Gender Differences in Learning about Spouse's Health: Field and Experimental Evidence

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Abstract

This paper studies health belief formation within couples. Using field data on critical illness insurance from an insurtech company, we first examine how health insurance demand—both for oneself and for one's spouse—responds to various negative health signals, including the shock of COVID-19, hospital visits, and indicators of unhealthy lifestyles. We uncover a pronounced gender asymmetry: Women increase health insurance purchases for their husbands in response to negative health news about husbands, but do not adjust coverage in response to health news about themselves, whereas men respond to neither. In a follow-up survey, we elicit individuals' beliefs about their own and their spouses' health and test these gender differences in learning, through a controlled information-provision experiment. We find pervasive health overconfidence regarding both oneself and one's spouse, and the experiment complements the field-data finding in that women update their husbands' negative health signals, but not their own, while men update neither. This paper advances the literature by extending ego-relevant belief updating to health and interpersonal contexts, and by showing that who decides within a household is central to household financial decisions.

Keywords: Insurance, Health overconfidence, Motivated beliefs, Gender differences

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1 Introduction

Economists have long been interested in how people form beliefs and update them in response to new information. Conventionally, beliefs are considered only for their instrumental value, serving as a key input when individuals contemplate optimal decision-making. Recently, the concept of motivated beliefs—the tendency for individuals to hold optimistic beliefs that directly enhance their welfare beyond their instrumental value—has attracted considerable attention (see e.g., Bénabou (2015) and Bénabou and Tirole (2016)). Most research in this area has however focused on how individuals think about themselves. For example, one might hold optimistic beliefs about one's own health to alleviate anxiety associated with illness (e.g., Weinstein, 1983; Köszegi, 2006; Oster et al., 2013; Schwardmann, 2019). In this paper, we extend the motivated belief research to an interpersonal context, specifically examining how individuals form and update beliefs about their spouses' health. This question is important because most people live in family units and frequently make decisions on behalf of their loved ones. If one's spouse holds more accurate beliefs, delegating decisions to spouse would improve decision-making quality, particularly when the individuals themselves may hold biased beliefs.

To address the above question, we first examine a field setting in the private critical illness insurance market (see Appendix A for a detailed introduction of critical illness insurance product and its market). Using a unique proprietary dataset provided by an anonymous insurtech company, we can distinguish between the applicant—the household member who initiates and completes the health insurance purchase—and the insured—the individual covered by the insurance policy. This distinction allows us to investigate whether insurance purchased for oneself versus for one's spouse responds differently to negative health information about the insured.[1] We consider three distinct types of health information that may signal elevated health risks: (1) whether the application occurred following the outbreak of COVID-19 pandemic, representing a broad, exogenous negative health shock; (2) whether the insured visited a hospital within the half year preceding the insurance application, serving as an indicator of recent poor health; and (3) whether the insured used their smart phone between 0:00 a.m. and 4:59 a.m. in the past 90 days, which proxies for an unhealthy lifestyle. Across all three indicators, we find a pronounced gender asymmetry: women increase health insurance purchases for their husbands in response to negative health news about husbands, but not for themselves, while men respond to neither.

1. By regulation, the applicant of an insurance policy is both the contract signer and the premium payer. Appendix Table B1 shows that, in the vast majority of cases, applicant-purchasers are also the primary decision makers for their insurance policies.

Studying belief updating using naturally occurring empirical data is inherently challenging, and our field setting presents several limitations. First, it is unclear whether the insurance applicant is the true primary decision-maker who applies their own beliefs, or merely the household member tasked with submitting the insurance application. Moreover, the identity of the purchaser may itself be endogenous. Second, beliefs are unobservable in insurance data; we only observe insurance coverage adjustments following proxies for health information. Understanding the accuracy of individuals' beliefs about health risks is essential for interpreting household financial decisions—for instance, whether there is underinsurance due to overconfidence and whether this varies with who makes the purchase. Third, it remains uncertain whether the observed patterns generalize beyond our sample or persist under stricter controls, particularly given that health insurance decisions are more complex than health belief formation alone.

To overcome these limitations, we conduct a survey experiment with 2,000 married individuals—1,000 men and 1,000 women—designed to shed light on health beliefs and belief updates between spouses. The main part of our survey includes an information-provision experiment designed to elicit respondents' prior health beliefs about themselves and their spouses, and to examine how individuals update these beliefs in response to relevant health information.[2] This experiment allows us to directly test the belief-updating asymmetries observed in our real-world insurance data. Specifically, following the experimental designs of Eil and Rao (2011) and Zimmermann (2020), respondents are asked to estimate both their own and their spouses' cancer risks relative to a group of 10 people of the same age and gender. These assessments are made both before and after receiving health-related information that is randomly assigned to be positive, neutral, or negative. The information provided consists of the physical exercise time of a randomly selected individual from the reference group of 10 people. To ensure respondents can link this exercise behavior information to cancer risk, they are shown findings from an authoritative study that establishes the relationship between exercise and cancer risk. By comparing the reported cancer risk assessments before and after the exercise information treatment, we identify how individuals update their beliefs about health risks–both for themselves and for their spouses–in response to new, relevant health signals.

As a result, we find pervasive evidence that individuals are overconfident about their own health, measured by either perceived risk of hospitalization or perceived cancer risk. This finding is consistent with prior research by Weinstein (1987) and Oster et al. (2013), and can be explained by individuals' tendency to maintain opti-

2. See Cavalan and Hopfensitz (2025) for a discussion on methodological challenges in measuring beliefs within households.

mistic beliefs about their own health as a way to reduce anxiety (e.g., Köszegi, 2003; Schwardmann, 2019). Interestingly, we also find that individuals exhibit overconfidence about their spouses' health. One plausible explanation is that contemplating the illness of a loved one is also psychologically painful, motivating individuals to believe that their spouses are in good health as a way to alleviate the discomfort. These observations also suggest that, in our original, empirical sample, people are generally underinsured–regardless of who makes the insurance purchase decisions.

When comparing how respondents update their beliefs about their own health versus their spouses' health in response to negative health information in our information-provision experiment, we find that female respondents (wives) adjust their beliefs significantly more for their husbands than for themselves after receiving a negative health signal. In contrast, male respondents (husbands) react to negative health information about their wives in much the same way as they do to information about their own health. Moreover, respondents of both genders do not update their beliefs about themselves differently between receiving a negative health signal and receiving a positive one, consistent with the recent findings of Coutts (2019). We further show that these results are robust to potential experimenter demand effects (Zizzo, 2010). Overall, our experiment reinforces what we observe in the real-world insurance data and provides additional evidence of a gender asymmetry in learning about a spouse's health.

This paper contributes to the literature in two ways. First, we extend the existing research on ego-relevant belief updating to the health domain and to an interpersonal context—specifically, between spouses. Prior studies have focused on belief traits such as IQ (e.g., Eil and Rao, 2011; Zimmermann, 2020; Möbius et al., 2022) and physical appearance (Eil and Rao, 2011), where individual rankings are observable and verifiable. In contrast, health presents a unique challenge: true health risks/status are difficult to measure and lack clear external benchmarks. To address this, we introduce a novel framework for studying belief updating in the health domain by linking perceived health risks to observable behavior—specifically, physical exercise frequency. This approach allows us to examine how individuals update beliefs about both their own health and their spouses' health. [3] Notably, we find that women are more responsive to negative health signals about their husbands than about themselves, suggesting that belief updating about a spouse's health may, in some cases, be more sensitive and more accurate than updating about one's own. This pattern does not hold for men, who respond similarly to negative health signals about themselves and their wives.

3. While prior research often finds evidence of asymmetric updating—where individuals respond more strongly to positive than to negative information (e.g., Eil and Rao, 2011)—we do not observe significant differences in responsiveness based on the valence of the health signal in our setting. It is worth noting, however, that the literature on asymmetry in belief updating presents mixed findings (see, e.g., Coutts, 2019).

Second, we also contribute to studying household financial decision-making by examining health insurance decisions between spouses. Household finance literature often treats households as a single decision-making unit (Campbell, 2006; Gomes et al., 2021), overlooking the potential intra-household interactions due to data limitations and challenges in uncovering the decision-making process within a household. By distinguishing between who receives insurance coverage and who purchases it, we demonstrate that the identity of the decision-maker significantly shapes insurance demand. Specifically, our empirical findings on how individuals respond to their spouses' health signals suggest that differences in health beliefs be an important channel. Evidence from our survey experiment reinforces this interpretation.

The rest of the paper is organized as follows. In section 2, we describe the field data, empirical design, and the empirical results. Section 3 presents the survey experiment and corresponding results. Finally, Section 4 concludes.

2 Empirical Evidence from the Critical Illness Insurance

2.1 Data and Sample

We obtain a proprietary dataset from an undisclosed insurtech company based in Shanghai, China. This company collects personal information of insured individuals to assess their risks. It subsequently provides underwriting–though not pricing–recommendations to its clients, i.e., insurance companies. Thanks to our ability to distinguish between insured individuals and applicants, as well as their relationships, this dataset enables us to investigate insurance decisions within spousal relationships.

Our dataset consists of three parts. The first part contains information on critical illness (CI) insurance policies obtained from the insurtech company's clientele. This includes insurance amounts, premiums, policy features, and sociodemographic details of insured individuals and applicants. The second part encompasses records of public health insurance claims made by insured individuals during the two years preceding their CI insurance applications.[4] These records capture each individual's hospital visits. The records span across 13 provinces, including Beijing, Tianjin, Chongqing, Shandong, Jiangsu, Sichuan, Fujian, Jilin, Henan, Guangxi, Hubei, Hunan, and Inner Mongolia. The third part of the dataset comprises individual behavioral data gathered

4. The public health insurance claim records cover over 70% of the claims from secondary and higher-level hospitals, but offer less complete records from lower-level hospitals and pharmacies. The high-level hospital records are more relevant to this research, as these institutions typically treat critical illnesses, whereas lower-level hospitals and pharmacies usually handle common, frequently occurring diseases.

by the insurtech company from third-party platforms, including, for example, smartphone usage behaviors. In the Appendix A, we describe in detail the critical illness insurance product and its market in China.

The dataset contains 129,374 long-term, ever-valid CI insurance policies that purchased either by the insured individuals themselves or by their spouses. The application dates range from November 25, 2019, to January 31, 2021. We restrict the dataset to applicant–insured pairs covered by only one CI insurance policy during the sample period.[5] After excluding observations with missing values in variables used in the baseline analyses, the final cross-sectional sample consists of 112,620 CI insurance policies covering the same number of unique applicant-insured pairs. The sample includes 54,843 male insureds and 57,777 female insureds. The sample spans eight insurance products from three insurance companies.

Table 1 presents the summary statistics of our sample, with variable definitions provided in Table B2 of Appendix B. Panels A and B display the samples for male and female insured individuals, respectively. The average age of male insureds is 33.2 years old, while it is 32.3 years old for female insureds.

In terms of health insurance demand, the average insurance amount is CNY 364,454 for male insureds and CNY 349,172 for female insureds. This suggests that male insured individuals on average receive 4.4% higher coverage, which could be driven by the breadwinner effect as men earn relatively more than women.[6] Insurance policies for male and female insureds exhibit similar characteristics. The average potential-maximum policy duration is 66.4 years for male insureds and 67.8 years for female insureds, as most policies remain effective until the (actuarial assumption of) death of the insured. The average planned premium payment period spans 27 years for insureds of either gender, as 72% of applicants opted for the longest possible contribution period for CI insurance, i.e., 30 years. Consequently, most policies are currently

5. This restriction addresses potential miscommunication or misunderstanding about CI insurance, where one may be unaware of an existing CI policy. In the original dataset, 3,714 applicant-insured pairs held at least two CI policies, which account for less than 2.8% of the sample (involving 7,624 policies in total). Our results remain robust when these observations are included.

6. The "breadwinner effect", typically in life and health insurance, reflects the tendency for the primary income earner to be more likely to hold insurance and to have higher coverage. In the U.S., LIMRA and Life Happens (2024) report 57% of men versus 46% of women own life insurance, an 11-point gap, the largest in the study's 14-year history. Lewis (1989) predicts greater coverage on the wage earner when dependents' consumption relies on that income. Using HRS and SCF data, Bernheim et al. (2003) find benchmark coverage is substantially higher for the primary earner. Lin and Grace (2007) construct a financial vulnerability index based on the loss of the household wage earner and find life insurance holdings rise with vulnerability—direct empirical evidence of the breadwinner effect. Gandolfi and Miners (1996) and Luciano et al. (2016) show that within a household, husbands are more likely to be covered by life insurance and have higher life insurance amount than their wives in the U.S. and Italy, respectively. Gokhale and Kotlikoff (2002) estimate recommended coverage of $630,079 for wives as survivors (coverage on husbands) versus $291,568 for husbands as survivors—a 2.2× difference.

active and ongoing. Additionally, 3.9% of the policies for male insureds were rejected by the insurtech company before final underwriting, compared to 1.8% for female insureds.

Among male insureds, 34% of CI insurance policies are purchased by their wives, while 66% are self-purchased. In contrast, among female insureds, 15% of CI insurance policies are purchased by their husbands, while 85% are self-purchased.[7] We also observe that 16% of male insureds purchase insurance for both themselves and their spouse, compared to 15% among female insureds. Thanks to this feature of our data, which distinguishes between applicants and insureds in insurance policies, we are able to examine how CI insurance demand—for oneself and for one's spouse—varies with negative health information.

With respect to individuals' negative health signals, we consider three types: whether the insurance application was submitted before or after the COVID-19 outbreak, hospital visits prior to the insurance application, and midnight smartphone usage habit. Within our sample, 88% policies for both genders were submitted after January 20, 2020, the date marking the COVID-19 outbreak in China. Within a six-month window before CI insurance application, 7.0% of female insureds visited a hospital at least once, compared with 4.2% of male insureds. 43% insured individuals had used their smartphones during midnight hours (0:00–4:59 a.m.) over the 90 days preceding their CI insurance application.

2.2 Empirical Strategy

We analyze how insurance demand—for oneself and for one's spouse—responds to different negative health signals about the insured. To allow for potential gender differences in the determinants of insurance demand, we estimate Equation (1) separately for male and female insureds.

$$\begin{aligned} Insurance_amount_{ipct} = \beta_0 + \beta_1 ForSpouse_{ipct} \times NegSignal_{ipct} \\ + \beta_2 ForSpouse_{ipct} + \beta_3 NegSignal_{ipct} + \delta_i + \delta_p + \delta_{ct} + \varepsilon_{ipct}. \end{aligned} \tag{1}$$

where $Insurance_amount_{ipct}$ is the logarithm of the insurance amount for policy i of product p in city c at time t (year-month). The variable $ForSpouse_{ipct}$ is a binary indicator equal to 1 if the applicant is the insured's spouse, and 0 if the applicant and the insured are the same person. $NegSignal_{ipct}$ represents the negative health signals associated with the insured. We include a rich set of fixed effects, δ_i, to control for char-

7. These proportions are consistent with a market survey conducted by WaterDrop (2022), which reported that 47% of users aged 30-40 prioritize buying insurance for themselves and 13% for their spouses; among users aged 40 and above, 61% prioritize themselves and 16% their spouses.

acteristics of the insured—such as age (in integer years), disease risk (in categories), and occupational risk (in categories)[8]—as well as policy characteristics, including policy status (in categories)[9], policy duration (in integer years), contribution period (in integer years), number of endorsements, and whether the insurance application was previously rejected. Additionally, we include product fixed effects (δ_p) to control for heterogeneity across the eight CI insurance products, and city-by-month fixed effects (δ_{ct}) to capture macroeconomic shocks and other unobserved factors that vary across cities and over time. Standard errors (ε_{ipct}) are clustered at the city level to allow for arbitrary correlation within cities.

The literature on motivated beliefs (e.g., Eil and Rao, 2011; Möbius et al., 2022) demonstrates that individuals tend to maintain optimistic self-views by discounting or downplaying negative information. Building on this, we hypothesize that people may be less responsive to negative health signals about themselves, but are more likely to update their beliefs when these signals pertain to their spouses' health. Empirically, a positive β_1 would indicate that insurance demand for one's spouse increases more than for oneself in response to negative health signals about the insured, whereas an insignificant β_3 would suggest that individuals do not adjust their own insurance decisions when confronted with negative health signals about themselves.

2.3 The impact of negative health signals on self and spouse insurance purchase

Table 2 presents the results from estimating Equation (1). We examine three distinct negative health signals: COVID-19, hospital visit, and midnight smartphone use. Our analysis distinguishes between male and female insured individuals. We begin with male insureds. The COVID-19 pandemic increased perceived health risks and societal anxiety, functioning as a universal negative health signal. The results in Column 1 show that, following the onset of the pandemic, wives purchase 3.0% more CI insurance for their husbands than men purchase for themselves. The second signal is the number of hospital visits in the six months preceding the CI insurance application, which serves as an indicator of poor health status. Column 3 shows that for male insureds, an additional hospital visit is associated with wives purchasing 5.9% more CI insurance for their husbands than the amount men purchase for themselves. The third

8. The disease risk categories include no, low, medium, and high disease risk, among four other minor categories. The occupational risk categories include low, medium-low, medium, medium-high, and high occupational risk, among two other minor categories. Note that these categories are provided by the insurtech company from their own model estimations.

9. Policy status includes valid, surrendered by agreement, surrendered according to policy terms, terminated by claims, and terminated by other reasons.

signal—midnight smartphone use captures aspects of an unhealthy lifestyle. The results in Column 5 indicate that when male insureds exhibit midnight smartphone use in the 90 days prior to the CI insurance application, wives purchase 3.0% more CI insurance for their husbands than men purchase for themselves. Notably, men do not respond to their own negative health signals when purchasing insurance for themselves, as evidenced by the insignificant coefficients on *NegSignal* in Columns 1, 3, and 5. This pattern may reflect motivated beliefs, whereby individuals maintain overly optimistic self-assessments to avoid the anxiety associated with illness (e.g., Bénabou and Tirole, 2002; Köszegi, 2003; Schwardmann, 2019).

In contrast, we do not observe any asymmetric self–spouse reactions to negative health signals of female insureds. Specifically, the insignificant coefficients on the interaction terms in Columns 2, 4, and 6 of Table 2 imply that husbands react to their wives' negative health indicators in a manner similar to how women respond to their own negative health signals. Likewise, women do not adjust their insurance purchases in response to their own negative health signals, as evidenced by the insignificant coefficients on *NegSignal* in these columns.

Figure 1 reorganizes the estimated coefficients of specifications in Table 2 to directly highlight gender differences. When purchasing for oneself (see Figure 1A), women and men do not show a significant difference in response to own negative health signals (neither gender significantly responds). However, when purchasing insurance for spouse (see Figure 1B), women purchase significantly more health insurance for their husbands in response to their husbands' negative health signals than men purchase for their wives in response to their wives' signals. We find similar patterns when replicating the analyses using subsamples based on the gender of applicants instead of insureds, as shown in Appendix Figure A1.

Our analyses so far suggest gender differences in how individuals learn about their spouse's health. However, these belief changes are not directly observable and must be inferred from insurance purchasing data. Furthermore, it remains unclear whether individuals hold biased beliefs about themselves or their spouse—and if so, in which direction. In addition, our insurance data have several limitations, for example, the variable $ForSpouse$ itself may be endogenous. To address these concerns, we conduct a survey experiment with married individuals in Section 3 to study health beliefs and belief updating between spouses in a controlled setting.

3 Information Provision Experiment with Married Individuals

In this section, we present a survey experiment conducted with married individuals. As discussed in previous sections, we find evidence of an asymmetry in how individuals and their spouses react to negative health-related information about the individual, particularly when the insured person is male. Our survey experiment will provide more conclusive evidence regarding how people form and update their beliefs on their own and their spouse's health risks in a well-controlled environment.

The survey experiment offers several strengths, notably its ability to directly observe individual beliefs (Stantcheva, 2023). It allows us to directly examine how individuals perceive their own and their spouse's health risks, as well as how they differ in updating negative health-related information. As a result, it provides concrete evidence for the existence and impact of motivated beliefs. Additionally, the experiment enables us to conclude that the asymmetry in belief updating is driven by husband's insufficient response to his own negative health risk signals, rather than wife's overreaction to her husband's signals. The experiment also overcomes limitations in previous empirical data by constructing the sample with married respondents only, ensuring clearer identification of decision-makers, and directly observing the characteristics of the decision maker (e.g., income and risk preference), thus reinforcing the validity of the empirical findings.

3.1 Experimental Design and Implementation

Our survey consists of six modules. The first module collects basic demographic data from respondents, including their gender, number of children, and weekly exercise time, as well as the same information about respondents' spouses. The second module elicits respondents' perceptions of the health risks. We ask respondents to compare their own health risks with those of their spouses, their own health risks with those of average population in their age and gender group, and their spouses' health risks with those of average population in their spouses' age and gender group. The third module introduces a survey experiment on belief updating, with further details provided later. The fourth module collects health information on both respondents and their spouses. The fifth module gathers data on respondents' education levels, lifestyle habits, risk preferences, and private insurance purchases. The sixth module addresses potential experimenter demand effects; and we inquire whether the respondents trust the exercise-health relationship study presented in the survey experiment

and the extent to which they find other individuals' health/exercise information helpful in shaping their beliefs about their own and their spouses' health risks.

In the health-belief elicitation experiment (i.e. the third module), we closely follow the experimental design outlined by Eil and Rao (2011) and Zimmermann (2020). The experiment consists of two stages. In the first stage, we ask respondents to provide their initial beliefs regarding their own health ranking and that of their spouses within a group of ten people of the same age and gender. We inform respondents that the other nine people in their group, or in the group of their spouses, were randomly selected from our previous pilot surveys. We then ask respondents the following questions: "What do you believe is the probability that your (or your spouse's) chance of having cancer is higher than half of the people in the 10-person group?" In contrast to previous studies (e.g., Eil and Rao, 2011; Zimmermann, 2020), determining actual rankings is challenging because cancer risks, unlike IQ or beauty, cannot be directly measured. We therefore convert cancer risks into specific comparisons of physical exercise routine among individuals, allowing us to conveniently provide ranking information on the one hand, and on the other hand, to assess whether the information we provide is positive or negative.

In the second stage of the survey experiment, respondents are presented with the following information: "Recent studies, featured in leading international oncology journals, find that an increase in physical exercises substantially reduces the risk of developing various types of cancer. Specifically, committing to 3 hours of moderate-intensity exercise per week has demonstrated a significant decrease in the incidence of liver cancer by 27%, lung cancer by 26%, and breast cancer by 10% (Moore et al., 2016)." This study is consistent with the recommendations of the World Health Organization (WHO, 2020), which advises individuals to engage in at least 150 to 300 minutes of moderate-intensity aerobic activity weekly, including exercises that noticeably elevate the heart rate, such as jogging and rope skipping. After receiving the study about the benefits of physical exercise in reducing cancer risk, respondents are asked to choose one of the other nine people in their own group (or one in their spouses' group) and are informed about the selected person's weekly exercise routine. Afterwards, they estimate the probability of having cancer higher than half of the people in the 10-person group again with the same question in the first stage.

With such a within-subject design, we compare subjects' prior beliefs with their posterior beliefs after receiving information on other individuals' exercise routine. Our underlying assumption here is that spending less time on exercise correlates with a higher risk of developing cancer. By providing the study information, we expect the respondents to interpret the information accordingly, and in particular, to learn

that the selected individual exercises more than the respondents themselves (or their spouses) is a negative signal, and vice versa. If respondents trust the provided information source, and update their beliefs in an unbiased manner, we would anticipate more optimistic posterior beliefs in health risk when respondents (or their spouses) engaged in more exercise than the selected individual but more pessimistic beliefs in the opposite scenario.

To mitigate potential ordering effects, we randomly determine the sequence in which respondents report their prior beliefs about their own health and that of their spouses. This order remains consistent when we elicit their posterior beliefs. In total, half of the respondents first receive information and update on their own group's weekly exercise routine (i.e. the respondent-first group), while the other half receive and update information on their spouses' group first (i.e. the spouse-first group).[10]

Another potential concern regarding our health-belief elicitation experiment (and also other similar experiments in the literature) is so-called experimenter demand effects. These effects refer to changes in behavior or beliefs among experimental respondents due to cues about what is considered appropriate behavior (Zizzo, 2010). Intuitively, if experimenter demand effects are present, they should disproportionately impact individuals who are more adept at discerning the study's intent and are more inclined to alter their choices based on the experimenter's purpose (Allcott and Taubinsky, 2015; Haaland et al., 2023). Following Allcott and Taubinsky (2015), we use the self-monitoring scale developed by Snyder (1974) as a proxy for this discernment ability and anticipate finding no evidence that self-monitoring ability moderates respondents' beliefs updating for both themselves and their spouses.

As mentioned earlier, it is essential that respondents take the received study seriously when forming their posterior beliefs. To assess this, we first determine whether respondents genuinely believe that an increase in physical exercise substantially reduces the risk of developing various types of cancer. Following Allcott and Taubinsky (2015), we gauge respondents' trust in this information using a five-point Likert scale ranging from "Distrust" to "Trust". Additionally, we ask respondents how helpful they find information about other individuals' exercise routines in shaping their posterior beliefs regarding their own and their spouses' health risk rankings, using a five-point Likert scale ranging from "Unhelpful" to "Helpful". In our formal analyses, we consider both specifications that include and exclude those who do not trust/find helpful the provided information.

10. Here are a link to the survey which respondents update for their own health risks first: https://www.credamo.com/u/nZx9zqNXE62, and a link to the survey which respondents update for their spouses' health risk first: https://www.credamo.com/u/Xy6A5JwADRo. The English survey instructions can be accessed here for more information.

Before real implementation, we preregistered our study in the American Economic Association's registry for randomized controlled trials (ID: AEARCTR-0011139, first published on June 23, 2023). We outsourced our data collection to a survey company called Credamo, known for operating a comprehensive data platform specializing in research, with over 3 million registered respondents. Studies conducted by Credamo users have been published in leading academic journals, including PNAS, Psychological Science, and Journal of Consumer Research, among others. Our respondents are selected from Credamo's respondent pool.

Before sending out the final survey, we conducted pilot surveys to gather feedback for improving the wording of survey instructions and questions. Participants in the pilot surveys received a fixed participation fee CNY 10 and were excluded from future participation in the final survey. The pilot data also provided us with a distribution of individuals' weekly exercise routine for different genders and age groups. This information is used in our information provision experiment as the aforementioned cancer risk signals to facilitate belief updating. Data from the pilots are not included in our analyses.

The actual, final survey started on May 9, 2023, and concluded on July 3, 2023. Our goal was to obtain a valid sample of 2,000 married individuals residing in Beijing who had never been diagnosed with cancer. We excluded individuals with a history of cancer because our health-belief elicitation experiment focused on cancer-related perceptions. Their responses might potentially bias our results. The choice of location was primarily based on cost-effectiveness, and there is no reason to believe it would affect the generalizability of our findings. Furthermore, we aimed for a balanced gender sample, targeting 1,000 male and 1,000 female respondents. Given that the legal age of marriage in China is 20 for female and 22 for male, and that individuals over 60 are likely to have different exercise time due to chronic diseases and retirement, we restrict the respondent age to 20-59.

Participants typically spent around 10 minutes completing the survey and received a fixed payment of CNY 11, where the platform's minimum pay for the same amount of work is set at CNY 3. We opted to offer nearly four times that amount to encourage active participation and, hopefully, enhance data quality. To screen out inattentive respondents, we check whether respondents' zodiac sign corresponds with their birth year. If not, these respondents will not get paid and will be dropped from our analyses.

3.2 Experiment Sample and Health Overconfidence

Table 3 displays the summary statistics for the experimental sample, with variable definitions provided in Appendix Table B3. Note that each respondent provides information that produces two observations: one for the respondent his/herself and the other for the respondent's spouse. After excluding observations with missing values in key variables, we remain with 3,481 observations, including 1,737 female observations and 1,744 male observations. For each observation, we use two variables to define its identity: a dummy of $Male\ respondent$ to mark the gender of the surveyed respondent; another dummy of $For\ spouse$ to mark whether the observation is for the respondent or the respondent's spouse. For example, an observation with $Male\ Respondent = 1$ and $For\ spouse = 1$ suggests that its information is about a female individual who is the wife of the respondent.

Regarding the exercise information about peers in the same group that respondents received—either for themselves or for their spouses—half of the messages constituted good news (i.e., the self or spouse's exercise time was longer than that of the selected comparison individual), one-quarter constituted bad news, and one-quarter were neutral. After receiving the information, 85% of belief updates aligned with the expected direction or had no updates. The remaining 15% reflected incorrect updates —for example, bad news leading to a lower perceived probability of having cancer, or good news leading to a higher perceived probability. Overall, the absolute difference between individuals' prior and posterior beliefs was about 9.0 percentage points.

Among both male and female individuals (including both respondents and their spouses), we observe similar individual characteristics. The average age is 34.4, which is comparable to the average age in our empirical sample. On average, the couple married for 8 years. Half of individuals hold at least a college degree. On average, they have fewer than one child (0.93). The median annual income falls into the band of CNY 50,001 to CNY 100,000. Around 6% of individuals have chronic diseases. On average, individuals in the sample visit hospitals once per year. Respondents and their spouses undergo health examinations at an average rate of once a year to once every two years. In terms of risk preferences, only 14% of individuals chose option 6 (CNY 20 (50%), CNY 700 (50%)), indicating risk neutrality or risk seeking, while the remaining exhibited various levels of risk aversion. On average, they exercise for 1–5 hours per week, while they believe that their peers tend to exercise for slightly longer durations.

When examining the belief elicitation section, individuals believe that they and their spouses are 27% more likely (and 73% less likely) to develop cancer compared to half of the people in a group of ten of the same age and gender (see the variable

of Cancer risk). This suggests that respondents are overconfident not only about their own health but also about their spouses' health.

In addition, Figure 2 illustrates a comparison between respondents' perceptions of their own health risks and those of their spouses. The blue bars represent respondents' beliefs about themselves, while the red bars represent their beliefs about their spouses. In our survey, participants were asked to estimate the likelihood of their own and their spouses' risk of hospitalization due to illness in the coming year, comparing to the population in the same age and gender group, using an eleven-point Likert scale ranging from 0 to 10. A smaller (larger) than 5 number indicates that respondents believe they are less (more) likely to be hospitalized than population average. As shown in the figure, all beliefs are below 5, suggesting that both women and men believe that they and their spouses are healthier than population average, that is a clear indication of overconfidence by underestimating health risks. The figure also shows that wives believe their husbands' health risk higher than husbands' beliefs about their own health risks; while husbands believe their wives' health risk similar to wives' beliefs about their own health risks. That is to say wives are less overconfident about their husbands' health, while all other three belief scenarios are more overconfident.[11]

3.3 Gender Differences in Learning about a Spouse's Health

To compare how respondents update their beliefs about their own health risks and that of their spouses following negative health-related signals, we adopt the following estimation specification:

$$\begin{aligned} BeliefUpdate_i = \delta_0 + \delta_1 ForSpouse_i \times NegInfo_i \\ + \delta_2 ForSpouse_i + \delta_3 NegInfo_i + \delta_4 \mathrm{X}_i + \varepsilon_i. \end{aligned} \tag{2}$$

where the dependent variable $BeliefUpdate$ is defined as the absolute difference between the answer to the question "What do you believe is the probability that your (or your spouse's) chance of having cancer is higher than half of the people in your 10-person group?" before and after learning the weekly exercise routine of a randomly selected person in their own group (or in their spouses' group).[12]

11. Appendix Figure A2 shows a direct comparison of hospitalization risk between spouses as reported by the survey respondents. We also observe that respondents tend to believe they are healthier than their spouses, although to a lesser extent. Moreover, this tendency is weaker among female respondents than among male respondents.

12. To limit the influence of extreme observations on our estimation, $BeliefUpdate$ is winsorized at the top 10% level. The value of $BeliefUpdate$ depends on the prior belief, that is the answer to the above question before providing any additional exercise information. When respondents subsequently receive positive information, their perceived probability of getting cancel can maximally decrease to 0,

$ForSpouse$ is a dummy variable, equal to one if the observation concerns about the respondent's spouse health risk, and zero if it concerns about the respondent's own health risk; $NegInfo$ is equal to one when respondents receive negative news, and zero if positive or neutral news. X_i represents two sets of control variables. The first set pertains to the demographics of the respondents (or respondents' spouse), including age, gender, years of marriage, education level, number of children, income level, health status (the presence of chronic illness, number of reported hospital visits in the year prior to the experiment, frequency of medical examinations), and risk preferences. The second set relates to belief updating and includes the individuals' exercise routine, the exercise routine of the selected peer in the 10-people group of the same age and gender, the order of belief elicitation, respondents' prior beliefs, and whether respondents updated beliefs in the right direction, i.e., more pessimistic about cancer risk if receiving negative information and vice versa.

Although, from a motivational perspective, individuals may wish to maintain optimistic beliefs about both their own and their spouses' health, the motivation to do so for their own health is likely stronger. So we conjecture that the estimated coefficient of the interaction term $ForSpouse \times NegInfo$ (i.e., δ_1) will be positive, indicating that when reacting to negative signals about their spouse's health—relative to positive or neutral signals—the belief updating is stronger than reacting to own negative health signals. Remember, however, that our previous empirical analyses yield different results for women and men. We will further distinguish individuals by gender to examine gender differences in the magnitude of δ_1. Finally, we do not expect any significant difference in updating beliefs for oneself and one's spouse when receiving positive or neutral information, as which will not introduce anxiety and thus no motivated belief to do so. That is, δ_2 is expected to be insignificant.

Figure 3 illustrates the belief updates in response to negative exercise-related information.[13] The figure shows that wives update more strongly to their husbands' negative exercise signals than wives update on their own information; while husbands update negative exercise signals similarly for their wives' and their own negative information. The asymmetry in belief updates is consistent with our empirical results in Figure 1 and Table 2. It is worth noting that male respondents appear to update their beliefs more on average compared to female respondents. As shown in Appendix Fig-

resulting in an average change of less than 30 percentage points. Conversely, those who receive negative information may increase their perceived probability to 100, leading to an average change of more than 70 percentage points. The winsorisation addresses this disparity. Thus, we estimate the equation using the Tobit model.

13. Appendix Figure A3 shows respondents' prior beliefs about their own and their spouse's cancer risk relative to the median person in their respective groups. Consistent with Figure 2, we observe pervasive overconfidence in this specific type of health risk, both for respondents themselves and for their spouses.

ure A4, this difference is primarily because male respondents place more weight on the message that exercising more can reduce cancer risk and find it more useful for updating their beliefs than female respondents; once we restrict the sample in respondents who believe the information and find it helpful, the observed average update difference between genders disappears, as shown in Appendix Figure A5. Since our analysis focuses on how the same individual reacts to their own and their spouse's health signals, this difference in information trust and usefulness does not affect our results.

Table 4 present our regression results, as specified in Equation (2). We conduct the same analysis separately for male and female respondents. In both panels, we run our regressions using three different samples: the full sample, subsample excluding those who received neutral exercise information, and subsample excluding both who received neutral exercise information and who made wrong direction of updates. Columns (2), (4), and (6) present the same analysis as Columns (1), (3), and (5), but restricted to respondents who believe the cancer information and find the exercise information helpful. Panel A shows that female respondents made significantly more updates in response to their husbands' negative exercise signal than to their own negative exercise signal, but there was no significant difference following a positive or neutral signal. Across all specifications, we find that wives made 3.0 to 3.2 percentage points more updates in response to their husbands' negative health signals than to their own negative health signals. Conversely, as Panel B shows, we do not find any significant differences in men's belief updating about own negative health signals and spouse's negative health signals. Figure 4 reorganizes the estimated coefficients of Column 1 in Table 4 to directly compare the gender difference in updates for spouse's negative health information.

As a robustness test, Appendix Table B4 further exclude individuals who did not update health beliefs (i.e. those having $BeliefUpdate$=0) and the results remain consistent. These results demonstrate significant asymmetries in wives' updates, while concurrently affirming that husbands do not display comparable significant asymmetries in their updates, as depicted in Figure 3. These findings reinforce our results using the insurance empirical data, in the sense that we document direct evidence that wives react to husbands' negative health signals more strongly than to their own.

One potential concern regarding this type of information provision experiment is experimenter demand effects (Haaland et al., 2023). Following the approach of Allcott and Taubinsky (2015), we investigate whether the self-monitoring scale developed by Snyder (1974) moderates belief updating. Our findings, as presented in Table 5, reveal no significant evidence of such moderation. Moreover, since our focus is on differences

in each respondent's reactions to information about themselves versus their spouse, we believe that any experimenter demand effects are unlikely to drive our finding that women respond more strongly to their husband's negative health signal than to their own.

4 Conclusion

In this paper, we study ego-relevant belief updating in the health domain within married couples. Leveraging a unique dataset on critical illness insurance from an insurtech company, we examine how insurance demand—used as a proxy for health beliefs—responds to negative health signals when either an individual or their spouse purchases coverage. We consider a range of health signals, from universal shocks such as COVID-19 to individualized information including hospital visits and unhealthy lifestyles. We document several notable patterns. First, neither women nor men increase insurance demand in response to their own negative health information. This behavior is consistent with motivated beliefs, whereby individuals downplay unfavorable information about themselves in order to preserve psychological well-being (Köszegi, 2006; Oster et al., 2013; Schwardmann and van der Weele, 2019). Second, women respond strongly to their husbands' negative health information by purchasing more insurance, whereas no comparable response is observed among men. This asymmetry points to gender differences in how spouses learn about and update beliefs regarding their spouses' health.

To address the limitations of field data, we replicate these findings using a survey-based information provision experiment with married individuals. Consistent with the existing literature (e.g., Weinstein, 1987; Oster et al., 2013), the experiment reveals widespread overconfidence—not only in individuals ' assessments of their own health risks but also in their beliefs about their spouses' health risks—suggesting the presence of motivated beliefs within households. Prior research has shown that individuals tend to hold overly optimistic beliefs about ego-relevant attributes such as intelligence, attractiveness, and health (e.g., Eil and Rao, 2011; Zimmermann, 2020). Our findings indicate that such overconfidence may extend to loved ones: individuals may prefer to believe that their spouses are healthy, as acknowledging serious illness could induce anxiety and emotional discomfort.

With respect to belief updating, we replicate our main field results in the experimental setting. That is women update their husbands' negative health signals more than they update for their owns', while men update in a similar pattern for themselves and for their wives'. The consistency of findings across field and experimental sam-

ples underscores the robustness of our conclusions. Because neither men nor women respond to their own health signals, the observed gender asymmetry in updating beliefs about a spouse's health cannot be attributed to a general tendency for women to be more attentive to information. Instead, we conjecture that this difference may stem from gendered socialization: women are often encouraged from early childhood to adopt caregiving roles (Eagly and Wood, 1999; West and Zimmerman, 1987), which may lead them to feel a greater responsibility for monitoring their husbands' health.

Whether the gender asymmetry in belief updates about their spouses extends beyond the health domain remains an open question. More broadly, understanding belief-updating dynamics within couples represents a promising avenue for future research, with important implications for policy design and welfare.

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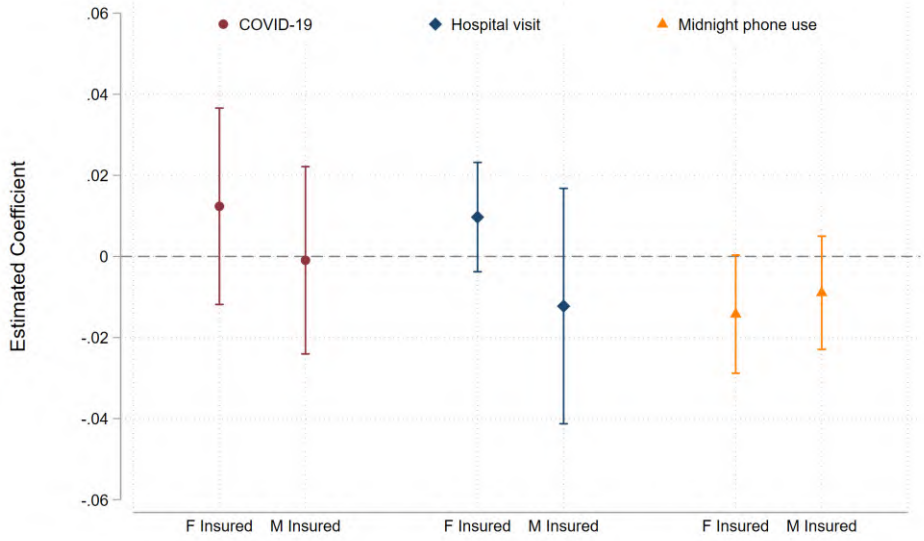
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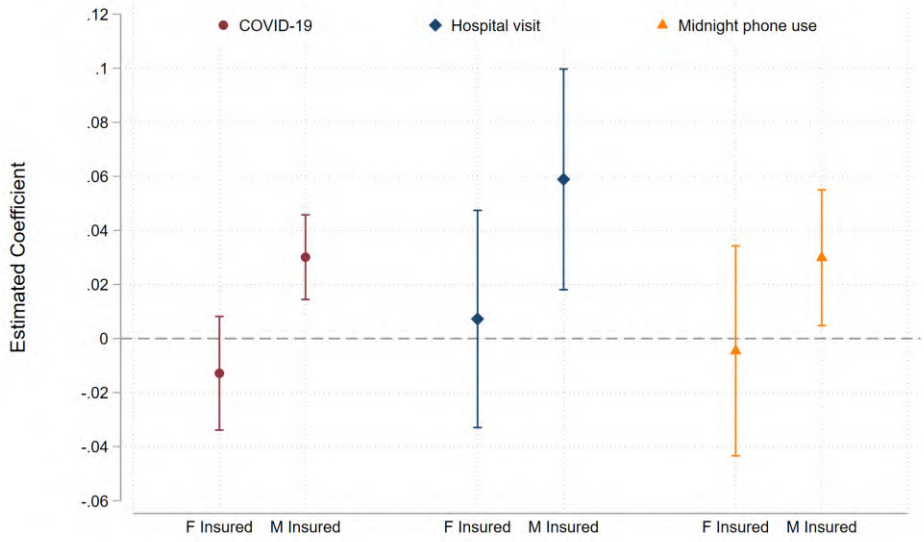
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Figures



(A) For Self



(B) For Spouse

Figure 1 Gender Differences in Insurance Purchases in Response to Negative Health Signals: By Insureds

Notes: The figure illustrates the impact of self purchases (Panel A) and spouse purchases (Panel B) on insurance amounts in response to negative health signals, distinguishing between male and female insureds. The figure examines three distinct negative health signals: COVID-19, hospital visits, and midnight cellphone usage. Each signal is denoted by a unique shape and color for clarity: maroon circles signify COVID-19, blue diamonds represent hospital visits, and orange triangles indicate midnight phone usage. Error bars represent 90% confidence intervals.

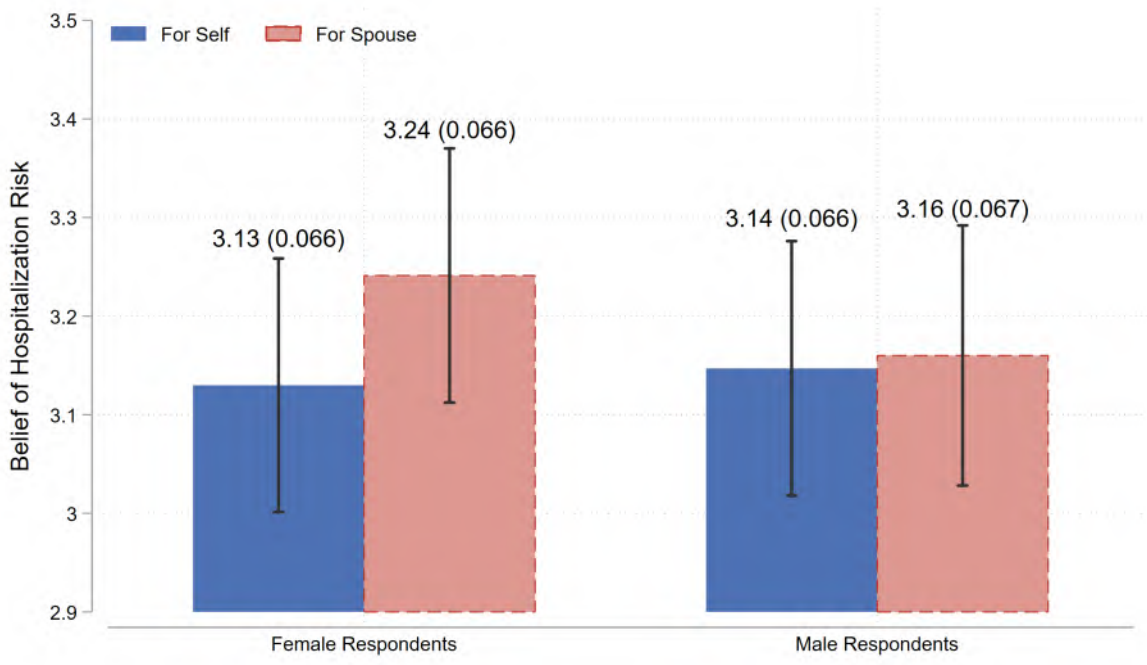


Figure 2 Hospitalization Risk between Gender and Spouses: Comparing with the Population Average

Notes: This figure presents a bar chart comparing between individuals' perceptions of their own hospitalization risk (blue bars) and those of their spouses (red bars). Hospitalization risk refers to the respondents' estimated likelihood of hospitalization due to illness in the next year, comparing their own (or their spouses') risks with the average risk of the same age and gender in the general population. It uses an eleven-point Likert scale ranging from 0 to 10, with 0 means least likely, 5 means equally likely, and 10 means most likely. The estimates control for the same set of control variables as in Equation (2). We report the mean values and standard errors are in parentheses.Error bars indicate 95% confidence intervals.

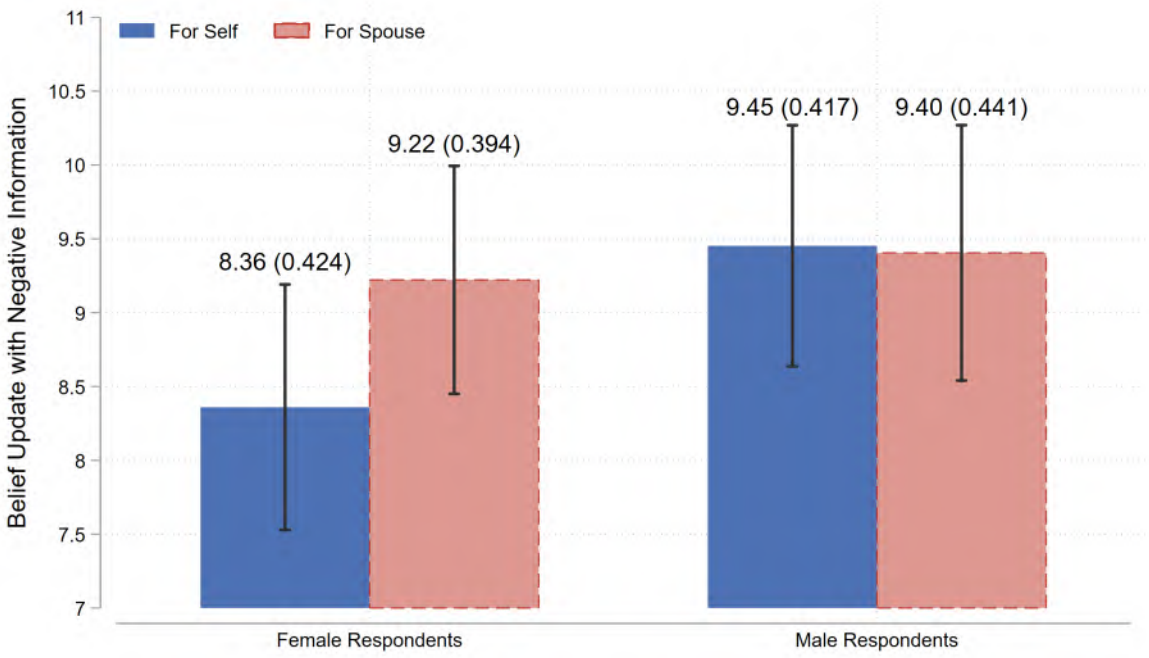


Figure 3 Belief Updates with Negative Health Information

Notes: This figure presents a bar chart comparing the belief updates in response to negative exercise-related information for male and female respondents, distinguishing between those for oneself (blue bar) and for spouses (red bar). Belief update (in percentage point) is the absolute difference between the answer to the question "What do you believe is the probability that your (or your spouse's) chance of having cancer is higher than half of the people in your 10-person group?" before and after learning the weekly exercise routine of a randomly selected person in their own group (or in their spouses' group). The estimates control for the same set of control variables as in Equation (2). We report the mean values and the standard errors are in parentheses. Error bars indicate 95% confidence intervals.

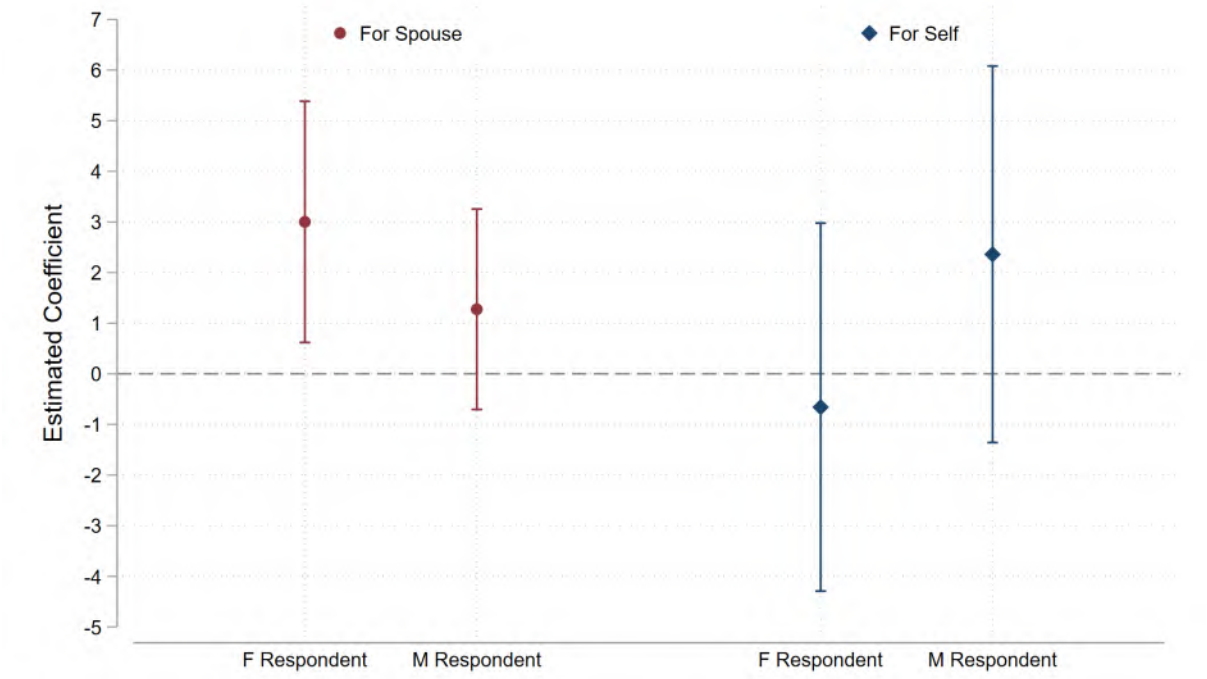


Figure 4 Gender Differences in Belief Updates in Response to Negative Health Information

Notes: The figure illustrates the gender differences in belief updates in response to negative health information, distinguishing between updates for oneself and for spouse. Error bars represent 90% confidence intervals.

Tables

Table 1 Summary Statistics: Empirical Sample

Variable	Obs	Mean	SD	Min	Max
Panel A: Male Insureds					
Insurance amount	54,843	364,454	133,563	10,000	660,000
Spouse purchase	54,843	0.34	0.47	0	1
For both	54,843	0.16	0.37	0	1
Insured age	54,843	33.2	6.01	18	60
Policy duration	54,843	66.4	13.8	19	88
Number of endorsements	54,843	0.09	0.35	0	2
Policy status	54,843	1.02	0.22	1	5
Contribution period	54,843	27	5.01	1	30
Ever rejected	54,843	0.039	0.19	0	1
COVID-19	54,843	0.87	0.34	0	1
Hospital visit	28,745	0.042	0.2	0	1
Midnight phone use	12,347	0.43	0.49	0	1
Panel B: Female Insureds					
Insurance amount	57,777	349,172	132,857	10,000	610,000
Spouse purchase	57,777	0.15	0.36	0	1
For both	57,777	0.15	0.35	0	1
Insured age	57,777	32.3	6.03	18	60
Policy duration	57,777	67.8	13.4	18	88
Number of endorsements	57,777	0.063	0.28	0	2
Policy status	57,777	1.01	0.2	1	5
Contribution period	57,777	26.9	5.06	1	30
Ever rejected	57,777	0.018	0.13	0	1
COVID-19	57,777	0.88	0.32	0	1
Hospital visit	29,555	0.07	0.26	0	1
Midnight phone use	12,841	0.44	0.5	0	1

Notes: This table presents the summary statistics of the main variables for male (Panel A) and female (Panel B) insureds in the empirical analyses. Insurance amount is the policy coverage (sum insured) of a critical illness insurance contract. Spouse purchase is 1 if the applicant is the spouse of the insured; 0 if the applicant and the insured are the same person. For both is 1 if the applicant purchased the CI insurance for both oneself and one's spouse; 0 otherwise. Insured age is the age of the insured when applying for the CI insurance. Policy duration is the maximum possible coverage years of the CI insurance policy. Number of endorsements is the number of policy endorsements. Policy status includes valid, surrendered by agreement, surrendered according to policy terms, terminated by claims, and terminated by other reasons. Contribution period is the scheduled years of CI insurance premium payments. Ever rejected is 1 if the insured was previously rejected by the insurtech company, and 0 otherwise. COVID-19 is 1 if the CI insurance policy was applied after January 20th, 2020, i.e. the outbreak time of COVID-19 in China; 0 otherwise. Hospital visit is 1 if the insured visited a hospital in the past half a year proceeding her CI insurance application, and 0 if the insured did not visit a hospital. Midnight phone use is 1 if the insured had used a smartphone between 0:00 am and 4:59 am over the 90 days preceding their CI insurance application, and 0 if had not.

Table 2 The Impact of Negative Health Signals on Insurance Amounts by Gender of Insureds

Dep. Var.:	Insurance Amounts (log)					
Neg. Signal:	COVID-19		Hospital Visit		Midnight Phone Use	
	Male Insureds	Female Insureds	Male Insureds	Female Insureds	Male Insureds	Female Insureds
	(1)	(2)	(3)	(4)	(5)	(6)
ForSpouse×NegSignal	0.030***	-0.013	0.059**	0.007	0.030*	-0.005
	(0.010)	(0.013)	(0.025)	(0.024)	(0.015)	(0.024)
NegSignal	-0.001	0.012	-0.012	0.010	-0.009	-0.014
	(0.014)	(0.015)	(0.018)	(0.008)	(0.008)	(0.009)
ForSpouse	-0.006	0.011	0.018***	0.002	0.014	0.024
	(0.008)	(0.013)	(0.006)	(0.008)	(0.012)	(0.017)
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Policy characteristics FE	Yes	Yes	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes	Yes	Yes
Disease risk FE	Yes	Yes	Yes	Yes	Yes	Yes
Occupation risk FE	Yes	Yes	Yes	Yes	Yes	Yes
City-year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	53,741	56,638	28,034	28,532	11,624	12,092
R-square	0.391	0.394	0.407	0.425	0.444	0.440

Notes: This table presents the impact of negative health signals on the insurance purchasing behavior between spouse. We adopt three proxies for negative health signals: whether the insurance purchase was in the period after the outbreak of COVID-19 on January 20, 2020 (Columns 1-2), whether the insured had hospital visits in the past half year before the insurance purchase (Columns 3-4), and whether the insured had records of midnight phone use in the past 90 days of the insurance purchase (Columns 5-6). For each proxy, we show the results for male and female insureds in separate columns. All specifications include a comprehensive set of fixed effects: (1) the insured's age (as an integer), (2) product ID, (3) policy characteristics—including policy duration (as an integer), policy status, the number of endorsements , contribution period (as an integer), and whether the application was rejected, (4) disease and occupation risk groups, and (5) city-by-year-by-month fixed effects. Regression model is specified in Equation (1). Robust standard errors, shown in parentheses, are clustered at the city level. *** p <0.01, ** p <0.05, * p <0.1.

Table 3 Summary Statistics: Experiment Sample

Variable	Obs	Mean	SD	Min	Max
Panel A: Main Variables					
Believe update	3,481	8.96	9.44	0	28
Male respondent	3,481	0.50	0.50	0	1
For spouse	3,481	0.50	0.50	0	1
Negative information	3,481	0.51	0.5	0	1
Neutral information	3,481	0.26	0.44	0	1
Positive information	3,481	0.23	0.42	0	1
Panel B: Control Variables					
Age	3,481	34.4	8.28	21	63
Marriage year	3,481	8.04	8.13	0	38
Education level	3,481	3.02	0.59	1	4
Children	3,481	0.93	0.7	0	3
Income level	3,481	3.41	1.13	1	6
Chronic disease	3,481	0.06	0.24	0	1
Hospital visit	3,481	1.02	1.12	0	5
Health examination	3,481	2.32	0.74	1	4
Risk preference	3,481	3.44	1.66	1	6
Exercise	3,481	2.31	0.98	1	4
Exercise peer	3,481	2.81	0.99	1	4
Cancer risk	3,481	27.4	21.4	0	100
Hospitalization risk	3,481	3.17	2.18	0	10
Respondent first	3,481	0.52	0.5	0	1
Improper update	3,481	0.15	0.36	0	1

Notes: This table presents the summary statistics of the variables in the experimental analyses. Detailed variable definitions are provided in Appendix Table B3. The sample is cross-sectional, and an observation is a respondent or a respondent's spouse (i.e. the individual). The experiment is conducted as follows. (i) 2000 married respondents with half men, half women and no cancer history are randomly selected in Beijing. (ii) For each respondent and each respondent's spouse, we hypothetically form a randomly selected 10-person group of the same age and gender (including the respondent or the respondent's spouse). (iii) We then ask the respondent "What do you believe is the probability that your (or your spouse's) chance of having cancer is higher than half of the people in the 10-person group?" (iv) We inform the respondent that recent studies show that increasing physical exercises substantially reduces the risk of developing various types of cancer. (v) Respondents choose one of the other nine people in their own group (or one in their spouses' group) and are informed about the selected persons' weekly exercise routine. (vi) Respondents estimate the probability again for the same question in Step (iii).

Table 4 Health Information and Belief Updating between Spouses

Dep. Var.:	Belief Update					
	Full Sample		Exclude Neutral Info.		Exclude Neutral Info. & Improper Updates	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Female Respondents (Wives)						
ForSpouse×NegativeInfo	3.002**	3.091**	3.048**	3.165**	3.046*	3.201*
	(1.448)	(1.445)	(1.427)	(1.423)	(1.828)	(1.835)
ForSpouse	-1.317	-1.210	-1.503	-1.426	-1.385	-1.314
	(1.204)	(1.199)	(1.201)	(1.193)	(1.583)	(1.573)
NegativeInfo	-0.658	-0.391	-0.115	0.081	-0.754	-0.313
	(2.210)	(2.197)	(2.156)	(2.142)	(2.758)	(2.755)
ForSpouse×NeutralInfo	2.274	1.988				
	(1.821)	(1.817)				
NeutralInfo	-2.921*	-2.593				
	(1.674)	(1.659)				
Observations	1,737	1,700	1,269	1,237	1,026	1,000
Pseudo R-square	0.0281	0.0281	0.0309	0.0316	0.0202	0.0207
Panel B: Male Respondents (Husbands)						
ForSpouse×NegativeInfo	1.275	1.544	1.173	1.437	1.293	1.482
	(1.551)	(1.556)	(1.547)	(1.551)	(1.883)	(1.891)
ForSpouse	-0.533	-0.682	-0.570	-0.723	-0.460	-0.488
	(1.264)	(1.266)	(1.283)	(1.284)	(1.582)	(1.588)
NegativeInfo	2.361	2.193	3.140	2.979	3.308	3.121
	(2.260)	(2.263)	(2.265)	(2.272)	(2.917)	(2.911)
ForSpouse×NeutralInfo	2.861	2.985				
	(1.920)	(1.932)				
NeutralInfo	-0.500	-0.467				
	(1.796)	(1.801)				
Observations	1,744	1,725	1,303	1,290	1,022	1,014
Pseudo R-square	0.0349	0.0347	0.0345	0.0348	0.0264	0.0271
Trust only		Yes		Yes		Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents how respondents updated their beliefs about their own and their spouses' health risk in response to different types of health information. Panels A and B report results for female and male respondents, respectively. In both panels, we use three different samples: the full sample, subsample excluding those who received neutral exercise information, and subsample excluding both who received neutral exercise information and who made the wrong direction of updates (i.e. improper updates). Columns (2), (4), and (6) present the same analyses as Columns (1), (3), and (5), but restricted to respondents who believe the cancer information and find the exercise information helpful. Control variables include two sets of factors. The first set pertains to the demographics of the individual about whom respondents update beliefs, including age, gender, years of marriage, education level, number of children, income level, health status, and risk preferences. The second set relates to belief updating and includes the individual's exercise routine, the exercise routine of the selected individual in the 10-people group of the same age and gender, the order of belief elicitation, respondents' prior beliefs, and whether respondents updated beliefs in the right direction. Regression model is specified in Equation (2). Robust standard errors, shown in parentheses, are clustered at the respondent level. *** p <0.01, ** p <0.05, * p <0.1.

Table 5 Experimenter Demand Effect

Dep. Var.:	Belief Update						
Indicator of Experimenter Demand:	(1) Behave as others wish	(2) Important to fit in	(3) Good intuition for others' motives	(4) NOT express true feelings	(5) Regulate my actions	(6) Change opinions to please someone	(7) Self-monitoring mean
Panel A: Female Respondents (Wives)							
ForSpouse×NegInfo×Indicator	1.129	0.483	0.665	0.256	-0.466	-0.486	-1.872
	(1.367)	(1.315)	(1.401)	(1.375)	(1.354)	(2.875)	(1.486)
Observations	1,737	1,737	1,737	1,737	1,737	1,737	1,737
R-square	0.0283	0.0286	0.0295	0.0285	0.0287	0.0291	0.0299
Panel B: Male Respondents (Husbands)							
ForSpouse×NegInfo×Indicator	2.521	1.019	0.640	-1.033	2.140	1.481	4.421
	(1.536)	(1.602)	(1.570)	(1.586)	(1.379)	(1.560)	(3.211)
Observations	1,744	1,744	1,744	1,744	1,744	1,744	1,744
R-square	0.0360	0.0353	0.0356	0.0352	0.0354	0.0353	0.0355
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table performs a robustness check by integrating variables from the Self-Monitoring Scale, along with their interactions with Spouse and Negative information. If demand effects are present, they should differentially affect people who are more able to detect the intent of the study and are more willing to change their choices given the experimenter's intent. We proxy for this ability using the self-monitoring scale. We control for the same set of individual fixed effects as in Table 4. Robust standard errors, shown in parentheses, are clustered at the respondent level. *** p <0.01, ** p <0.05, * p <0.1.

Online Appendix for "Gender Differences in Learning About Spouse's Health: Field and Experimental Evidence"

Ruo Jia[*] Jiawei Mo[†] Chang Zhang[‡] Jiakun Zheng[§]

In this appendix, we collect the analyses, discussions, data descriptions, figures, and tables omitted from the main text.

Appendix A Critical Illness Insurance **A2**

Appendix B Additional Tables and Figures **A3**

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Appendix A Critical Illness Insurance

Critical illness (CI) insurance, also known as "dreadful disease" insurance, provides a lump-sum payment upon the first-time diagnosis of a list of severe or critical conditions (see Gatzert and Maegebier (2015) for a review). Pioneering cancer policies in the United States, Israel, and Japan contributed to the development of such insurance products (Dash and Grimshaw, 1993). CI insurance was first introduced in 1983 in South Africa, covering the four most common critical illnesses: cancer, heart attack, stroke, and coronary artery bypass surgery.

Unlike traditional health insurance, which primarily covers medical procedures and hospitalization costs, CI insurance is designed to provide a lump-sum payment upon the first diagnosis of a list of specified critical illnesses. This approach offers immediate financial relief, enabling policyholders to manage various expenses that may arise from severe health conditions, including medical and non-medical costs such as loss of income, home care, or travel for treatment. The primary goal is to address gaps in the coverage provided by traditional health and disability insurance policies.

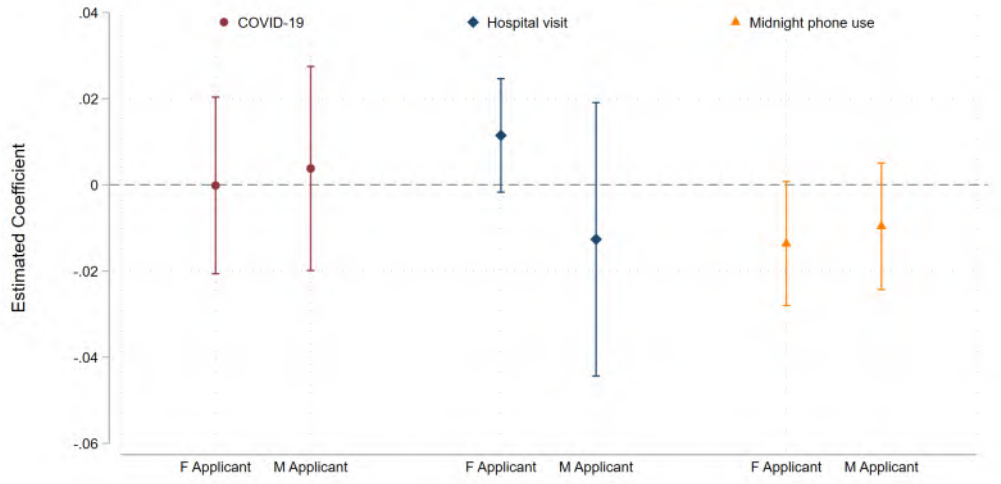
CI insurance in China has emerged as a pivotal financial tool that addresses the protection gaps left by the public health insurance system. The rising cost of healthcare, an aging population, and increasing awareness of health risks have contributed to the growing demand for comprehensive health coverage and, therefore, CI insurance in China. Additionally, the limitations of public insurance, such as co-payments, caps on reimbursements, and coverage restrictions, have made private CI insurance an attractive complement to public coverage. The product's ability to provide a financial safety net for high-cost illnesses like cancer, heart disease, and stroke has resonated with consumers seeking to mitigate the financial burden of such diagnoses.

The CI insurance market in China has seen significant growth. According to a report by Swiss Re Institute,[1] critical illness insurance generates CNY 435 billion (USD 63 billion) in premiums in 2020, accounting for almost half (47%) of the health insurance market in China, cementing its position as a cornerstone of the health insurance market and providing valuable data for research. For example, Eling et al. (2017), utilizing a comprehensive dataset of group critical illness insurance from a major life and health insurance company in China, suggests that group insurance alone may not effectively mitigate adverse selection challenges in the market. The market is highly competitive, with numerous insurers offering CI insurance. In 2007, the Insurance Association of China and the Chinese Medical Doctor Association defined a list of 25 critical diseases, which has since been widely adopted across the Chinese CI insurance market.

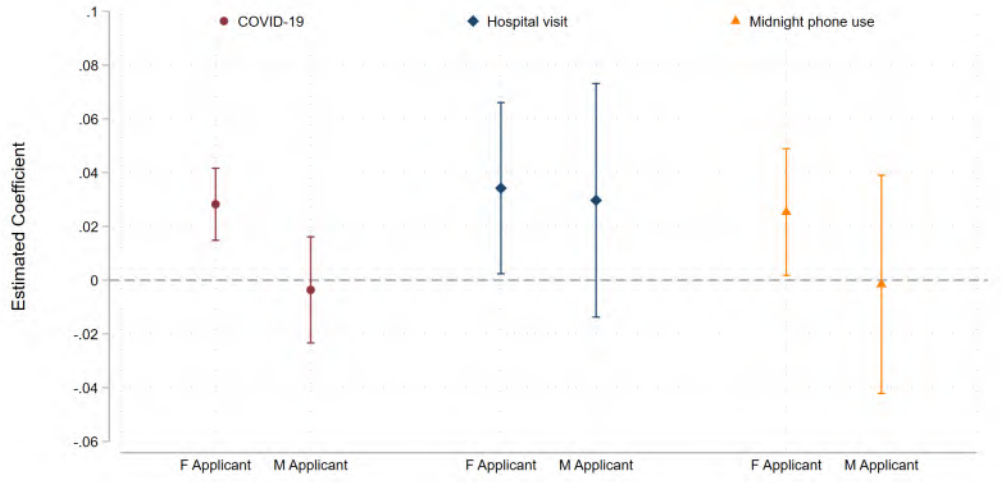
In the United States, CI insurance is commonly offered as riders to other insurance contracts or integrated within policy structures. Many life insurance policies include an Accelerated Benefit Rider, which allows the insurer to advance a portion of the life insurance benefits if the insured experiences a severe illness or injury. Some specified disease insurance provides coverage for a single critical illness, such as cancer, heart attack, or stroke.

1. For further details, see https://www.swissre.com/institute/research/topics-and-risk-dialogues/china/critical-illness-insurance-in-china.html (2022)

Appendix B Additional Tables and Figures



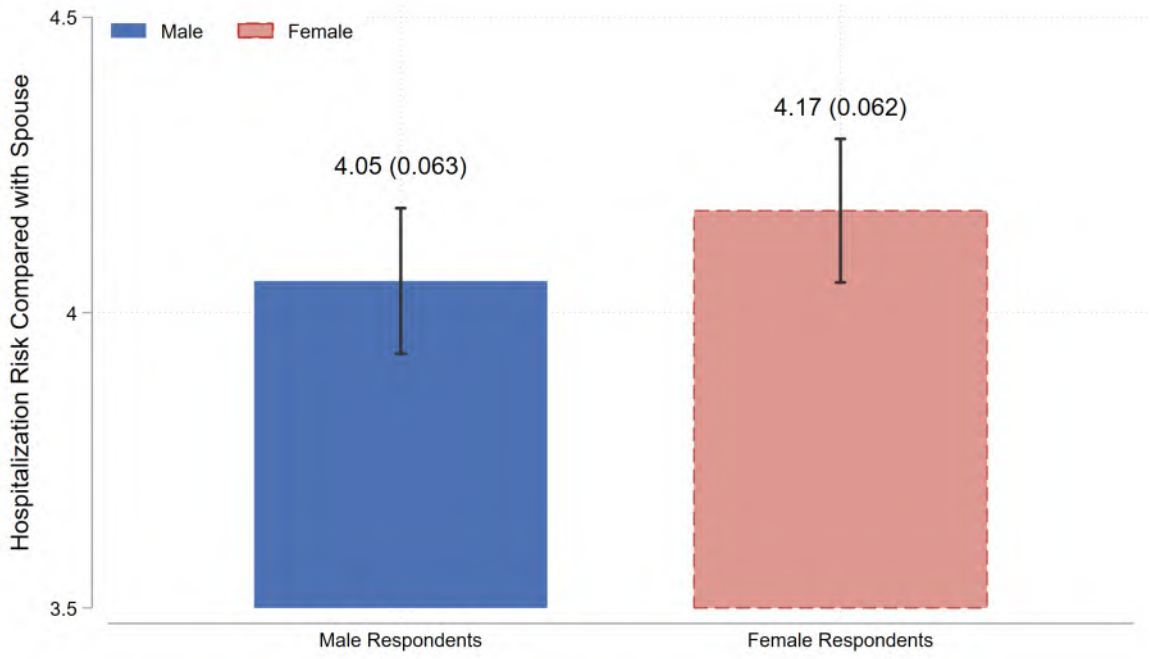
(A) For Self



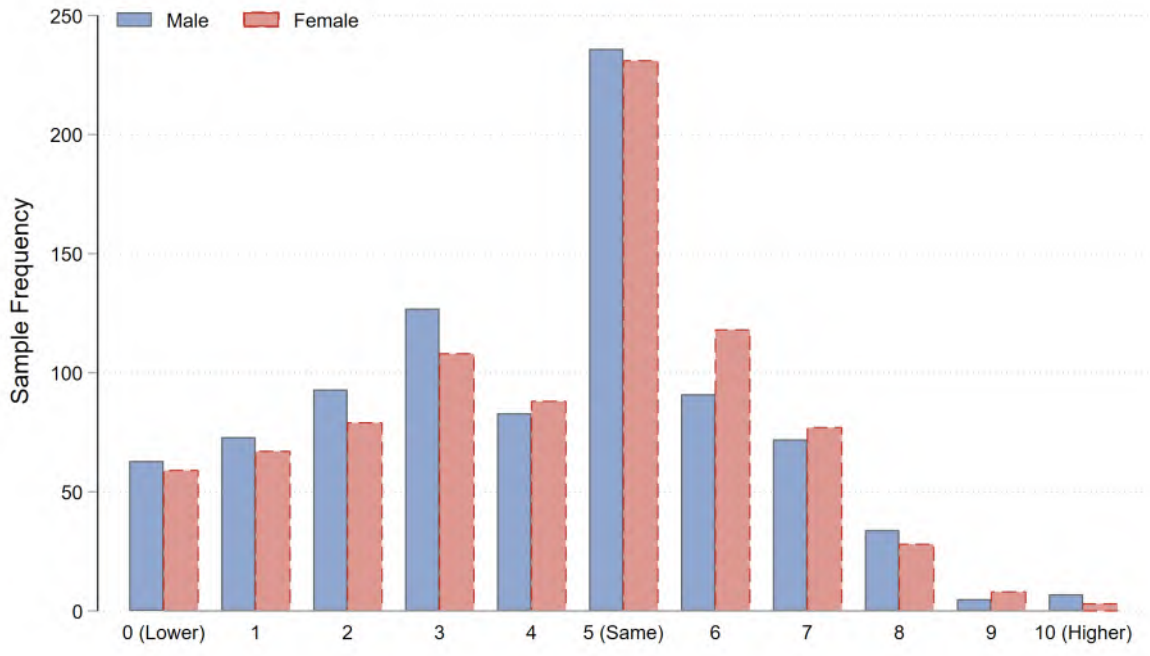
(B) For Spouse

Figure A1 Gender Differences in Insurance Purchases in Response to Negative Health Signals: By Applicants

Notes: The figure illustrates the impact of self purchases (Panel A) and spouse purchases (Panel B) on insurance amounts in response to negative health signals, distinguishing between male and female applicants. The figure examines three distinct negative health signals: COVID-19, hospital visits, and midnight cellphone usage. Each signal is denoted by a unique shape and color for clarity: maroon circles signify COVID-19, blue diamonds represent hospital visits, and orange triangles indicate midnight phone usage. Error bars represent 90% confidence intervals.



(A) Group Means



(B) Distribution

Figure A2 Overconfidence of Health Risk Comparing Oneself with One's Spouse: Male versus Female Respondents

Notes: This figure compares the perception of hospitalization risk comparing between oneself with one's spouse. Male respondents are in blue bars and female respondents are in red bars.

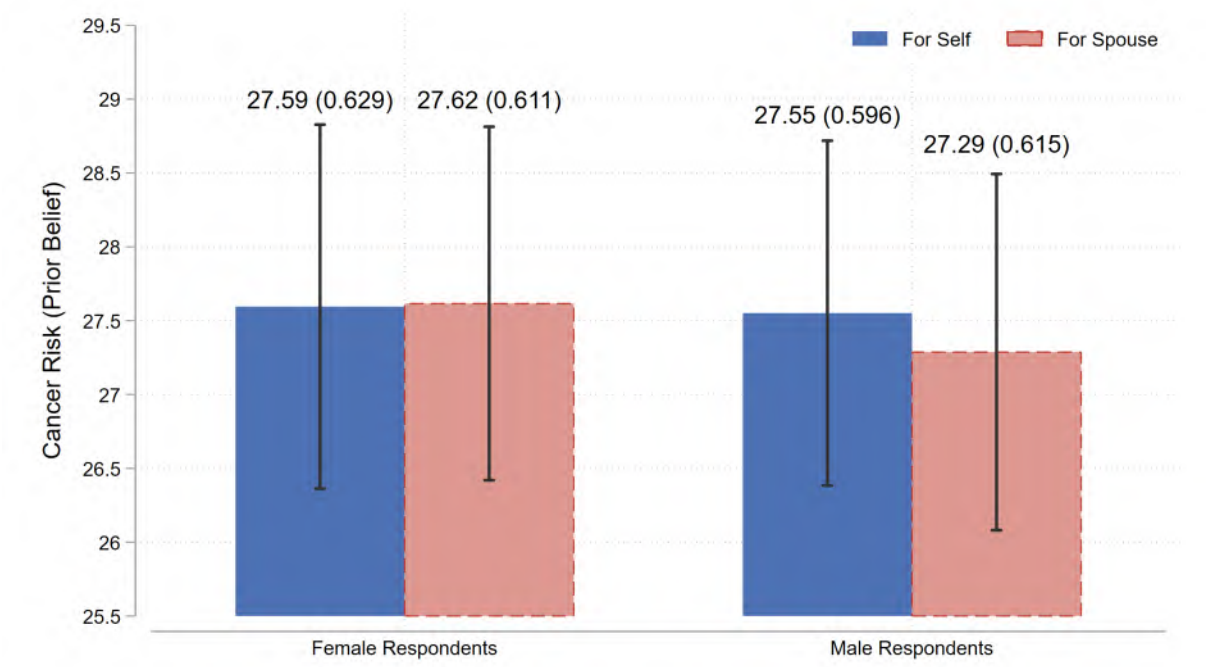
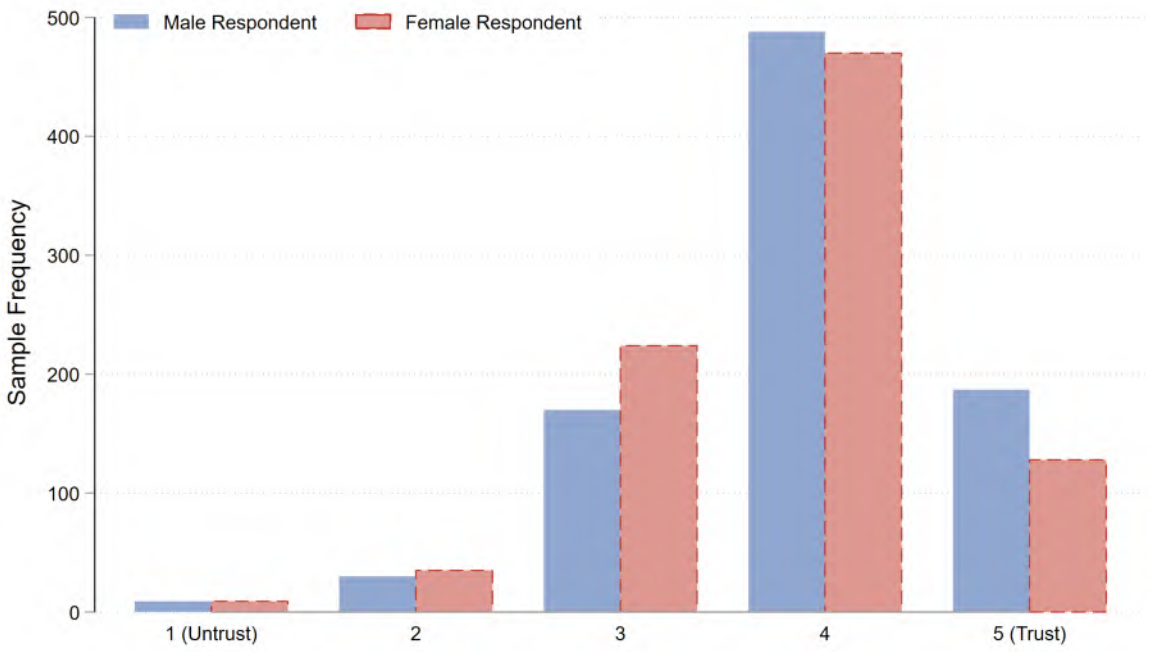
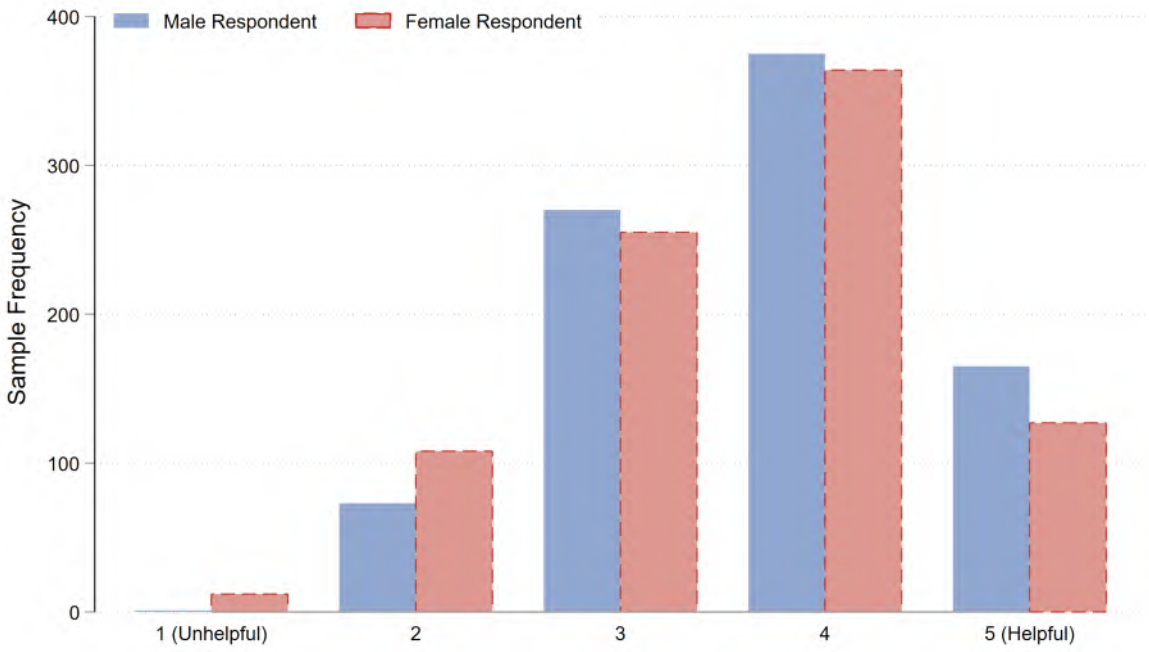


Figure A3 Prior Belief of Cancer Risk between Gender and Spouses: Comparing with the Population Average

Notes: This figure presents a bar chart comparing between individuals' prior belief of their own cancer risk (blue bars) and those of their spouses (red bars). The estimates control for the same set of control variables as in Equation (2). We report the mean values and the standard errors are in parentheses. Error bars indicate 95% confidence intervals.



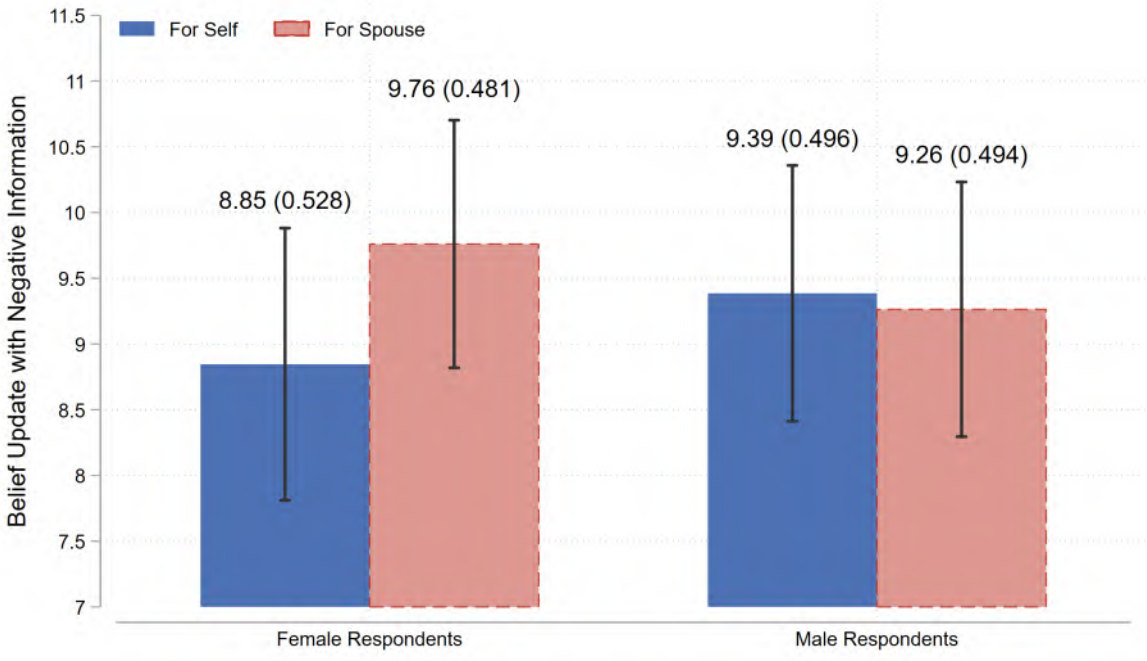
(A) To What Extent Do You Believe the Cancer Information?



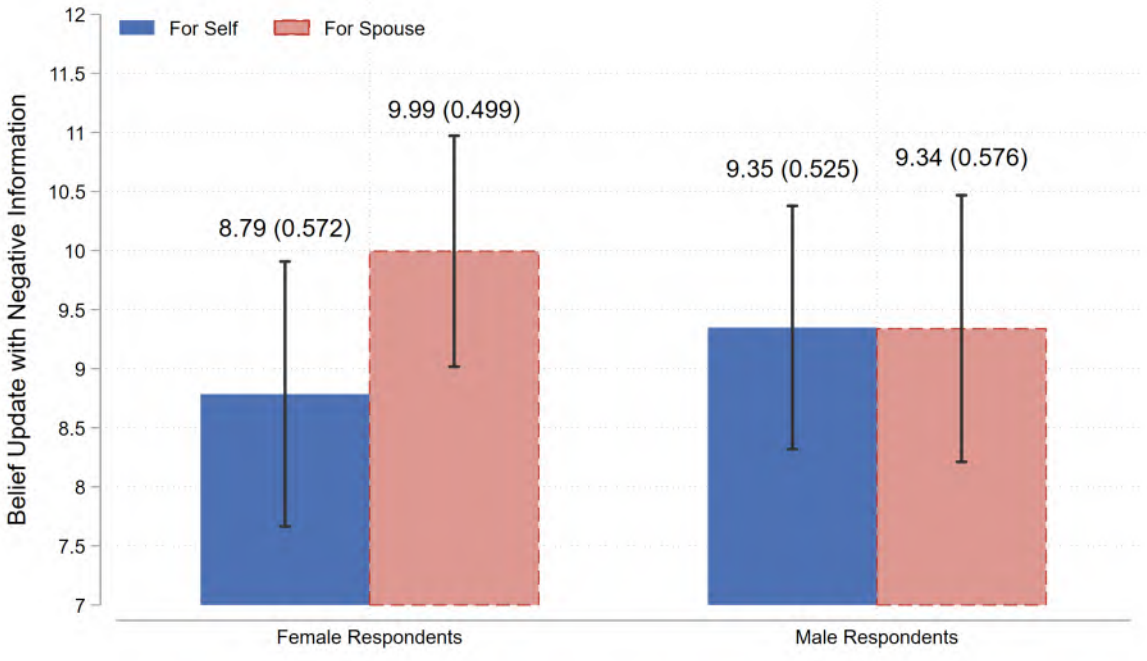
(B) To What Extent Do You Find the Exercise Information Helpful?

Figure A4 Information Trustfulness and Helpfulness: Male versus Female Respondents

Notes: This figure presents a bar chart comparing the trustfulness and helpfulness of the information between male (blue bars) and female (red bars) respondents.



(A) Respondents Who Highly Believe the Cancer Information



(B) Respondents Who Find the Exercise Information Much Helpful

Figure A5 Belief Updates with Negative Health Information: Restricting to Respondents Who Believe the Information and Find It Helpful

Notes: This figure presents a bar chart comparing the belief updates in response to negative exercise-related information for male and female respondents, distinguishing between those for oneself (blue bar) and for spouses (red bar). We restrict the sample to respondents who highly believe the cancer information (Panel A) and find the exercise information much helpful (with ranking greater than 60%, Panel B). The estimates control for the same set of control variables as in Equation (2). We report the mean values and the standard errors are in parentheses. Error bars indicate 95% confidence intervals.

Table B1 Insurance Premium Payer and Decision Maker

		Decision Maker				Total
		Self	Spouse	Joint Decision	Others	
Applicant - Purchaser	Self	714 [84%]	54 [13%]	163 [51%]	42 [23%]	973 [55%]
	Spouse	101 [12%]	348 [85%]	126 [39%]	15 [8%]	590 [34%]
	Others	31 [4%]	8 [2%]	31 [10%]	124 [69%]	194 [11%]
Total		846 [100%]	410 [100%]	320 [100%]	181 [100%]	1,757 [100%]

Notes: This table demonstrates the relationship between who is the applicant and thus paid the insurance premiums (self, spouse, among others) and who made the decision to purchase the critical illness insurance (self, spouse, joint decision, and others) according to our survey. In the survey, we asked both questions on who made the insurance purchase decision and who paid the insurance premium. Each cell includes the number of observations and its proportion in the corresponding group of decision makers (shown in brackets).

Table B2 Variable Definition of Empirical Sample

Variable	Definition
Panel A: Policy Variables	
Insurance amount	The policy coverage (sum insured) of a critical illness insurance contract.
Spouse purchase	1 if the applicant is the spouse of the insured; 0 if the applicant and the insured are the same person.
For both	1 if the applicant purchase the CI insurance for both oneself and one's spouse; 0 if the applicant purchase only for oneself or one's spouse.
Insured male	1 if an insured is male; 0 if female.
Insured age	Age of the insured when applying for the CI insurance.
Policy duration	Coverage years of the CI insurance policy.
Number of endorsement	Number of policy endorsements.
Disease risk	Estimated disease risk categories provided by the insurtech company based on their own models, including no, low, medium, and high disease risk, among four other minor categories.
Occupational risk	Estimated occupational risk categories provided by the insurtech company based on their own models, including low, medium-low, medium, medium-high, and high occupational risk, among two other minor categories.
Policy status	The status of the CI insurance application. It is a categorical variable including valid, surrendered by agreement, surrendered according to policy terms, terminated by claims, and terminated by other reasons.
Contribution period	Scheduled years of CI insurance premium payments.
Ever rejected	1 if an insured has been rejected by the insurtech company before the valid CI insurance policy; 0 otherwise.
Panel B: Health Signals	
COVID-19	1 if the CI insurance policy was applied after January 20th, 2020, i.e. the outbreak time of COVID-19 in China; 0 otherwise. See an official report for a detailed timeline of the pandemic and pandemic-control measures at https://www.gov.cn/zhengce/2020-06/07/content_5517737.htm.
Hospital visit	1 if the insured visited a hospital in the past half a year proceeding her CI insurance application, as recorded in the public health insurance settlement system; 0 if the insured did not visit a hospital.
Midnight phone use	The number of days that the insured used a smartphone between 0:00 am and 4:59 am in the past 90 days of CI insurance application.
Panel C: Other Control Variables	
Product	Categorical variable of eight products provided by three insurers.
City	Prefecture-level city of the insured at the time of the CI insurance application.

Notes: This table presents the definitions of variables in the empirical sample. The sample is cross-sectional and each observation is a valid CI insurance policy. The sample period is from November 2019 to January 2021, according to the date of insurance applications.

Table B3 Variable Definition of Experiment Sample

Variable	Definition
Panel A: Main Variables	
Belief update	The absolute difference between the answers to the question "What do you believe is the probability that your (or your spouse's) chance of having cancer is higher than half of the people in your 10-person group?" before and after providing the weekly exercise information of a randomly selected peer from the 10 people group.
For spouse	1 if an observation captures information of a respondent's spouse, and 0 if the observation captures the information of a respondent.
Negative information	1 if the randomly selected peer exercises more than the respondent (or respondent's spouse); 0 otherwise.
Neutral information	1 if the randomly selected peer exercises the same as the respondent (or respondent's spouse); 0 otherwise.
Positive information	1 if the randomly selected peer exercises less than the respondent (or respondent's spouse); 0 otherwise.
Panel B: Control Variables	
Age	Age of the respondent (or respondent's spouse).
Marriage year	The duration of the respondent's current marriage. Education level Categorical variable: 1 if secondary school graduate or below, 2 if high school graduate, 3 if college graduate or bachelor's degree, and 4 if master's or doctoral degree.
Children	Categorical variable: 0 if the individual has no child, 1 if one child, 2 if two children, and 3 if three or more children.
Income level	Categorical variable: 1 if the annual income of the individual is CNY 10,000 or below; 2 if CNY 10,001-50,000; 3 if CNY 50,001-100,000; 4 if CNY 100,001-200,000; 5 if CNY 200,001-300,000, and 6 if more than CNY 300,000. Chronic disease 1 if the individual has one or more chronic diseases; 0 otherwise. Hospital visit Counts of hospital visits in one year prior to the survey; 5 if 5 times or more.
Health examination	Categorical variable: 1 if the individual conducts health examinations every six months or less, 2 if every year, 3 if every two years, and 4 if less frequently than every two years.
Risk preference	The respondent chooses a lottery option for oneself and one's spouse. Categorical variable: 1 if the individual prefers CNY 280 (50%), CNY280 (50%) to the other 5 lotteries; 2 if CNY 240 (50%), CNY 360 (50%); 3 if CNY 200 (50%), CNY 440 (50%); 4 if CNY 160 (50%), CNY 520 (50%); 5 if CNY 120 (50%), CNY 600 (50%); 6 if CNY 20 (50%), CNY 700 (50%). See Dave et al. (2010) and Eckel and Grossman (2008) for more details.
Exercise	Categorical variable: 1 if the individual exercises less than one hour a week; 2 if 1 (inclusive) to 3 (exclusive) hours a week; 3 if 3 (inclusive) to 5 (exclusive) hours a week; and 4 if 5 hours or more a week.
Exercise peer	Categorical variable: 1 if the selected peer exercises less than one hour a week; 2 if 1 (inclusive) to 3 (exclusive) hours a week; 3 if 3 (inclusive) to 5 (exclusive) hours a week; and 4 if 5 hours or more a week.
Cancer risk	The probability for the following question "What do you believe is the probability that your (or your spouse's) chance of having cancer is higher than half of the people in the 10-person group?" before providing any additional exercise information.
Hospitalization risk	The respondents' estimated likelihood of hospitalization due to illness in the next year, comparing their own and their spouses' risks with the average risk of the same age and gender in the general population. It uses an eleven-point Likert scale ranging from 0 to 10, with 0 means least likely, 5 means equally likely, and 10 means most likely.
Respondent first	1 if the respondent updates information for oneself first and then for one's spouse; 0 if the respondent updates information for one's spouse first and then for oneself.
Improper update	1 if the respondent estimates a lower (higher) probability of having cancer after receiving negative (positive) information.

Notes: This table presents the definitions of variables in the experiment sample.

Table B4 Robustness: Excluding Individuals Who did not Update

Dep. Var.:	Belief Update					
	Full Sample		Exclude Neutral Info.		Exclude Neutral Info. & Improper Updates	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Female Respondents (Wives)						
ForSpouse×NegativeInfo	2.386**	2.457**	2.415**	2.465**	2.394	2.359
	(1.185)	(1.181)	(1.201)	(1.193)	(1.471)	(1.466)
ForSpouse	-1.884*	-1.841*	-1.998*	-1.916*	-2.437*	-2.231*
	(0.996)	(0.998)	(1.018)	(1.017)	(1.286)	(1.277)
NegativeInfo	-1.206	-1.006	-1.131	-0.941	-3.105	-2.674
	(1.681)	(1.669)	(1.659)	(1.652)	(2.060)	(2.059)
Observations	1,153	1,133	896	879	653	642
R-square	0.0149	0.0150	0.0154	0.0159	0.0134	0.0134
Panel B: Male Respondents (Husbands)						
ForSpouse×NegativeInfo	-0.327	-0.154	-0.664	-0.480	-1.538	-1.492
	(1.285)	(1.287)	(1.313)	(1.315)	(1.458)	(1.459)
ForSpouse	0.186	0.046	0.461	0.298	1.458	1.449
	(1.024)	(1.021)	(1.066)	(1.061)	(1.212)	(1.212)
NegativeInfo	1.866	1.822	2.553	2.507	1.789	1.947
	(1.792)	(1.798)	(1.829)	(1.841)	(2.206)	(2.207)
Observations	1,226	1,216	965	956	684	680
R-square	0.0164	0.0169	0.0188	0.0196	0.0196	0.0198
Trust only		Yes		Yes		Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table displays the results of a robustness test conducted in Table 4. We excluded individuals who did not update their information. Panels A and B report results for female and male respondents, respectively. In both panels, we use three different samples: the full sample, subsample excluding those who received neutral exercise information, and subsample excluding both who received neutral exercise information and who made the wrong direction of updates (i.e., improper updates). Columns (2), (4), and (6) present the same analysis as Columns (1), (3), and (5), but restricted to respondents who believe the cancer information and find the exercise information helpful. Control variables include two sets of factors. The first set pertains to the demographics of the individual about whom respondents update beliefs, including age, gender, years of marriage, education level, number of children, income level, health status, and risk preferences. The second set relates to belief updating and includes the individual's exercise routine, the exercise routine of the selected individual in the 10-people group of the same age and gender, the order of belief elicitation, respondents' prior beliefs, and whether respondents updated beliefs in the right direction. Regression model is specified in Equation (2). Robust standard errors, shown in parentheses, are clustered at the respondent level. *** p <0.01, ** p <0.05, * p <0.1.