are about air pollution in general (on a scale from 1 – "not worried at all" to 7 – "very worried").

Next, we introduced the treatment variation to increase perceived control and elicited participants' preference to receive information about the loss in life expectancy due to air pollution. Participants who had received the information were then tasked to recall it after undertaking an incentivized real effort task consisting in counting coins in tables for two minutes. Participants who did not receive the information moved straight to the coin-counting task. At the end of the study, we measure participants' perceived control over the health impacts of air pollution as well as their general memorization ability. The latter was measured using an incentivized item recognition task.[17] An overview of the experimental procedure is displayed in Table 3.

[17] In the item recognition task, participants were instructed to memorize 30 items that were each displayed for one second. Their memory ability was then tested by showing 15 items and asking the participant whether each of them was part of the previous list. Of those 15 items, eight were previously shown while seven were not. For each correct answer, participants received a reward of INR 5.

Table 3 – Experimental procedure.

	Step	Control	HPC
1.	Entry questionnaire	X	X
2.	General information on air pollution	X	X
3.	Belief elicitation (AP severity and worry)	X	X
4.	HPC treatment variation		X
5.	Information acquisition decision	X	X
6.	Information on loss of life expectancy (cond. on randomization and 5.)	X	X
7.	Real effort task	X	X
8.	Information recall (cond. on 6.)	X	X
9.	Perceived control questionnaire	X	X
10.	Item recognition task	X	X

Notes: This table describes the experimental procedure followed in chronological order in a total of 10 steps. HPC stands for high perceived control treatment. Step 5, namely the information acquistition decision about the loss of life expectancy due to air pollution, was implemented with a 60% probability.

III. Data

The experiment was implemented with Dynata, a survey company commonly used for economic research (Stantcheva, 2022). Completion was rewarded by the survey company in the form of panel points that can be redeemed in various forms, including cash payments. In addition, participants received an average bonus incentive payment (the sum of earnings in the incentivized recall task, the effort task, and the item recognition task) of just under INR 75 (about USD 0.90).[18] Exclusion criteria that either prevented participants from completing the experiment or excludes them from the analysis were pre-registered.[19] The experiment was programmed in nodeGame (Balietti, 2017) and conducted in English in November 2022.

A total of 2,357 participants completed the experiment of which 2,031 observations are retained after applying exclusion criteria, see Table 4 for participant characteristics.[20] The sample is typical for online recruitment in developing countries (Dechezleprêtre et al., 2022). Participants are, on average, rather young (34 years old), predominantly male (66%), live in urban areas (89%), are rich (median household income between the 80$^{\text{th}}$ and 90$^{\text{th}}$ percentile of the national distribution), and well educated (40% with a Masters degree or higher). The average loss of life expectancy in our sample is about 6 years (with values ranging between 1 and 12 years). This appears aligned with the average prior beliefs of participants. When asked

[18]Upon completing the experiment, participants were informed that they would be invited for another experiment two weeks later. Details about the follow-up experiment are provided in Appendix C. Information on the purpose of the follow-up experiment was not provided.

[19]We took several steps to ensure good data quality that we applied to the Indian and US sample: First, we included a question designed to detect straight-lining, *i.e.*, choosing the same response option multiple times in a row. Second, we check for consistency with respect to the participant's reported age by including a question with a free numerical input as well as a question with pre-defined age bins. Third, we exclude participants that give unambiguously automated or otherwise entirely nonsensical responses to the free text input feedback questions. Fourth, participants were excluded if they needed more than five attempts to correctly answer any of the comprehension questions during the general information on air pollution. And lastly, we excluded participants that completed the full experiment in less than five minutes. For the pre-analysis plan, see https://doi.org/10.1257/rct.10083-1.0.

[20]2,645 participants were initially recruited, *i.e.*, we observe an attrition rate of just over 10%.

to rate the air quality in their district, the average response rate is a value of 5 on a 10-point Likert scale. Moreover, participants are rather worried about air pollution (average of 5.6 on a 7 point Likert scale).

Table 4 – Summary statistics of participant characteristics.

	Mean	Median	SD	Min	Max
Age	34.13	32.00	11.03	18	80.0
Female	0.34	0.00	0.47	0	1.0
Household size	4.34	4.00	2.01	1	63.0
Urban	0.89	1.00	0.31	0	1.0
Income group	7.97	9.00	2.63	2	10.0
Highschool degree	0.10	0.00	0.30	0	1.0
College degree	0.50	1.00	0.50	0	1.0
Masters degree or higher	0.40	0.00	0.49	0	1.0
Average number of life years lost in home district	5.85	4.50	2.69	1	11.8
Prior belief about air pollution	4.94	5.00	2.51	1	10.0
Confidence in prior	4.13	4.00	0.78	1	5.0
Worried about air pollution	5.63	6.00	1.52	1	7.0

Notes: The table shows summary statistics of pre-treatment characteristics for a total sample of $N = 2,031$ participants from India after data cleaning according to the pre-registered exclusion criteria. The calculation of average number of life years lost follows (Ebenstein, Lavy and Roth, 2016) and is based on the annual average population-weighted $PM_{2.5}$ concentration in the participant's district of residence (Hammer et al., 2020).

IV. Results in the Aggregate Sample

A. Perceived Control

Before presenting the results for our two main outcomes quantifying information ignorance, we first examine whether the HPC treatment, *i.e.*, providing information on private protection measures, successfully increased participants' perceived control over the negative health effects of air pollution exposure as intended. As detailed in Section A, we collected two measures of perceived control: a 7-item questionnaire adapted from Pearlin and Schooler (1978) to the context of air pollution, as well as a one-item measure adapted from Trope, Gervey and Bolger (2003). Figure 4 plots the distribution of the standardized index of perceived control for participants in the control (in light gray) and treatment group (in dark gray).[21] The graph shows that the distribution in the treatment group is shifted to the right, indicating that the HPC treatment successfully increased perceived control.

We substantiate the descriptive result by analysing statistical differences between treatment and control group on the two standardized measures of perceived control. We find that the treatment significantly increases perceived control in the index by 0.19 standard deviations ($p < 0.001$ in a Mann-Whitney U two-sample test, hereafter MW test, combined N=2,036) and in

[21] The index of perceived control was computed by adding the answers to the 7-item questionnaire, subtracting the control group mean, and dividing by the control group standard deviation, following the procedure in Kling, Liebman and Katz (2007).

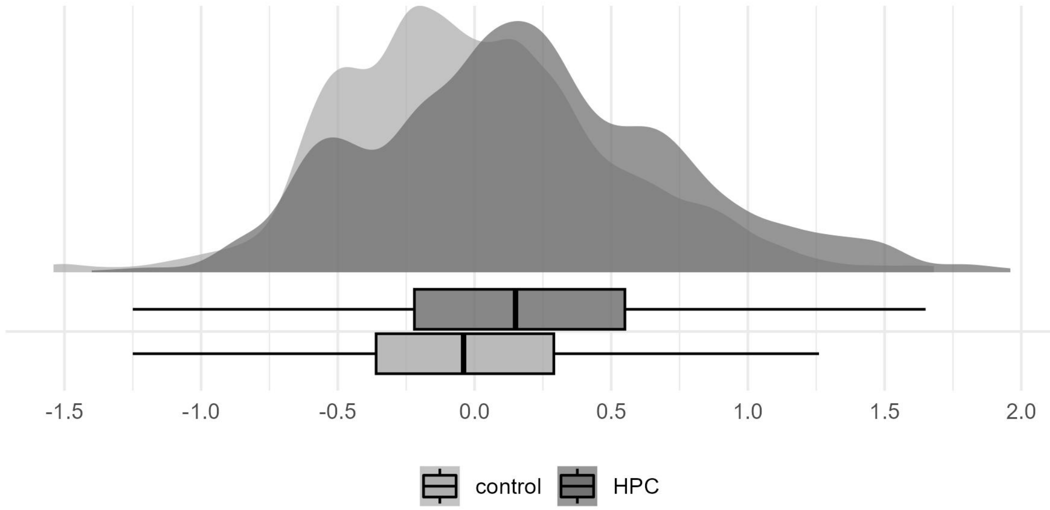

Figure 4 – Distribution of the perceived control index.

Notes: This figure presents the kernel densities of the distributions of perceived control in the Indian sample, as measured by the standardized index of participants' answers to the 7-item questionnaire, adapted from Pearlin and Schooler (1978) to the context of air pollution. Two distributions are presented: lighter gray corresponds to responses in the control group and darker gray corresponds to responses in the treatment group. Perceived control was elicited after the main outcomes of interest, see Table 3 for the experimental procedure.

the one-item measure by 0.17 standard deviations ($p < 0.001$ in a MW test, combined N=2,036). Results on both measures of perceived control are supported by regression analyses that control for the actual average life years lost due to air pollution in the participant's home district, how worried the participant is about air pollution in general, and state fixed effects, see Appendix Table A-2. Importantly, we remind the reader that the two measures of perceived control were elicited at the end of the study and thus could be impacted by participants' experience within the experiment. Hence, the results above should only be regarded as general evidence that the experimental variation achieved a shift in perceived control in the intended direction.

B. Information Avoidance

Our first outcome of interest is the impact of the HPC treatment on participants' preference to receive information about the loss of life expectancy due to air pollution in their home district. Panel A in Figure 5 displays the shares of participants who prefer to receive (in light grey) or avoid (in dark gray) the information. In the control group, 7.9% of participants indicate that they prefer not to receive the information. This share is comparable to the one observed in studies on the willingness to acquire health related information, such as getting tested for contagious medical conditions (*e.g.*, Sullivan et al., 2004; Ganguly and Tasoff, 2017).

In the treatment group, the proportion of participants who prefer to avoid the information lies at 8.24%, not statistically different than the share in control group (Fischer exact test: $p = 0.871$, combined N=2,036). We find consistent results using both linear probability models and logistic regressions where we additionally control for the prior belief about the severity of air pollution and the confidence in this prior belief, see Appendix Table A-6.

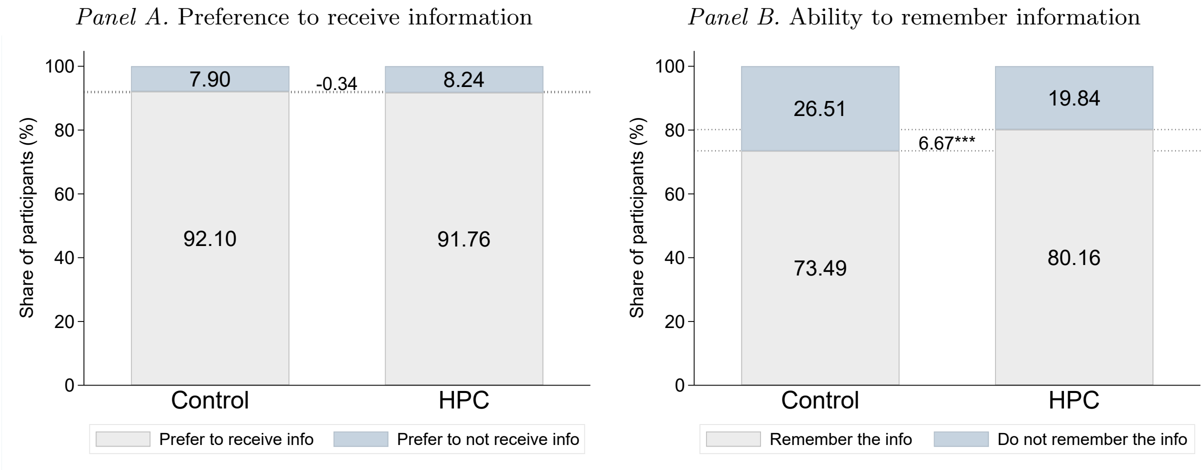

Figure 5 – Share of participants that prefer to receive/avoid the information (Panel A) and share of participants that remember/forget the information (Panel B), in control and treatment groups (Indian sample).

Result 1 *In the aggregate sample, we do not find evidence that the HPC treatment increases the proportion of participants who prefer to receive information about the average loss of life expectancy in their district due to air pollution.*

C. Information Retention

We now turn to the effect of the HPC treatment on information retention. For the subsequent analyses, we only consider participants that were randomized into receiving the information. We consider the share of participants who are able to recall the correct average loss in life expectancy in their home district within a ± 0.5 year error margin as our primary measure of information retention.[22] Panel B in Figure 5 shows the share of participants in each group that is able to recall the average loss of life expectancy in their home district (light gray bars) and the share of participants who is not (dark gray bars). We find that 26.5% of participants fail to recall the information in the control group compared to 19.8% in the treatment group. The treatment thus induces a decrease in the proportion of participants that do not recall the information by more than 25% (Fisher exact test: $p = 0.007$, combined N=1,196).

To probe these results further, we estimate the HPC treatment effect on three measures of information retention, conditional on respondents' prior belief about the air quality in the home district, their confidence in the prior belief, and their general memory abilities, see Table 5. Beyond the binary variable of information recall (column 1), we analyze treatment effects on

[22]Participants could earn a positive bonus for recalling the information within a ± 0.5 year error margin.

Table 5 – Estimated effects on information retention.

	Recall	Retention error	Abs. retention error
	(1)	(2)	(3)
HPC	0.069***	-0.123	-0.228**
	(0.025)	(0.109)	(0.098)
Prior belief about air pollution	0.020***	-0.093***	-0.079***
	(0.006)	(0.031)	(0.028)
Confidence in prior belief	0.007	0.071	-0.079
	(0.018)	(0.098)	(0.085)
Performance memory task	0.630***	-0.838	-2.402***
	(0.101)	(0.708)	(0.542)
Observations	1,196	1,196	1,196
Control mean	.73	.16	1.02

Notes: This table presents the estimated effect of the HPC treatment on information retention in the Indian sample. Each column corresponds to a different outcome variable. The retention error is defined as the difference between respondent's answer in the incentivized task asking them to recall the number and the corresponding correct value. The absolute retention error is the absolute value of that difference. All models control for respondent's prior belief about air quality in her home district, confidence in the prior belief, and performance in the visual memory task. Standard errors are clustered at the district level and reported in parentheses. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

the information retention error (column 2), and the absolute information retention error (column 3). We define information retention error as the difference between participant's recall of the number of years of life lost due to air pollution in their home district and the actual number of years of life lost, *i.e.*, how far off participants' recall is from the information they received. We find that the HPC treatment increases the likelihood to recall the information by 6.9 percentage points ($p = 0.003$). The effect corresponds to a significant reduction in the absolute retention error by about 0.23 years ($p = 0.036$; column 3), the equivalent of a 22.4% reduction compared to the control group average. The treatment effect on the retention error is negative but not statistically significant ($p = 0.316$, column 2), suggesting that although a lower level of perceived control makes retention of information less precise, it is not significantly biased in a particular direction. In line with these findings, we formulate the following result about the treatment effect on information retention:

Result 2 *In the aggregate sample, the HPC treatment significantly increases participants' ability to remember the information about the average loss of life expectancy due to air pollution in their home district.*

The regression analysis in Table 5 further indicates that the ability to recall the information (and the associated retention error) is positively (negatively) associated with the performance in the memory task: as intuitively expected, those with a better general memory are also better at recalling the information on the average loss of life expectancy ($p < 0.001$). In addition, we find a positive correlation between participant's ability to recall the information and their prior belief about the severity of air pollution in the home district ($p < 0.001$, across all measures of information retention). The finding suggests that participants' expectation about air quality might interfere with their ability to retain the actual information about the adverse health effects of air pollution, in line with the theoretical framework outlined in Section I.[23] [24] Section V investigates whether the treatment interacts with participants' prior beliefs to affect information avoidance and retention.

D. Complementarity and Substitutability

In the related literature on information ignorance, it is common to investigate information avoidance and information retention separately. In this context, the two strategies are generally regarded as complements, *i.e.*, forgetting is a measure of last resort when receiving distressful information cannot be avoided. The experimental procedure in this paper, which randomizes who receives the information, allows us to study the two strategies jointly. First, we can test whether the information is more likely to be forgotten among those that expressed a preference to avoid it, which would suggest complementarity. Second, we can examine whether forgetting is common also among those that wanted to see the information, which would suggest substitutability.

With this aim, we estimate a model in which the HPC treatment indicator is interacted with a dummy variable equal to one if the respondent stated a preference for not receiving information about the average loss in life expectancy due to air pollution, and zero otherwise. Table 6 presents the estimated coefficients on the three measures of information retention defined in Section C. The results suggest that information avoidance and selective retention work both as complements and as substitutes. First, we find that in the control group, participants who preferred to avoid the information are about 20 percentage points less likely to recall the information than those who preferred to receive it, see column 1. This is the complementary effect: when participants prefer to avoid information but can't, they are less likely to retain it. Secondly, among participants who expressed a preference for receiving the information in the control group, only 75% of them were able to recall it. Interestingly, we observed a positive and significant treatment effect on recall, indicating that increasing perceived control can enhance information retention. This finding suggests that the 25% forgetting rate among participants who initially wanted to receive the information in the control group was not solely due to cognitive limitations but at least partly influenced by motivated reasoning. These results provide evidence that information avoidance and selective retention can also be substitutes.

[23] We also investigate respondents' performance in the coin counting task, administered immediately after the decision whether to acquire or avoid information about the average loss of life expectancy in the main experiment. We document no significant treatment effects in this regard. Results are presented in Appendix B.

[24] With the intent of investigating the effect of the HPC treatment on perceived control and information retention over time, we invited participants that received the information on the average life expectancy loss during the experiment to come back after two weeks (as per the pre-registration plan). However, participation in this follow-up study was conditional on the main variables of interest from the first experiment. This prevents us from providing unbiased tests of the HPC treatment effect over time. We provide details on the design of this follow-up, recruitment procedure, and estimated treatment effects on the main outcomes in Appendix C.

Table 6 – Estimated effects on information retention for repondents that preferred to receive or to avoid information.

	Recall (1)	Retention error (2)	Abs. retention error (3)
HPC	0.061**	-0.079	-0.202**
	(0.025)	(0.115)	(0.098)
Follow-up	-0.196**	0.658	0.824*
	(0.089)	(0.632)	(0.493)
HPC x Follow-up	0.125	-0.788	-0.413
	(0.112)	(0.862)	(0.674)
Observations	1,196	1,196	1,196
Control mean Main	0.75	0.11	0.97

Notes: This table presents the estimated coefficients in the Indian sample from regression models where the HPC treatment indicator is interacted with a dummy variable equal to 1 if the respondent stated to prefer not receiving the information about the average loss of life expectancy in their home district, and 0 otherwise. Each column corresponds to a different outcome variable. The retention error is defined as the difference between respondent's answer in the incentivized task asking them to recall the number and the corresponding correct value. The absolute retention error is the absolute value of that difference. All models control for respondent's prior belief about air quality in her home district, confidence in the prior belief, and performance in the visual memory task. Standard errors are clustered at the district level and reported in parentheses. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

V. Heterogeneity by Prior Beliefs

The theoretical framework in Section I suggests that the aggregate effects of an increase in perceived control on the information acquisition and information retention decisions of respondents will depend on the composition of prior beliefs in the sample. Namely, the model implies that perceived control will mainly impact the decisions of optimistic participants. In contrast, perceived control will not affect the decisions of pessimistic participants, for whom acquiring and retaining the information should always be the optimal strategies. In this section, we evaluate whether these predictions align with what is observed in the experiment.

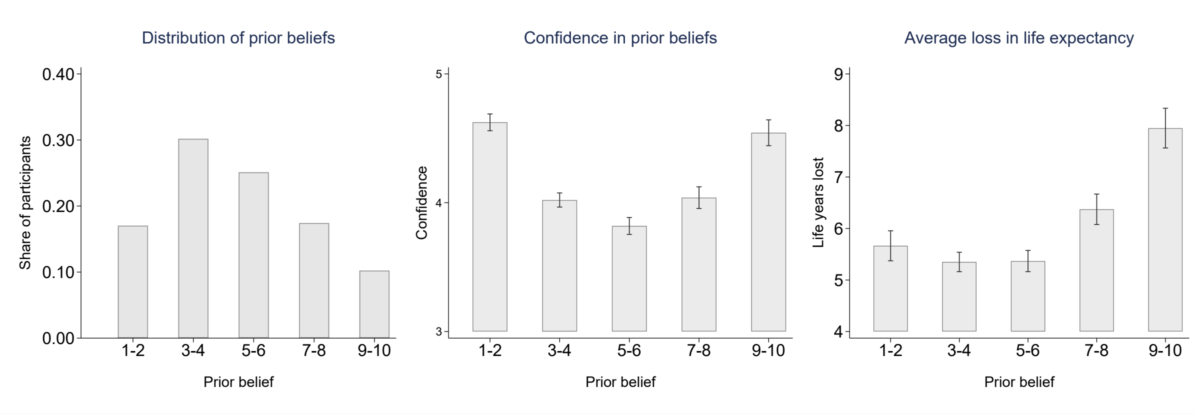

Figure 6 – Prior beliefs, average confidence, and actual average loss of life expectancy.

Notes: This figure presents histograms for the distribution of prior beliefs (left panel), the average confidence by prior belief (middle panel), and the associated average loss of life expectancy by prior belief (right panel) in the Indian sample. Prior beliefs are re-scaled to a 5-point from a 10-point scale, where 1 stands for "best air quality" and 10 for "worst air quality".

Figure 6 offers an overview of participants' prior beliefs and their strength, as contrasted to the actual level of loss in life expectancy.[25] The left panel captures the distribution of prior beliefs and documents substantial variation therein. About 18% of participants believe that the air quality in their respective district is very good (a value of 1 or 2), while only about 10% believe it to be particularly bad (a value of 9 or 10). Interestingly, the average confidence with which participants state their prior belief follows a U-shape, see the middle panel in Figure 6. While all participants appear to be generally confident in their prior belief (the lowest average is around 4 on a 5 point Likert scale), participants with more neutral priors are significantly less confident than those who are very optimistic or very pessimistic.

The right panel of Figure 6 captures the average loss of life expectancy by prior belief, with two noticeable patterns in the data. First, priors seem fairly aligned with reality overall: Participants with more optimistic priors generally live in districts with a lower average loss of life expectancy than participants with more pessimistic priors. However, the actual levels of air quality are strikingly similar for participants with prior beliefs between 1 to 6, suggesting that participants who believe that they are experiencing excellent air quality (prior 1-2) may be relatively optimistic compared to participants with more neutral priors (prior 3-6).

To examine the presence of heterogeneous treatment effects on information acquisition and information retention, we estimate linear probablity models where the HPC treatment indicator is interacted with participants' prior beliefs (5 categories). Figure 7 illustrates the estimated marginal treatment effects. Additionally, we print the respective average rate of information acquisition and successful recall rates in the control group. We find that the HPC treatment significantly increases information acquisition for particularly optimistic participants (a prior of 1 or 2) by about six percentage points (p-value = 0.035). In contrast, for all other beliefs, *i.e.*, rather neutral or pessimistic priors, we observe no significant treatment effect. Moreover, we document no difference between optimistic and pessimistic participants with respect to information acquisition in the control group.

In the two right panels of Figure 7, we study heterogeneity by prior beliefs for information retention. In the control group, a striking pattern is observed, whereby participants with optimistic priors are significantly less likely to remember the information on the loss of life expectancy than any other subgroup. Only 45% of participants with a very optimistic prior are able to recall the information, compared to 73.5% in the control group average and up to 82% among participants with more pessimistic priors. These results are consistent with findings from the related literature that selective information retention occurs especially when the information contradicts prior beliefs (Budescu and Fischer, 2001; Bénabou, 2013; Oster, Shoulson and Dorsey, 2013). In addition, we find that the HPC treatment is particularly effective for

[25] Recall that prior beliefs were elicited at the beginning of the experiment as as a qualitative response about the air quality in the participant's home district, from 1 – "best air quality" to 10 – "worst air quality". To retain statistical power, we transform this measure into a variable with five category, effectively grouping value pairs from the original scale.

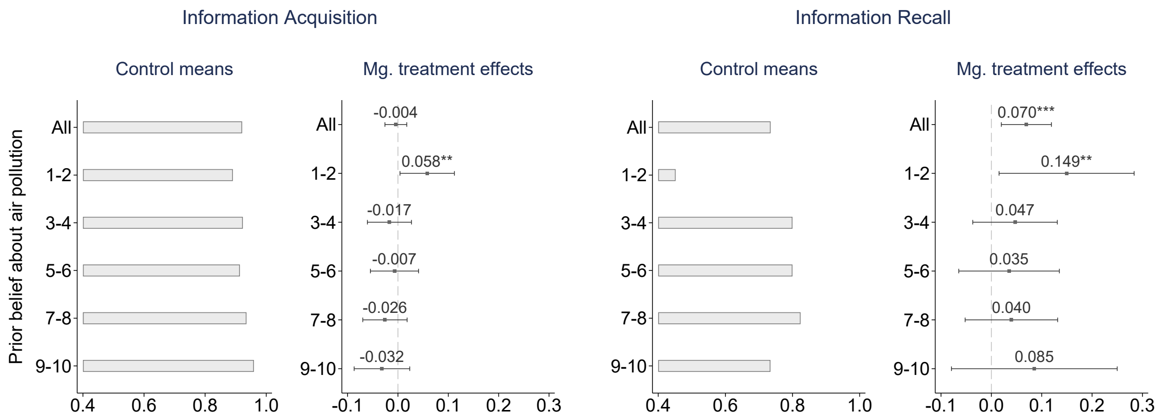

FIGURE 7 – CONTROL GROUP MEANS AND TREATMENT EFFECTS ON INFORMATION ACQUISITION AND INFORMATION RECALL, BY PRIOR BELIEFS ABOUT THE SEVERITY OF AIR POLLUTION IN THE HOME DISTRICT.

Notes: This figure presents the control group means and marginal HPC treatment effects on information acquisition and information recall in the Indian sample. The control mean for information recall refers to the share of respondents in the control group that are able to remember the information within a ± 0.5 years error margin. The marginal treatment effects are based on an interaction between the HPC treatment dummy and the participants' prior beliefs about the air quality in their district of residence. All models control for the participants' confidence in the prior belief, their performance in the item recognition task, and the regional average loss of life expectancy. Standard errors are clustered at the district level. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

participants with very optimistic priors. For this subgroup, information retention increases by about 15 percentage points (p-value = 0.029). In line with our theoretical predictions, optimistic individuals appear to be driving the positive treatment effect on information retention observed in the aggregate sample.

In summary, the analysis presented in this section highlights existing heterogeneity in treatment effects by prior beliefs on both information acquisition and information retention. We find that increasing perceived control significantly impacts participants' preference to receive and their ability to remember the information about the average loss in life expectancy due to air pollution. These results are aligned with the insights of the theoretical model presented in Section I, whereby increasing perceived control positively affects information acquisition and retention among optimistic individuals, while having no effect on decisions taken by pessimistic individuals. To conclude, we formulate the following result statements:

Result 3 *Among optimistic participants, the HPC treatment significantly increases participants' willingness to receive information about the average loss of life expectancy due to air pollution in the home district.*

Result 4 *Among optimistic participants, the HPC treatment significantly increases participants' ability to remember the information about the average loss of life expectancy due to air pollution in the home district.*

VI. Lowering the Threat? Evidence From the USA

The results presented so far show that increasing perceived control can be an effective strategy to reduce strategic ignorance, mostly among optimistic participants from India. The experiment was purposefully implemented in a setting where there is an ongoing air pollution crisis with severe health consequences. Thus, information on the health risks of air pollution is expected to be particularly prone to being dismissed, and this decision can be especially sensitive to perceived control. Indeed, the theoretical framework presented in Section I suggests that the impact of increasing perceived control on information avoidance and retention will depend on the expected and observed pollution level, respectively. A question that implicitly appears is whether and to which extent can an increase in perceived control be an effective tool to reduce information ignorance in a setting where the threat is considerably lower.

To answer this question, we implemented the same experiment with a sample from the USA, where the air pollution level is significantly lower than in India, but still imposes substantial health risks in terms of mortality and morbidity (Deryugina et al., 2019). The experimental procedure and exclusion criteria in the US were identical to the experiment with the Indian sample, as described in section II.[26] We recruited 2,518 participants via Amazon Mechanical Turk of which 2,340 completed the experiment. We retain 2,272 observations after applying the exclusion criteria. We primarily sampled participants from states with the highest average air pollution, including California, Illinois, Missouri, Mississippi, Tennessee, Iowa, Nebraska, Kansas, Louisiana, Alabama, Georgia, and Arkansas. As expected, the average loss of life expectancy in the US sample was about 0.5 year (with values ranging between 0.1 and 1.5 years), which is substantially lower than the average loss of life expectancy in the Indian sample. Information on the expected average loss of life expectancy was provided at the county level.

As in the Indian sample, our treatment manipulation successfully increased perceived control in the US sample by around 0.50 standard deviations for the index,[27] and by 0.53 standard deviations for the one-item measure. For both measures, the effect is significant with $p < 0.001$ in a Mann-Whitney test, combined N=2,251. Around 16.5% of participants prefer to not receive the information about the average life expectancy loss in the control group which increases to 17.7% in the treatment group, but the difference is not statistically significant ($p = 0.469$ in a Fisher exact test, combined N=2,264). Among participants who received the information, about 16.7% cannot recall the life expectancy loss within a ± 0.5 year error margin. The share of forgetting

[26] We introduced a slight variation in the leaflet used for the HPC treatment with the US sample. As the choice of cooking and heating fuels in developed countries is less of a health concern than in developing countries, we substituted the action "use clean cooking and heating fuels" under the "at home" category as shown in Figure 3 with the action "avoid smoke from open fires and waste burning". Participants in the US received a fixed reward of USD 3.00 for completing the experiment. Together with the variable incentives (USD 0.50 for a perfect recall of the information, USD 0.20 for recalling the information within a ± 0.5 year error margin, USD 0.02 for each correctly solved exercise in the effort task, and USD 0.05 for each correct response in the item recognition task), participants earned an average of USD 3.85.

[27] See Figure A-4.

is 15.3% in the treatment group, again not statistically different than the control ($p = 0.545$ in a Fisher exact test, combined N=1,298), see Appendix Figure A-5 for an illustration.

For the same reasons outlined in section V, we repeat the heterogeneity analysis of the HPC treatment effect on information avoidance and retention with respect to participants' prior beliefs about air quality in their home county.

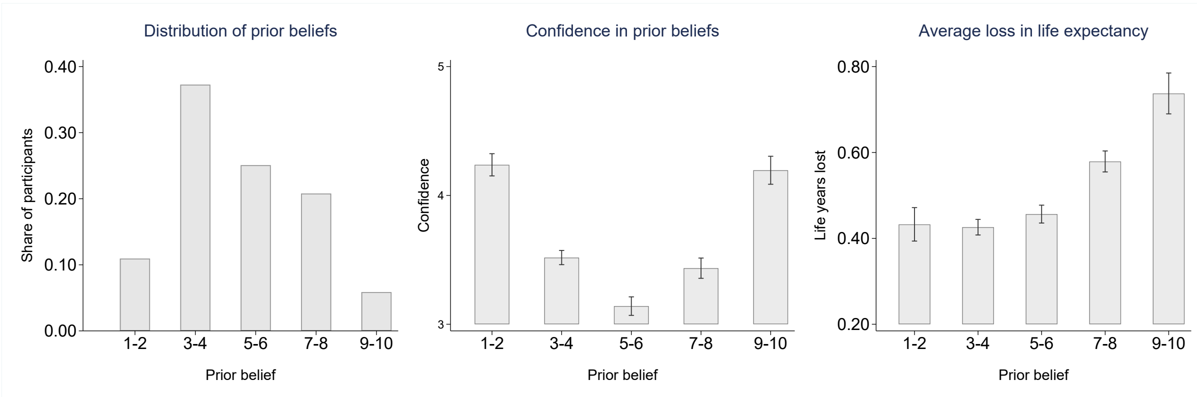

Figure 8 – Distribution of prior beliefs about the severity of air pollution in home county (US), average confidence in priors, and actual average loss in life expectancy.

Notes: This figure presents histograms for the distribution of prior beliefs in the US sample (left panel), the average confidence by prior belief (middle panel), and the associated average loss of life expectancy by prior belief (right panel). Prior beliefs are re-scaled from a 10-point to a 5-point scale.

Figure 8 displays a similar pattern to the one observed in the Indian sample. About 10% of the US participants are very optimistic (a prior belief of 1 or 2 on the 10 point Likert scale); a prior of 3 or 4 is the modal response, and confidence follows a U-shape in which participants with a more neutral belief are significantly less confident than those who believe to experience very good or very bad air quality. As in the Indian sample, participants with a very optimistic prior (prior 1-2) do not reside in counties with lower avergae losses in life expectancy due to air pollution than participants with more neutral beliefs (prior 3-6).

Figure 9 shows the effect of the HPC treatment by prior beliefs on information acquisition (left panel) and information retention (right panel) in the US sample. We find no significant treatment effect on information acquisition, irrespective of prior beliefs. In contrast, we replicate our previous finding that the treatment significantly improves information retention for the most optimistic participants. As in the Indian sample, participants with very optimistic priors are the least likely to recall the information in the control group. For this subgroup, the treatment increases the share of participants who remember the information by almost 18 percentage points (p=0.032). In comparison, the treatment has no effect on recall in any other subgroup.

These findings have two important implications. First, the pattern observed in the US sample is largely consistent – although weaker – with that noticed in the Indian sample, indicating the robustness of our previous results. Second, we find evidence that increasing perceived control can be an effective tool to improve information retention among those individuals who are the

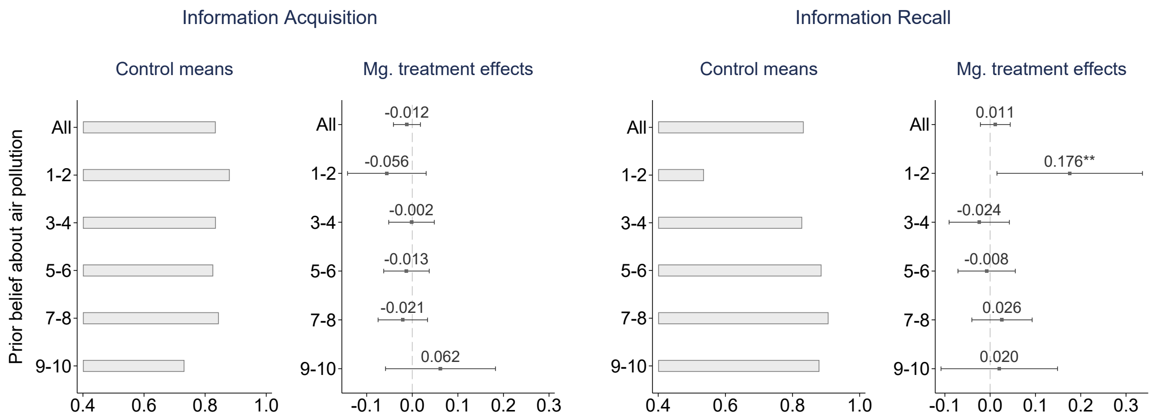

FIGURE 9 – CONTROL GROUP MEANS AND TREATMENT EFFECTS ON INFORMATION ACQUISITION AND INFORMATION RECALL, BY PRIOR BELIEFS ABOUT THE SEVERITY OF AIR POLLUTION IN HOME REGION.

Notes: This figure presents the control group means and marginal HPC treatment effects on information acquisition and information recall in the US sample. The control means for information recall refer to the share of respondents in the control group that were able to remember the information within a ±0.5 years error margin. The coefficients are estimated using linear probability models. The marginal treatment effects are based on an interaction between the HPC treatment dummy and the participants' prior beliefs about the air quality in their county of residence. All models control for the participants' confidence in the prior belief, their performance in the item recognition task, and the regional average LYL. Standard errors are clustered at the county level. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

most likely to forget, even in contexts where the threat is less extreme.

VII. Conclusion

This paper studies whether an increase in perceived control, *i.e.*, the belief that a particular outcome can be influenced through one's actions, can reduce strategic ignorance of distressing yet potentially decision-enhancing information. We present a simple model to illustrate how perceived control can reduce avoidance and improve retention of distressing information.

We examine the role of perceived control in the context of information about the adverse health effect of air pollution in an online experiment. We introduce exogenous variation in participants' perceived control by randomly providing half of our sample with a list of private measures that can protect against the adverse health effect of air pollution. Subsequently, we assess participants' preference for receiving distressing information and their ability to recall it. We observe that the treatment has no impact on information avoidance in the aggregate, but does significantly enhance information retention. Furthermore, we find that increasing perceived control reduces information avoidance and improves information retention among those with highly optimistic prior beliefs, leaving the preferences of more pessimistic participants unaffected. A replication of our experiment with a US sample brings further evidence of the heterogeneous treatment effect on information retention. Overall, these findings indicate that enhancing perceived control can serve as an effective method for mitigating information ignorance, even in situations where the underlying threat is relatively low but highly pertinent.

The empirical application in this paper centers on studying how respondents engage with information about the health consequences of air pollution. Air pollution is an example of a major global health crisis that is often not acknowledged, met with indifference, or easily drowned out by other, seemingly more pressing issues. We show that actionable advice on how to protect oneself against the adverse health effects of air pollution can mitigate information ignorance. With a broader interpretation, our results may be informative for other types of distressful information, especially in situations where individuals perceive little control over methods to counteract the underlying threat. We expect leveraging perceived control to be valuable with respect to both aggregate and individual-level information, having a large scope of applications in areas ranging from health and the environment to immigration and social justice.

A promising frontier for future research lies in exploring whether and to what extent increased attention to information will result in behavioral changes, including the actual adoption of private actions and changes in the demand for public policies to address specific challenges. The effect on the latter is particularly difficult to predict. On the one hand, being less ignorant about certain problems is expected to lead to higher support for public actions. On the other hand, if increases in perceived control are achieved through more awareness about private protection measures, demand for public action might stall.

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Appendix

A. Additional Results from the Main Experiment

A-1. The Indian Sample

Balance Tests

Table A-1 – Sample characteristics and balance tests for the India sample.

	C		HPC		HPC - C
	N	Mean	N	Mean	
Age	1,000	34.11	1,031	34.15	0.05
		(10.94)		(11.12)	(0.49)
Female	1,000	0.34	1,031	0.34	0.00
		(0.47)		(0.47)	(0.02)
Household size	1,000	4.33	1,030	4.34	0.01
		(2.38)		(1.57)	(0.09)
Urban	1,000	0.90	1,031	0.89	-0.01
		(0.31)		(0.31)	(0.01)
Income group	1,000	8.03	1,031	7.92	-0.11
		(2.58)		(2.69)	(0.12)
Education	1,000	2.31	1,031	2.29	-0.02
		(0.64)		(0.64)	(0.03)
District average life years lost	1,000	5.81	1,031	5.89	0.08
		(2.72)		(2.66)	(0.12)
Prior belief about air pollution	1,000	4.90	1,031	4.99	0.09
		(2.56)		(2.47)	(0.11)
Confidence in prior	1,000	4.13	1,031	4.13	-0.00
		(0.78)		(0.78)	(0.03)
Worried about air pollution	1,000	5.61	1,031	5.66	0.05
		(1.56)		(1.49)	(0.07)
Joint orthogonality F-stat					0.28
					(0.99)

Notes: Summary statistics of pre-treatment respondent characteristics and balance tests between means values in control and treatment groups in the main experiment (India sample). Standard deviations are reported in parentheses. The right-most column reports the difference in means between treatment and control, with the estimated standard errors in parentheses. C = control, HPC = high perceived control treatment. Significant t-test estimates are denoted as follows: *** $p<0.01$, ** $p<0.05$, and * $p<0.1$.

Perceived Control

Table A-2 – Estimated treatment effects on perceived control in the Indian sample.

	7-item Index (Pearlin and Schooler, 1978)			1-item Measure (Trope, Gervey and Bolger, 2003)		
	(1)	(2)	(3)	(4)	(5)	(6)
HPC	0.188***	0.188***	0.192***	0.179***	0.189***	0.185***
	(0.022)	(0.022)	(0.022)	(0.040)	(0.039)	(0.040)
Prior belief about air pollution		0.018**	0.024***		-0.113***	-0.117***
		(0.008)	(0.008)		(0.009)	(0.009)
Confidence in prior belief		-0.042**	-0.036*		0.208***	0.205***
		(0.020)	(0.020)		(0.030)	(0.030)
Average LYL		-0.019**	0.006		-0.012*	0.045
		(0.007)	(0.021)		(0.007)	(0.037)
State FE	No	No	Yes	No	No	Yes
Observations	2,031	2,031	2,028	2,031	2,031	2,028
Control mean	0	0	0	0	0	0

Notes: This table presents OLS estimations of two standardized measures of perceived control adapted to the context of air pollution from Pearlin and Schooler (1978) and Trope, Gervey and Bolger (2003). Standard errors are clustered at the district level and presented in parentheses. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Preference for Information

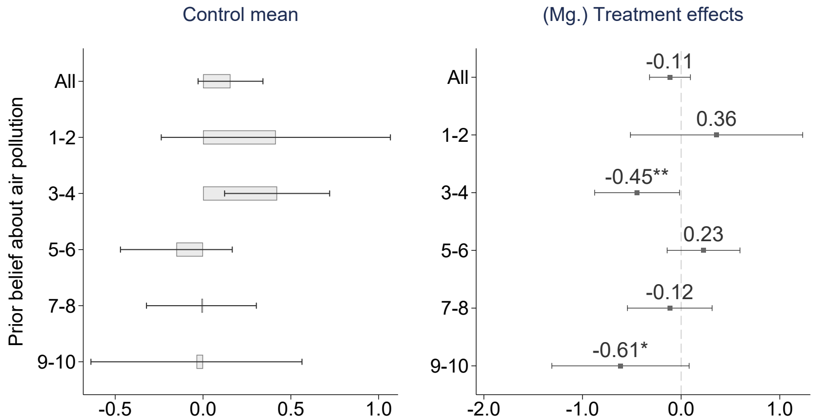
Table A-3 – Estimated treatment effects on information acquisition in the Indian sample.

	Preference to receive information					
	LPM			Logistic		
	(1)	(2)	(3)	(4)	(5)	(6)
HPC	-0.003	-0.004	-0.003	-0.004	-0.004	-0.002
	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)	(0.010)
Prior beliefs about air pollution		0.003	0.002		0.004	0.002
		(0.002)	(0.002)		(0.003)	(0.002)
Confidence in prior		0.051***	0.050***		0.045***	0.038***
		(0.009)	(0.009)		(0.007)	(0.010)
State FE	No	No	Yes	No	No	Yes
Observations	2,031	2,031	2,028	2,031	2,031	1,980
Control mean	.92	.92	.92	.92	.92	.92

Notes: This table presents estimates from linear probability models and logistic models on participants' preference to receive information about the life expectancy loss due to air pollution in their home district. Displayed coefficients of the logistic models refer to marginal effects. We use a conditional logit model for the fixed effect model in column 6. Standard errors are clustered at the district level. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Information Retention

Panel A. Retention Error



Panel B. Absolute Retention Error

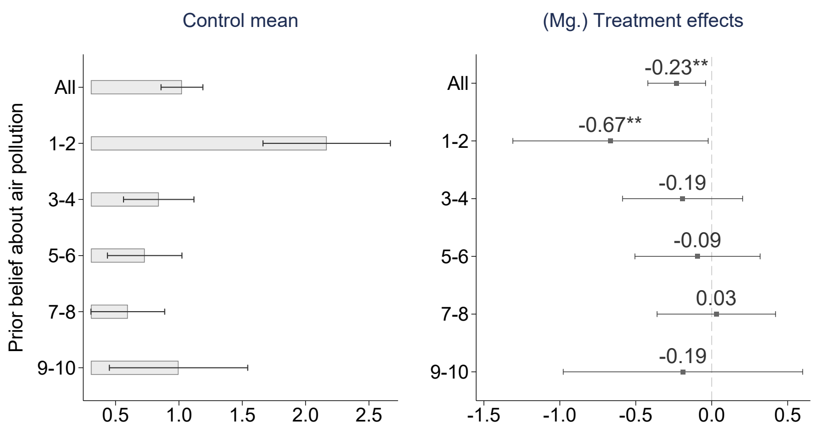


Figure A-1 – Control group means and treatment effects on the information retention error and absolute retention error, by prior beliefs about the severity of air pollution in home district (Indian sample).

Notes: This figure presents the control group means (with 95% CI) and marginal treatment effects on the retention error and the absolute retention error in the Indian sample. The retention error is defined as participants' answer minus the true value. The marginal treatment effects are estimated on interaction models between the treatment and participants' prior beliefs about the regional air quality. All models control for the participants' confidence in the prior belief, their performance in the visual memory task, and the regional average loss in life expectancy. Standard errors are clustered at the district level. Significance: *** p<0.01, ** p<0.05, and * p<0.1.

Performance in the visual Memory task Task

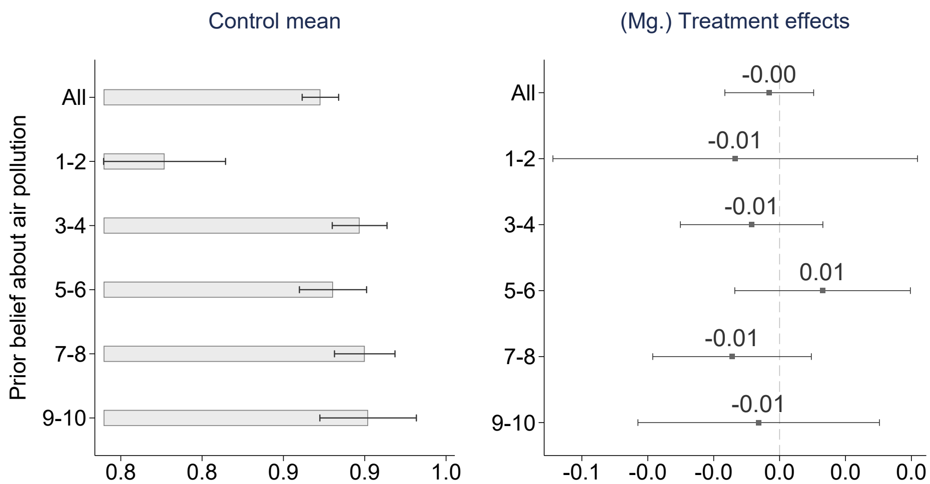


Figure A-2 – Control group means and treatment effects on participants' performance in the visual memory task, by prior beliefs about the severity of air pollution in home district (Indian sample).

Notes: This figure presents the control group means (with 95% confidence intervals) and estimated HPC marginal treatment effects on participants' performance in the visual memory task in the Indian sample. The marginal treatment effects are estimated on interaction models between the HPC treatment and participants' prior beliefs about the regional air quality. All models control for the participants' confidence in the prior belief and the regional average LYL. Standard errors are clustered at the district level. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Time Spent on Information Pages

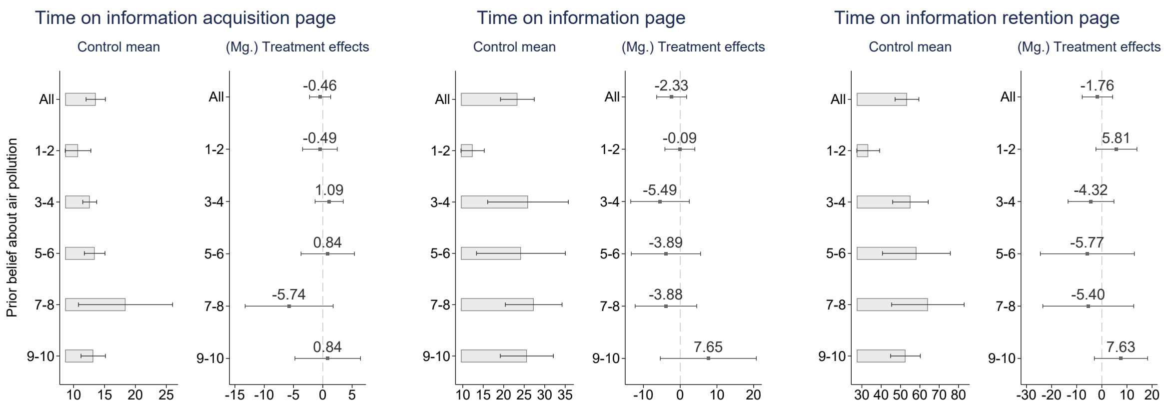


Figure A-3 – Control group means and treatment effects on the time participants spend on the LYL information page, by prior beliefs about the severity of air pollution in home district (Indian sample).

Notes: This figure presents the control group means (with 95% confidence intervals) and estimated HPC marginal treatment effects on on the time (in seconds) that participants have spent on the LYL information page in the Indian sample. The marginal treatment effects are estimated on interaction models between the HPC treatment and participants' prior beliefs about the regional air quality. All models control for the participants' confidence in the prior belief, their performance in the visual memory task, and the regional average LYL. Standard errors are clustered at the district level. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

A-2. The US Sample

Balance Tests

Table A-4 – Sample characteristics and balance tests for the USA sample.

	C		HPC		HPC - C
	N	Mean	N	Mean	
Age	1,124	39.19	1,140	38.62	-0.56
		(11.69)		(11.85)	(0.49)
Female	1,124	0.50	1,140	0.51	0.01
		(0.50)		(0.50)	(0.02)
Household size	1,118	3.12	1,136	3.06	-0.06
		(2.21)		(1.45)	(0.08)
Urban	1,124	0.74	1,140	0.74	-0.00
		(0.44)		(0.44)	(0.02)
Income group	1,124	5.09	1,140	5.07	-0.02
		(2.33)		(2.31)	(0.10)
Education	1,124	1.97	1,140	1.97	0.00
		(0.67)		(0.66)	(0.03)
County average life years lost	1,124	0.49	1,140	0.48	-0.02
		(0.29)		(0.28)	(0.01)
Prior belief about air pollution	1,124	4.98	1,140	4.96	-0.02
		(2.12)		(2.20)	(0.09)
Confidence in prior	1,124	3.49	1,140	3.56	0.06*
		(0.88)		(0.90)	(0.04)
Worried about air pollution	1,124	4.45	1,140	4.47	0.03
		(1.72)		(1.73)	(0.07)
Joint orthogonality F-stat					1.02
					(0.42)

Notes: Summary statistics of pre-treatment respondent characteristics and balance tests between means values in control and treatment groups in the main experiment (US sample). Standard deviations are reported in parentheses. The right-most column reports the difference in means between treatment and control, with the estimated standard errors in parentheses. C = control, HPC = high perceived control treatment. Significant t-test estimates are denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Perceived Control

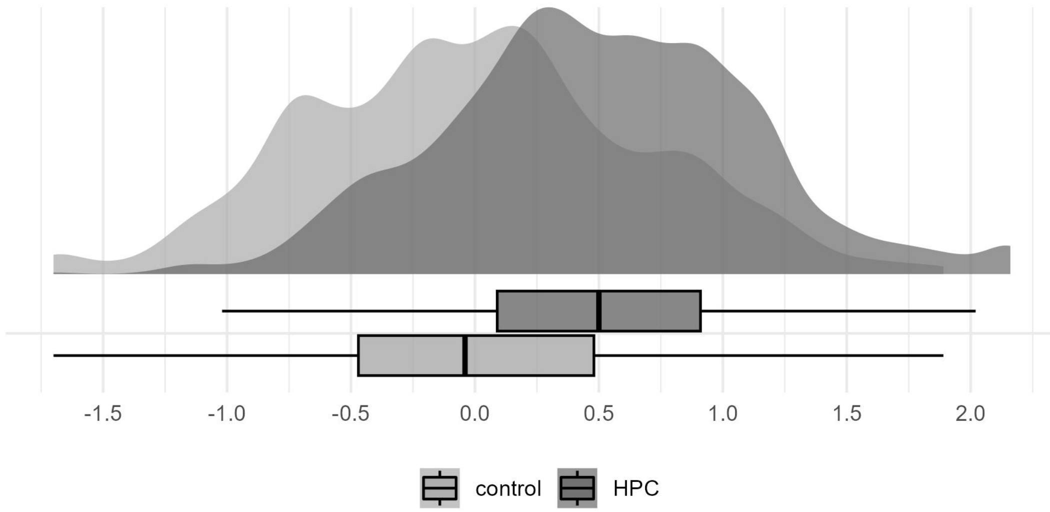


Figure A-4 – Distribution of the perceived control index (USA sample).

Notes: This figure presents the kernel densities of the distributions of perceived control, as measured by the standardized index of participants' answers to the 7-item questionnaire, adapted from Pearlin and Schooler (1978) to the context of air pollution. Two distributions are presented: lighter gray corresponds to responses in the control group and darker gray corresponds to responses in the treatment group. Perceived control was elicited after the main outcomes of interest, see Table 3 for the experimental procedure.

Table A-5 – Estimated effects on perceived control (US sample).

	7-item Index (Pearlin and Schooler, 1978)			1-item Measure (Trope, Gervey and Bolger, 2003)		
	(1)	(2)	(3)	(4)	(5)	(6)
HPC	0.495***	0.493***	0.494***	0.527***	0.514***	0.514***
	(0.029)	(0.029)	(0.029)	(0.043)	(0.042)	(0.042)
Prior belief about air pollution		-0.016**	-0.014**		-0.097***	-0.096***
		(0.007)	(0.006)		(0.011)	(0.011)
Confidence in prior belief		0.012	0.014		0.165***	0.165***
		(0.016)	(0.016)		(0.021)	(0.021)
Average LYL		-0.061	-0.138		-0.036	-0.065
		(0.060)	(0.087)		(0.079)	(0.105)
State FE	No	No	Yes	No	No	Yes
Observations	2,251	2,251	2,251	2,262	2,262	2,262
Control mean	0	0	0	0	0	0

Notes: This table presents OLS estimations of two standardized measures of perceived control adapted to the context of air pollution from Pearlin and Schooler (1978) and Trope, Gervey and Bolger (2003). Standard errors are clustered at the district level and presented in parentheses. Significance is denoted as follows: *** $p<0.01$, ** $p<0.05$, and * $p<0.1$.

Preference for Information

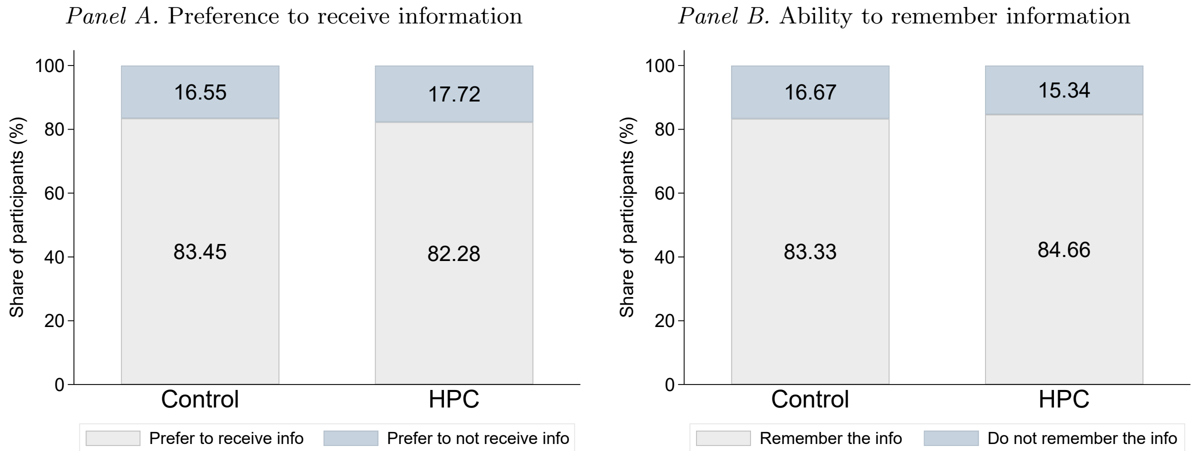


Figure A-5 – Share of participants (US sample) that prefer to receive/avoid the information (Panel A) and share of participants that remember/forget the information (Panel B), by treatment.

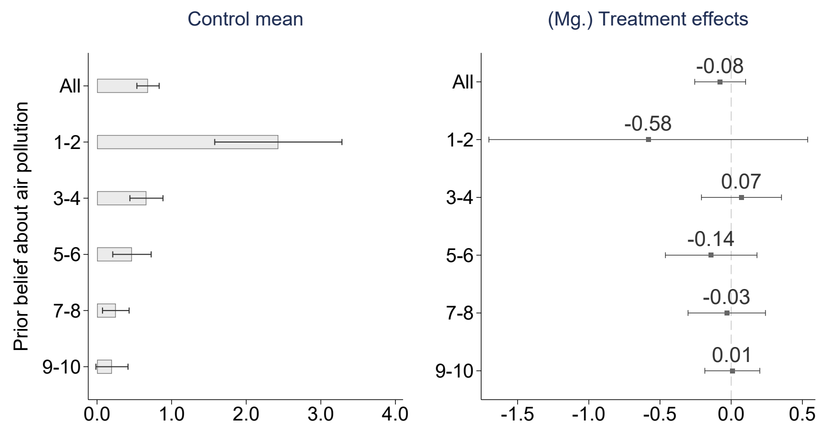
Table A-6 – Estimated effects on information acquisition (US sample).

	Preference to receive information					
	OLS			Logistic		
	(1)	(2)	(3)	(4)	(5)	(6)
HPC	-0.012	-0.012	-0.011	-0.012	-0.012	-0.019
	(0.015)	(0.015)	(0.015)	(0.016)	(0.015)	(0.027)
Prior beliefs about air pollution		-0.006*	-0.006		-0.006*	-0.010
		(0.003)	(0.004)		(0.003)	(0.006)
Confidence in prior		-0.003	-0.003		-0.003	-0.006
		(0.010)	(0.010)		(0.010)	(0.015)
State FE	No	No	Yes	No	No	Yes
Observations	2,264	2,264	2,264	2,264	2,264	2,264
Control mean	.83	.83	.83	.83	.83	.83

Notes: This table presents estimates from linear probability models and logistic models on participants' preference to receive information about the life expectancy loss due to air pollution in their home district. Displayed coefficients of the logistic models refer to marginal effects. We use a conditional logit model for the fixed effect model in column 6. Standard errors are clustered at the district level. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Information Retention

Panel A. Retention Error



Panel B. Absolute Retention Error

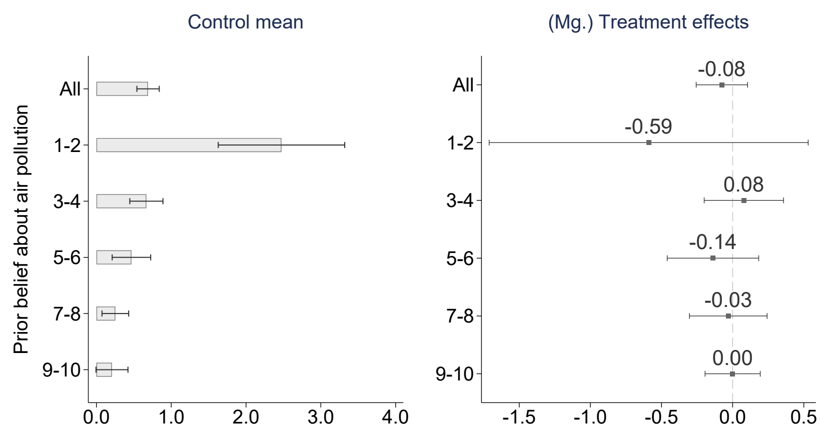


Figure A-6 – Control group means and treatment effects on the information retention error, by prior beliefs about the severity of air pollution in home county (US sample).

Notes: This figure presents the control group means (with 95% CI) and marginal HPC treatment effects on the retention error and the absolute retention error in the USA sample. The retention error is defined as participants' answer minus the true LYL value. The marginal treatment effects are estimated on interaction models between the HPC treatment and participants' prior beliefs about the regional air quality. All models control for the participants' confidence in the prior belief, their performance in the visual memory task, and the regional average LYL. Standard errors are clustered at the county level. Significance: *** p<0.01, ** p<0.05, and * p<0.1.

Performance in the Visual Memory Task

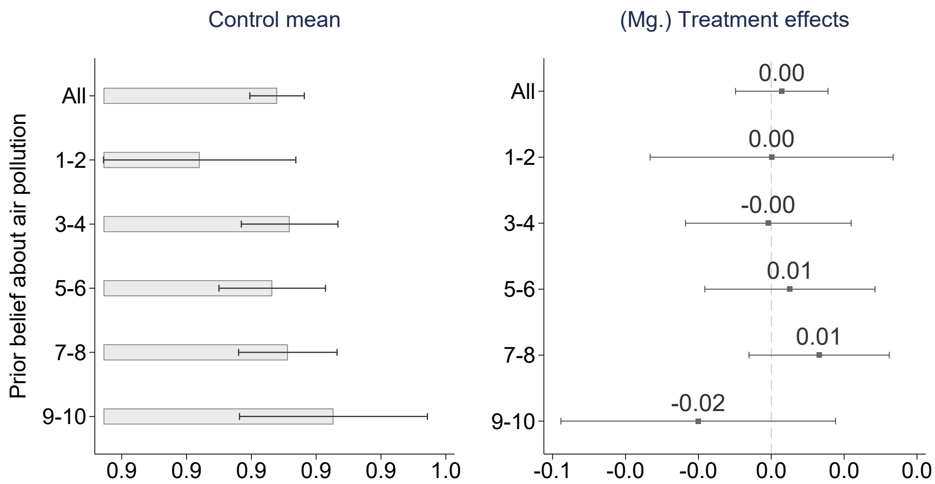


Figure A-7 – Control group means and treatment effects on participants' performance in the item recognition task, by prior beliefs about the severity of air pollution in home county (US sample).

Notes: This figure presents the control group means (with 95% confidence intervals) and estimated HPC marginal treatment effects on participants' performance in the visual memory task in the USA sample. The marginal treatment effects are estimated on interaction models between the HPC treatment and participants' prior beliefs about the regional air quality. All models control for the participants' confidence in the prior belief and the regional average LYL. Standard errors are clustered at the county level. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Time Spent on Information Pages

Panel A. USA

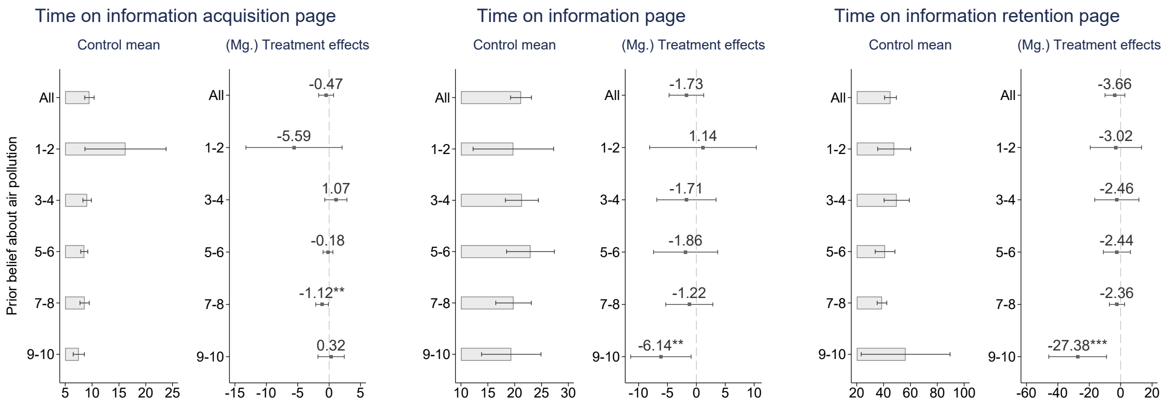


Figure A-8 – Control group means and treatment effects on the time participants spend on the LYL information page, by prior beliefs about the severity of air pollution in home county (US sample).

Notes: This figure presents the control group means (with 95% confidence intervals) and estimated HPC marginal treatment effects on on the time (in seconds) that participants have spent on the LYL information page in the USA sample. The marginal treatment effects are estimated on interaction models between the HPC treatment and participants' prior beliefs about the regional air quality. All models control for the participants' confidence in the prior belief, their performance in the visual memory task, and the regional average LYL. Standard errors are clustered at the county level. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

B. Performance in the Coin Counting Task

We first perform a Fligner-Pollicelo test to check for differences in participants' performance in the coin counting test between those that were randomized to see the information about the average loss of life expectancy in their home district/county and those that were not. In the Indian sample, the 1-tailed asymptotic p-value is equal to 0.457 according to a two-sample Fligner-Policello robust rank order test. In the US, the p-value is 0.371. We conclude that participants exposed to the information performed no differently than participants not exposed to the information in the coin counting task.

Table A-7 – Performance in the coin counting task – interaction model.

	Nr. correct counts	
	USA	India
HPC	0.088	0.333**
	(0.144)	(0.131)
Received info	-0.049	0.114
	(0.136)	(0.144)
HPC × Received info	-0.063	-0.284
	(0.188)	(0.183)
Prior belief about air pollution	0.135***	0.110***
	(0.028)	(0.021)
Confidence in prior belief	-0.176***	-0.097
	(0.058)	(0.059)
Average LYL	-0.347*	-0.007
	(0.196)	(0.026)
Observations	2,264	2,031
Control mean, Did not receive info	6.99	5.3

Notes: This table presents OLS estimates of models where the HPC treatment is interacted with a dummy variable equal to 1 for participants randomized to receive LYL information. Participants' performance in the coin counting task is measured as the number of correct counts achieved within a two-minute task limit. Standard errors are clustered at the county/district level. This estimation is performed relying on the full sample of observations. LYL stand for "life years lost." Significance: *** p<0.01, ** p<0.05, and * p<0.1.

Table A-8 – Performance in the coin counting task by participants that received the LYL info.

	Nr. correct counts	
	USA	India
HPC	0.021	0.049
	(0.120)	(0.128)
Prior belief about air pollution	0.149***	0.132***
	(0.033)	(0.031)
Confidence in prior belief	-0.142*	-0.120
	(0.079)	(0.088)
Performance memory task	4.878***	5.344***
	(0.643)	(0.607)
Average LYL	-0.661***	-0.002
	(0.234)	(0.024)
Observations	1,298	1,196
Control mean	6.94	5.51

Notes: This table presents OLS estimates of the HPC treatment effect on participants' performance in the coin counting task, as measured by the number of correct counts achieved within a two-minute task limit. Standard errors are clustered at the county/district level. This estimation employs only observations from participants that have been randomized into seeing the LYL information. LYL stand for "life years lost." Significance: *** p<0.01, ** p<0.05, and * p<0.1.

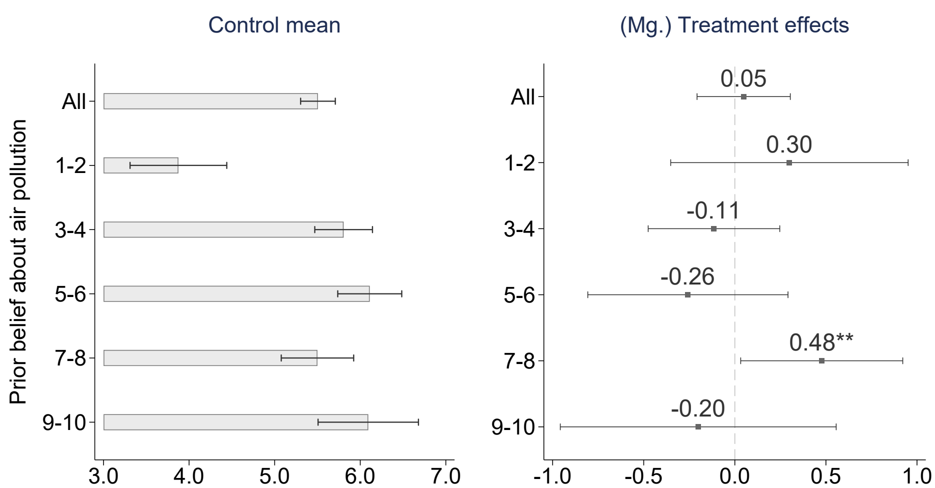


Figure A-9 – Control group means and treatment effects on participants' performance in the filler task, by prior beliefs about the severity of air pollution in home district (Indian sample).

Notes: This figure presents the control group means (with 95% confidence intervals) and estimated HPC marginal treatment effects on participants' performance in the filler task in the Indian sample. The marginal treatment effects are estimated on interaction models between the HPC treatment and participants' prior beliefs about the regional air quality. All models control for the participants' confidence in the prior belief, their performance in the visual memory task, and the regional average LYL. Standard errors are clustered at the district level. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

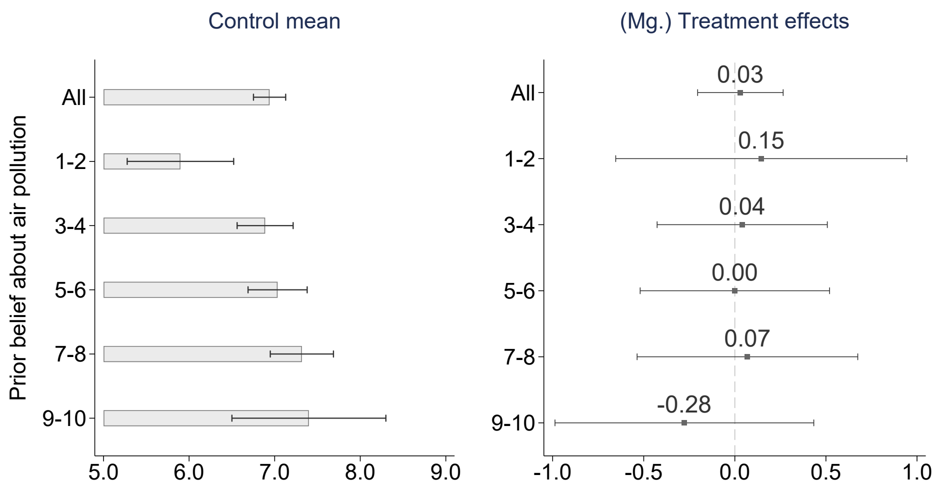


Figure A-10 – Control group means and treatment effects on participants' performance in the filler task, by prior beliefs about the severity of air pollution in home county (US sample).

Notes: This figure presents the control group means (with 95% confidence intervals) and estimated HPC marginal treatment effects on participants' performance in the filler task in the US sample. The marginal treatment effects are estimated on interaction models between the HPC treatment and participants' prior beliefs about the regional air quality. All models control for the participants' confidence in the prior belief, their performance in the visual memory task, and the regional average LYL. Standard errors are clustered at the county level. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

C. The Follow-Up Experiment

Design and objectives

We conducted a follow-up for both the Indian and the US sample. All participants who received the information on the average loss of life expectancy in their home region in the main study were invited to take part in the follow-up study two weeks later. First, we again elicited demographic variables to test for inconsistencies with responses in the main experiment. Then, participants were asked to recall the information on the number of life-years lost provided in the main experiment. The incentive scheme used for the recall task in the follow-up was identical to the one used in the main experiment. Participants were neither contacted nor reminded of any information in-between the main and follow-up experiments. The follow-up experiment concluded with two questionnaires: (i) we repeated the measurement of perceived control equivalent to the main experiment, and (ii) we asked participants how often they engage with various protective measures against air pollution exposure.[28]

Sample

In India, a total of 1,198 participants were invited to the follow-up, 626 (52%) were recruited, and 604 completed the follow-up experiment. 494 participants remain for the analysis after addressing inconsistency issues between the location information provided in the main and follow-up experiments. A total of 1,302 participants in the US sample received information on the number of life years lost in their home county in the main experiment and were therefore invited to partake in the follow-up study. 660 (51%) were recruited out of which 649 completed the follow-up experiment. After applying the location consistency criteria, a total of 502 participants remain available for the analysis.[29]

Selection

To test for potential selection issues, we compare participants who selected in with participants who selected out of the follow-up. We observe substantial differences between both groups in both countries, see Appendix Tables A-12 to A-15. Importantly, we find that participation in the follow-up is conditional on our main variables of interest from the main study: in both the US and Indian samples, participants who selected into the follow-up i) scored higher on perceived control, and ii) were significantly better at recalling the number of life-years lost than those that selected out of the follow-up. Consequently, we cannot provide a clean test of the long term effect of perceived control on information retention and leave this question open for future research. For the sake of completeness, we report the results from our pre-registered analyses on our self-selected sample below but remind the reader that these results should be interpreted with care.

Results on Perceived Control

In the US follow-up sample, perceived control is 0.42 points higher in the treatment group than

[28] All participants were invited to give open feedback at the end of each experiment. Additionally, we debriefed participants in the control group on the protective measures one can utilize to protect oneself against air pollution exposure. Participants who did not receive information on life years lost were debriefed after the main experiment as they were not re-invited for the follow-up. All others were debriefed after the follow-up experiment.

[29] As for the main study, Indian participants were rewarded by the survey company in panel points and received an additional average bonus payment of INR 22 (about USD 0.27). US participants received a fixed reward of US $1.00 for completing the follow-up (which took about 3 minutes). Together with the incentives that participants were able to earn, the average reward was US $1.24.

in the control group, a significant positive difference (MW test $p < 0.001$, combined N=501). In the Indian follow-up sample, perceived control is 0.12 points higher in the treatment group than in the control group, a marginally significant difference (MW test $p = 0.052$, combined N=494). We find similar results using our one-item measure: perceived control is 0.51 points higher in the treatment group than in the control group in the USA ($p < 0.001$) and 0.24 points higher in India ($p = 0.008$).

TABLE A-9 – ESTIMATED EFFECTS ON PERCEIVED CONTROL OF AIR POLLUTION IN MAIN VERSUS FOLLOW-UP EXPERIMENTS.

	Index			Trope et al. 2003		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: USA					
HPC	0.567***	0.572***	0.573***	0.640***	0.655***	0.657***
	(0.066)	(0.066)	(0.068)	(0.086)	(0.086)	(0.088)
Follow-up	0.028	0.028	0.028	0.099**	0.099**	0.099**
	(0.025)	(0.025)	(0.025)	(0.043)	(0.043)	(0.043)
HPC × Follow-up	-0.153***	-0.153***	-0.154***	-0.127	-0.127	-0.127
	(0.039)	(0.039)	(0.040)	(0.080)	(0.080)	(0.081)
State FE	No	No	Yes	No	No	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Observations	994	994	994	1,000	1,000	1,000
Control mean Main	-0.03	-0.03	-0.03	-0.10	-0.10	-0.10
HPC × Follow-up (margin)	0.414***	0.419***	0.420***	0.513***	0.528***	0.530***
	(0.065)	(0.064)	(0.066)	(0.094)	(0.091)	(0.091)
	Panel B: India					
HPC	0.214***	0.221***	0.187***	0.286***	0.268***	0.241***
	(0.043)	(0.042)	(0.040)	(0.069)	(0.072)	(0.079)
Follow-up	-0.060*	-0.060*	-0.060*	0.089*	0.089*	0.089*
	(0.031)	(0.031)	(0.031)	(0.050)	(0.051)	(0.051)
HPC × Follow-up	-0.097**	-0.097**	-0.097**	-0.044	-0.044	-0.044
	(0.045)	(0.045)	(0.046)	(0.070)	(0.070)	(0.071)
State FE	No	No	Yes	No	No	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Observations	988	988	988	988	988	988
Control mean Main	0.06	0.06	0.06	-0.09	-0.09	-0.09
HPC × Follow-up (margin)	0.116**	0.124**	0.090*	0.242***	0.224**	0.196*
	(0.050)	(0.049)	(0.050)	(0.088)	(0.094)	(0.103)

Notes: This table presents estimated coefficients of difference-in-differences models. Models (2), (3), (5), and (6) control for participants' prior belief about air quality in the home region, their confidence in the prior belief, and the average number of life years lost due to air pollution in the home region. Columns (3) and (6) additionally include state fixed effects. All control variables have been collected in the main experiment. In all models, standard errors are clustered at the county/district level. The analysis relies only on answers from participants that took part in both the main and follow-up experiments, *i.e.*, a balanced panel. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

To assess changes in treatment effects over time, we estimate differences-in-differences regressions using data from both the main and follow-up experiments for the sub-sample of participants who took part in both the main and the follow-up study. Appendix Table A-9 presents the estimated HPC treatment effects in interaction with a dummy variable for the follow-up study. First, we find a significant and positive effect of our treatment in the main study in all specifications for our self-selected sample of participants in both countries. In addition, the coefficient of the interaction term is negative and significant for the perceived control index. However, the overall effect of our treatment manipulation on perceived control is still positive and significant in the follow-up in both countries, see the *HPC × Follow-up (margin)* coefficient in Appendix

Table A-9. These results suggest that while the HPC treatment effect on perceived control fades over time, it still has a positive and significant impact two weeks after participants' have been exposed to it.

Results on Information Retention

We pre-registered a test on whether participants in the treatment group are more likely to recall the information about the number of life-years lost in their home region two weeks after having been exposed to it. In both countries, the share of respondents that is still able to recall the information is about 64%, and this proportion does not differ between the treatment and the control group.[30] To evaluate changes in treatment effects between the main and follow-up studies, we estimate differences-in-differences by interacting the treatment dummy with a follow-up dummy. Results are presented in Appendix Table A-10.

We find no treatment effect in the main experiment for the self-selected sub-sample of participants who completed both experiments in either country. It is therefore not surprising that we find no treatment effect in the follow-up either. Nonetheless, results point to a significant decrease in the recall rate over the two-week period of 24 percentage points in the US sample and 14 percentage points in the Indian sample ($p < 0.001$ in both samples). Yet, the decrease in successful recall over time does not differ between the treatment and control groups. Given that the sample that has selected into the follow-up study appears to be less susceptible to engage in strategic memory distortion, we view the estimated reduction in recall over the two-week period as a lower bound for the true effect.

Results on Protective Measures

We also pre-registered that we would test whether participants in the treatment group report engaging more often with the protective measures than participants in the control group. In the main study, participants in the treatment group were provided with information about a set of private measures to protect themselves against air pollution exposure. To test the effect of exposing participants to information about such measures on their reported preventive behavior, we asked participants to report how often they engage with these measures, offering five response options that range from "never" to "every day".[31] We standardized the responses for all nine activities to z-scores following Kling, Liebman and Katz (2007) and computed an equally-weighted index.

We find that among participants who completed both studies, participants in the treatment group report using the defensive measures more frequently than participants in the control group. This difference is significant (marginally for India) in both samples (MW test: $p = 0.011$, combined N=501 for the US sample and $p = 0.066$, combined N=494 for the Indian sample). In addition, we examine the effect of our treatment on each component of our aggregated measure separately. The regression results are displayed in Appendix Table A-11. We find that a change in commuting habits (in both the US and Indian samples) as well as a higher intention to

[30] In the US sample, 63.6% of participants in the control group and 57.9% in the treatment group are able to recall the information within a 0.5 year error margin; the difference is not statistically significant (Fisher exact test: $p = 0.201$, combined N=501). In the Indian sample, 65.4% of participants in the control group and 65.4% of respondents in the treatment group are able to recall the information within a 0.5 year error margin; the difference is not significant (Fisher exact test: $p = 1$, combined N=494).

[31] In particular, we asked about the following activities: wearing a face mask, using an air purifier indoors, checking the air quality in the area, avoiding highly polluted areas when commuting, opening windows to ventilate rooms, removing dust in the household, spending time in nature, burning waste, and handling open fires (*e.g.*, for cooking or heating).

Table A-10 – Estimated effects on information retention in the main versus follow-up experiments.

	Recall (1)	Retention error (2)	Abs. retention error (3)
		Panel A: USA	
HPC	-0.003	0.010	0.009
	(0.031)	(0.113)	(0.113)
Follow-up	-0.242***	0.871***	0.884***
	(0.029)	(0.139)	(0.139)
HPC x Follow-up	-0.054	0.041	0.046
	(0.041)	(0.191)	(0.191)
Observations	1,000	1,000	1,000
Control mean Main	0.88	0.37	0.37
HPC x Follow-up (margin)	-0.056	0.051	0.055
	(0.044)	(0.212)	(0.212)
		Panel B: India	
HPC	0.061**	-0.079	-0.202**
	(0.025)	(0.115)	(0.098)
Follow-up	-0.196**	0.658	0.824*
	(0.089)	(0.632)	(0.493)
HPC x Follow-up	0.125	-0.788	-0.413
	(0.112)	(0.862)	(0.674)
Observations	1,196	1,196	1,196
Control mean Main	0.75	0.11	0.97
HPC x Follow-up (margin)	0.006	-0.178	0.106
	(0.042)	(0.168)	(0.169)

Notes: This table presents estimated coefficients of difference-in-differences models, where the HPC treatment indicator is interacted with a dummy indicator for the follow-up study. Each column corresponds to a different outcome variable. The retention error is defined as participants' post-treatment answer minus the correct value. All models control for participants' prior belief about air quality in the home region, their confidence in the prior belief, and the average number of life years lost due to air pollution in the home region. All control variables have been collected in the main experiment. In all models, standard errors are clustered at the county/district level and presented in parentheses. The analysis relies only on answers from participants that took part in both the main and follow-up experiments, *i.e.*, a balanced panel. Significance is denoted as follows: *** $p<0.01$, ** $p<0.05$, and * $p<0.1$.

undertake preventive medical tests (in the US sample) drive the HPC treatment effect on the aggregate measure. These results suggest that providing information about protection measures moderately increases their reported use two weeks after receiving the information.

Table A-11 – Estimated effects on the adoption of defensive measures against air pollution in the follow-up experiment.

	Index (1)	Face mask (2)	Air purifier (3)	Medical tests (4)	Change in commute (5)	Frequent ventilation (6)	Dust removal (7)	Time in nature (8)	Avoid waste burning (9)	Avoid open fires (10)
Panel A: USA										
HPC	0.106***	0.069	0.086	0.178**	0.240***	0.086	0.106	0.102	0.016	0.066
	(0.035)	(0.087)	(0.077)	(0.087)	(0.085)	(0.076)	(0.086)	(0.099)	(0.082)	(0.077)
Obs.	500	500	500	500	500	500	500	500	500	500
Panel B: India										
HPC	0.073*	0.104	0.059	0.089	0.195**	0.124	0.108	0.109	-0.052	-0.080
	(0.044)	(0.090)	(0.097)	(0.107)	(0.092)	(0.075)	(0.080)	(0.081)	(0.086)	(0.079)
Obs.	494	494	494	494	494	494	494	494	494	494

Notes: The table presents estimated treatment effects on the adoption of various defensive measures against air pollution. Each column corresponds to a different defensive measure. All outcome measures have been collected in the follow-up experiment, approximately two weeks after the main experiment. Column (1) presents the estimated treatment effect on an index that equally weights the defensive measures used as outcome variables in Columns (2)-(9). Each component of the index has been standardized following Kling, Liebman and Katz (2007). All outcome variables have a mean value of 0 in the control group. All models control for participants' prior belief about air quality in the home region, their confidence in the prior belief, the average number of life years lost due to air pollution in the home region, and participants' performance in the visual memory task. All control variables have been collected in the main experiment. Standard errors are clustered at the county/district level and presented in parentheses. Significance is denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Balance tests: Main versus Follow-up

Table A-12 – Sample characteristics and balance tests for the USA control group in the main *versus* follow-up experiments.

	Selected In		Main		Selected Out		In - Main	In - Out
	N	Mean	N	Mean	N	Mean		
Age	260	41.35	672	39.22	412	37.87	2.13**	3.48***
		(12.29)		(11.62)		(10.98)	(0.86)	(0.91)
Female	260	0.53	672	0.51	412	0.50	0.02	0.03
		(0.50)		(0.50)		(0.50)	(0.04)	(0.04)
Household size	260	2.96	669	3.21	409	3.37	-0.25	-0.41**
		(2.38)		(2.36)		(2.34)	(0.17)	(0.19)
Urban	260	0.78	672	0.74	412	0.72	0.04	0.06*
		(0.42)		(0.44)		(0.45)	(0.03)	(0.03)
Income group	260	5.09	672	5.22	412	5.31	-0.13	-0.22
		(2.42)		(2.37)		(2.34)	(0.17)	(0.19)
Education	260	1.96	672	1.97	412	1.98	-0.01	-0.02
		(0.63)		(0.65)		(0.67)	(0.05)	(0.05)
Average LYL	260	0.47	672	0.48	412	0.49	-0.02	-0.03
		(0.28)		(0.28)		(0.28)	(0.02)	(0.02)
Prior belief about air pollution	260	5.02	672	4.94	412	4.89	0.08	0.13
		(1.93)		(2.06)		(2.14)	(0.15)	(0.16)
Confidence in prior belief	260	3.44	672	3.48	412	3.51	-0.04	-0.06
		(0.82)		(0.85)		(0.88)	(0.06)	(0.07)
Worried about air pollution	260	4.20	672	4.47	412	4.64	-0.27**	-0.44***
		(1.76)		(1.69)		(1.63)	(0.12)	(0.13)
Preferred to not receive info	260	0.15	672	0.13	412	0.11	0.02	0.03
		(0.35)		(0.33)		(0.32)	(0.02)	(0.03)
Time spent on LYL page (s)	260	23.39	672	21.18	412	19.78	2.21	3.61*
		(25.50)		(25.76)		(25.86)	(1.88)	(2.04)
Recall	260	0.88	672	0.83	412	0.81	0.04*	0.07**
		(0.33)		(0.37)		(0.40)	(0.03)	(0.03)
Retention error	260	0.37	672	0.68	412	0.88	-0.31**	-0.51***
		(1.28)		(1.98)		(2.29)	(0.13)	(0.16)
Abs retention error	260	0.37	672	0.69	412	0.89	-0.32**	-0.52***
		(1.28)		(1.97)		(2.29)	(0.13)	(0.16)
Perceived control (index)	256	-0.03	665	0.02	409	0.06	-0.05	-0.08
		(0.71)		(0.67)		(0.64)	(0.05)	(0.05)
Perceived control (Trope et al., 2003)	260	-0.10	671	0.01	411	0.09	-0.11	-0.18**
		(0.95)		(0.99)		(1.00)	(0.07)	(0.08)
Filler task performance	260	7.25	672	6.94	412	6.75	0.31*	0.50**
		(2.51)		(2.48)		(2.45)	(0.18)	(0.20)
Visual memory task performance	260	0.91	672	0.91	412	0.90	0.01	0.01
		(0.10)		(0.11)		(0.12)	(0.01)	(0.01)
Joint orthogonality F-stat							1.19	2.78
							(0.26)	(0.00)

Notes: The table presents summary statistics of respondent characteristics and balance tests between the samples of respondents that took part in the main and follow-up experiments, only in the control group. Selected In refers to respondents that took part in both the main and follow-up experiments. Selected Out refers to respondents that took part only in the main experiment. All characteristics have been collected in the main experiment. Parentheses underneath mean values are standard deviations of the respective observable characteristic. The two right-most columns report the difference in means between the sample that selected in the follow-up and the and sample in the main experiment or the sample that selected out of the follow-up, with estimated standard error in parentheses. Significant t-test estimates are denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Table A-13 – Sample characteristics and balance tests for the USA HPC treatment group in the main *versus* follow-up experiments.

	Selected In		Main		Selected Out		In - Main	In - Out
	N	Mean	N	Mean	N	Mean		
Age	240	40.27	626	38.69	386	37.71	1.57*	2.55**
		(11.92)		(12.39)		(12.59)	(0.93)	(1.01)
Female	240	0.49	626	0.50	386	0.51	-0.01	-0.02
		(0.50)		(0.50)		(0.50)	(0.04)	(0.04)
Household size	239	2.85	625	3.04	386	3.16	-0.19*	-0.31***
		(1.41)		(1.42)		(1.42)	(0.11)	(0.12)
Urban	240	0.78	626	0.75	386	0.73	0.03	0.05
		(0.42)		(0.44)		(0.45)	(0.03)	(0.04)
Income group	240	5.32	626	5.05	386	4.89	0.27	0.43**
		(2.28)		(2.31)		(2.32)	(0.17)	(0.19)
Education	240	1.94	626	1.99	386	2.01	-0.04	-0.07
		(0.63)		(0.66)		(0.68)	(0.05)	(0.05)
Average LYL	240	0.45	626	0.48	386	0.50	-0.03*	-0.05**
		(0.24)		(0.27)		(0.29)	(0.02)	(0.02)
Prior belief about air pollution	240	5.14	626	4.99	386	4.89	0.15	0.25
		(2.02)		(2.17)		(2.26)	(0.16)	(0.18)
Confidence in prior belief	240	3.40	626	3.51	386	3.58	-0.11	-0.18**
		(0.94)		(0.92)		(0.90)	(0.07)	(0.08)
Worried about air pollution	240	4.27	626	4.46	386	4.59	-0.19	-0.31**
		(1.69)		(1.72)		(1.73)	(0.13)	(0.14)
Preferred to not receive info	240	0.13	626	0.13	386	0.13	0.00	0.00
		(0.34)		(0.34)		(0.34)	(0.03)	(0.03)
Time spent on LYL page (s)	240	20.13	626	19.55	386	19.19	0.58	0.94
		(21.31)		(25.44)		(27.72)	(1.85)	(2.09)
Recall	240	0.88	626	0.85	386	0.83	0.03	0.05
		(0.33)		(0.36)		(0.38)	(0.03)	(0.03)
Retention error	240	0.37	626	0.61	386	0.75	-0.24*	-0.38**
		(1.23)		(1.87)		(2.17)	(0.13)	(0.15)
Abs retention error	240	0.37	626	0.61	386	0.77	-0.24*	-0.40***
		(1.23)		(1.87)		(2.16)	(0.13)	(0.15)
Perceived control (index)	238	0.54	622	0.47	384	0.43	0.07	0.11**
		(0.63)		(0.62)		(0.61)	(0.05)	(0.05)
Perceived control (Trope et al., 2003)	240	0.54	625	0.53	385	0.53	0.01	0.02
		(0.89)		(0.89)		(0.90)	(0.07)	(0.07)
Filler task performance	240	7.34	626	6.98	386	6.76	0.36**	0.58***
		(2.35)		(2.37)		(2.36)	(0.18)	(0.19)
Visual memory task performance	240	0.92	626	0.91	386	0.91	0.01	0.01
		(0.10)		(0.10)		(0.11)	(0.01)	(0.01)
Joint orthogonality F-stat							1.17	2.58
							(0.28)	(0.00)

Notes: The table presents summary statistics of respondent characteristics and balance tests between the samples of respondents that took part in the main and follow-up experiments, only in the HPC treatment group. Selected In refers to respondents that took part in both the main and follow-up experiments. Selected Out refers to respondents that took part only in the main experiment. All characteristics have been collected in the main experiment. Parentheses underneath mean values are standard deviations of the respective observable characteristic. The two right-most columns report the difference in means between the sample that selected in the follow-up and the and sample in the main experiment or the sample that selected out of the follow-up, with estimated standard error in parentheses. Significant t-test estimates are denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Table A-14 – Sample characteristics and balance tests for the India control group in the main *versus* follow-up experiments.

	Selected In		Main		Selected Out		In - Main	In - Out
	N	Mean	N	Mean	N	Mean		
Age	234	34.44	581	34.07	347	33.82	0.37	0.61
		(11.31)		(10.71)		(10.30)	(0.84)	(0.91)
Female	234	0.31	581	0.35	347	0.38	-0.04	-0.07*
		(0.46)		(0.48)		(0.49)	(0.04)	(0.04)
Household size	234	4.40	581	4.43	347	4.45	-0.03	-0.05
		(1.41)		(2.84)		(3.49)	(0.19)	(0.24)
Urban	234	0.90	581	0.90	347	0.90	-0.00	-0.00
		(0.30)		(0.30)		(0.29)	(0.02)	(0.03)
Income group	234	8.18	581	8.07	347	7.99	0.11	0.19
		(2.48)		(2.48)		(2.48)	(0.19)	(0.21)
Education	234	2.28	581	2.32	347	2.34	-0.03	-0.06
		(0.65)		(0.64)		(0.63)	(0.05)	(0.05)
Average LYL	234	5.72	581	5.84	347	5.92	-0.12	-0.20
		(2.70)		(2.73)		(2.75)	(0.21)	(0.23)
Prior belief about air pollution	234	5.28	581	4.99	347	4.80	0.28	0.48**
		(2.41)		(2.59)		(2.68)	(0.20)	(0.22)
Confidence in prior belief	234	4.11	581	4.14	347	4.16	-0.03	-0.05
		(0.75)		(0.77)		(0.79)	(0.06)	(0.07)
Worried about air pollution	234	5.57	581	5.61	347	5.64	-0.04	-0.07
		(1.50)		(1.59)		(1.65)	(0.12)	(0.13)
Preferred to not receive info	234	0.05	581	0.06	347	0.06	-0.01	-0.01
		(0.22)		(0.23)		(0.24)	(0.02)	(0.02)
Time spent on LYL page (s)	234	25.87	581	23.34	347	21.62	2.54	4.25
		(56.92)		(50.52)		(45.71)	(4.06)	(4.27)
Recall	234	0.79	581	0.73	347	0.69	0.06*	0.10***
		(0.40)		(0.44)		(0.46)	(0.03)	(0.04)
Retention error	234	0.05	581	0.16	347	0.23	-0.10	-0.17
		(2.08)		(2.27)		(2.38)	(0.17)	(0.19)
Abs retention error	234	0.82	581	1.02	347	1.16	-0.21	-0.34**
		(1.92)		(2.03)		(2.09)	(0.15)	(0.17)
Perceived control (index)	234	0.06	581	-0.01	347	-0.05	0.07*	0.11***
		(0.48)		(0.50)		(0.51)	(0.04)	(0.04)
Perceived control (Trope et al., 2003)	234	-0.09	581	-0.00	347	0.06	-0.09	-0.15*
		(0.90)		(0.98)		(1.02)	(0.07)	(0.08)
Filler task performance	234	5.68	581	5.51	347	5.39	0.17	0.28
		(2.37)		(2.49)		(2.57)	(0.19)	(0.21)
Visual memory task performance	234	0.89	581	0.87	347	0.86	0.02*	0.03***
		(0.12)		(0.14)		(0.15)	(0.01)	(0.01)
Joint orthogonality F-stat							0.64	1.46
							(0.87)	(0.09)

Notes: The table presents summary statistics of respondent characteristics and balance tests between the samples of respondents that took part in the main and follow-up experiments, only in the control group. Selected In refers to respondents that took part in both the main and follow-up experiments. Selected Out refers to respondents that took part only in the main experiment. All characteristics have been collected in the main experiment. Parentheses underneath mean values are standard deviations of the respective observable characteristic. The two right-most columns report the difference in means between the sample that selected in the follow-up and the and sample in the main experiment or the sample that selected out of the follow-up, with estimated standard error in parentheses. Significant t-test estimates are denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Table A-15 – Sample characteristics and balance tests for the India HPC treatment group in the main *versus* follow-up experiments.

	Selected In		Main		Selected Out		In - Main	In - Out
	N	Mean	N	Mean	N	Mean		
Age	260	34.15	615	33.85	355	33.63	0.30	0.52
		(11.37)		(11.24)		(11.15)	(0.83)	(0.92)
Female	260	0.28	615	0.31	355	0.34	-0.04	-0.06
		(0.45)		(0.46)		(0.47)	(0.03)	(0.04)
Household size	260	4.46	614	4.45	354	4.45	0.00	0.01
		(1.59)		(1.62)		(1.64)	(0.12)	(0.13)
Urban	260	0.93	615	0.89	355	0.87	0.04*	0.06**
		(0.25)		(0.31)		(0.34)	(0.02)	(0.03)
Income group	260	8.47	615	7.94	355	7.55	0.53***	0.91***
		(2.31)		(2.64)		(2.80)	(0.19)	(0.21)
Education	260	2.34	615	2.33	355	2.32	0.02	0.03
		(0.61)		(0.63)		(0.64)	(0.05)	(0.05)
Average LYL	260	5.77	615	5.90	355	5.99	-0.12	-0.21
		(2.61)		(2.65)		(2.69)	(0.20)	(0.22)
Prior belief about air pollution	260	5.04	615	4.99	355	4.95	0.06	0.10
		(2.30)		(2.49)		(2.61)	(0.18)	(0.20)
Confidence in prior belief	260	4.13	615	4.16	355	4.17	-0.02	-0.04
		(0.73)		(0.75)		(0.76)	(0.05)	(0.06)
Worried about air pollution	260	5.68	615	5.69	355	5.69	-0.01	-0.02
		(1.47)		(1.47)		(1.47)	(0.11)	(0.12)
Preferred to not receive info	260	0.03	615	0.05	355	0.06	-0.02	-0.03*
		(0.17)		(0.22)		(0.24)	(0.02)	(0.02)
Time spent on LYL page (s)	260	23.94	615	20.98	355	18.80	2.97	5.14***
		(31.45)		(24.14)		(16.62)	(1.96)	(1.96)
Recall	260	0.84	615	0.80	355	0.77	0.04	0.06*
		(0.37)		(0.40)		(0.42)	(0.03)	(0.03)
Retention error	260	0.12	615	0.04	355	-0.02	0.08	0.13
		(1.88)		(1.97)		(2.04)	(0.14)	(0.16)
Abs retention error	260	0.69	615	0.80	355	0.89	-0.12	-0.21
		(1.75)		(1.80)		(1.83)	(0.13)	(0.15)
Perceived control (index)	260	0.27	615	0.21	355	0.16	0.07	0.11**
		(0.57)		(0.56)		(0.55)	(0.04)	(0.05)
Perceived control (Trope et al., 2003)	260	0.20	615	0.21	355	0.22	-0.02	-0.03
		(0.93)		(0.95)		(0.96)	(0.07)	(0.08)
Filler task performance	260	5.98	615	5.53	355	5.20	0.45**	0.78***
		(2.21)		(2.45)		(2.56)	(0.18)	(0.20)
Visual memory task performance	260	0.88	615	0.87	355	0.86	0.01	0.02*
		(0.13)		(0.14)		(0.16)	(0.01)	(0.01)
Joint orthogonality F-stat							1.21	3.08
							(0.24)	(0.00)

Notes: The table presents summary statistics of respondent characteristics and balance tests between the samples of respondents that took part in the main and follow-up experiments, only in the HPC treatment group. Selected In refers to respondents that took part in both the main and follow-up experiments. Selected Out refers to respondents that took part only in the main experiment. All characteristics have been collected in the main experiment. Parentheses underneath mean values are standard deviations of the respective observable characteristic. The two right-most columns report the difference in means between the sample that selected in the follow-up and the and sample in the main experiment or the sample that selected out of the follow-up, with estimated standard error in parentheses. Significant t-test estimates are denoted as follows: *** p<0.01, ** p<0.05, and * p<0.1.