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Does personalized information improve health plan choices when individuals are distracted?

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Abstract

Choice-based health insurance systems allow individuals to select a health plan that fits their needs. However, bounded rationality and limited attention may lead to sub-optimal insurance coverage and higher-than-expected out-of-pocket payments. In this paper, we study the impact of providing personalized information on health plan choices in a laboratory experiment. We seek to more closely mimic real-life choices by randomly providing an incentivized distraction to some individuals. We find that providing personalized information significantly improves health plan choices. The positive effect is even larger and longer-lasting if individuals are distracted from their original task. In addition to providing decision support, receiving personalized information restores the awareness of the choice setting to a level comparable to the case without distraction thus reducing inertia. Our results indicate that increasing transparency of the health insurance system and providing tailored information can help individuals to make better choices and reduce their out-of-pocket expenditures.

JEL Classification: I13, D83, C91

Keywords: health insurance choice; decision under uncertainty; limited attention; information; laboratory experiment

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1 Introduction

Health insurance expenditures place a substantial burden on household budgets. For example, a typical household in the United States spends approximately 5% of pre-tax income on health insurance (Bureau of Labor Statistics 2016). In the European Union, where basic health insurance is mostly mandatory, household spending on health insurance relative to disposable income amounts to approximately 8% in Germany and the Netherlands, and 7% in France and Belgium (Eurostat 2016). In Switzerland, expenditures for basic health insurance amount to approximately 6% of disposable income and almost 10% if out-of-pocket health expenditures are taken into account. Households with low socio-economic status face even higher relative costs, up to 20% in the lowest income quintile (Federal Statistical Office 2013). Despite the financial importance for households, 17% of the Swiss population are not able to give exact details about their health insurance plan (Federal Statistical Office 2012). In a representative survey of the Swiss population conducted in 2015 (Boes et al. 2015), more than 40% of the respondents reported that choosing health insurance is difficult because of the many health insurers and plans offered in the market. The low health insurance literacy exhibited by a non-negligible part of the population is not specific to the Swiss system, with similar discrepancies being observed for other countries such as the United States (Loewenstein et al. 2013).

Choice-based health insurance systems, such as that in Switzerland rely on the ability of individuals to choose a health plan that fits their health care needs and preferences. However, a rich body of economic and psychological literature casts doubt on the ability of individuals to choose optimally and consistently in situations of risk and uncertainty (e.g., Kahnemann 1973; Kahneman and Tversky 1979; Hirshleifer and Teoh 2003; see Kunreuther et al. 2016 for an overview in the domain of health insurance). The number of choice options, switching costs, myopic preferences, menu and framing effects, probability weighting and limited consumer information have been studied as potential determinants of health plan choices (e.g., Schram and Sonnemans 2011; Abaluck and Gruber 2011; Ketcham et al. 2012; Heiss et al. 2013; Barseghyan et al. 2013; Bhargava et al. 2015; Handel and Kolstad 2015; Schmitz and Ziebarth 2016). Van

Winssen et al. (2016) provide several behavioral explanations for the low uptake of voluntary deductibles in basic health insurance in the Netherlands. They suggest that providing specific information regarding the health insurance system or the individuals' health care expenditures may improve health insurance competence and, thus, decrease inertia. Heiss et al. (2016) test two different sources of inertia in Medicare Part D, namely switching costs and inattention. They present evidence that inattention contributes substantially to inertia in health plan choices. This is supported by Eisler (2009) who finds that a substantial share of Swiss residents is not aware of the magnitude of price differences between health plans and the related savings potential, which is one reason for the individuals' low intention to switch health plans. The objective of our paper is to expand on this literature and to gain a better understanding of the role of personalized information and limited attention in health insurance decisions. As it is difficult to control for the choice environment and learn more about the mechanisms guiding decision-making with observational data, we implement a laboratory experiment.

Our contribution to the literature on health insurance choices is threefold. First, we investigate the effects of providing personalized information on health plan choices in a laboratory experiment. This setup allows us to isolate the impacts of specific information interventions by randomly assigning participants to treatment and control groups, thereby systematically eliminating endogeneity issues that are omnipresent in observational data (e.g., Frechette et al. 2015). Second, in contrast to existing experiments on health insurance choices (e.g., Schram and Sonnemans 2011), we introduce two new and relevant features in our design: (*i*) inertia and (*ii*) incentivized distraction. We allow for inertia by offering subjects the option to, at the end of each round, either adjust their insurance decision or to remain inactive and retain their previous insurance plan. Thus, we can exclude the possibility of potentially distorting effects of forcing individuals to make active decisions (e.g., Dhar and Simonson 2003). In addition, we contribute to the current discussion on inertia and inattention in health plan choices (e.g., Heiss et al 2016) as our results generate direct insights about the effects of information on attention and consequently plan choice quality. We also impose opportunity costs on the health plan decision by

allowing subjects to pursue an incentivized secondary task during each round. The rationale is to more closely mimic real-life choice situations where individuals have to allocate their attention to several competing tasks. We investigate how personalized information affects choice behavior and decision quality in this setup. Third, we observe not only the final insurance choice of an individual but also whether an individual made an active decision; we record the decision time, we document whether an individual changed contracts and whether expected costs were reduced, and we calculate the distance to the expected cost-minimizing contract in each round. These outcomes allow us to gain a better understanding of the mechanisms driving an individual's health plan choice in the experimental setup.

Our results suggest that providing personalized information has a positive effect on decision quality. Participants who received information on optimal health insurance coverage and potential cost savings had, on average, lower out-of-pocket expenditures for a given health status. Introducing an incentivized secondary task substantially reduced choice quality, as subjects moved further away from their optimal insurance coverage relative to subjects who were not distracted. This result may be explained by rational inattention because we observe a positive net effect on the individuals' bank account. Providing personalized information to individuals distracted by the incentivized secondary task had a strong and long-lasting positive effect on decision quality. The informed individuals selected better-suited health plans relative to those who were purely exposed to the distraction treatment. Regarding the underlying mechanisms, the effects seemed to operate mainly through the increased awareness of the choice setting and incorporation of the personalized information into the decision-making process. The latter is reflected in the finding that individuals more likely switched toward better-suited plans in the periods following the receipt of information than individuals who did not receive such information.

The remainder of the paper is organized as follows. Section 2 contextualizes our study in the broader literature on bounded rationality and limited attention. Section 3 briefly summarizes the main features of the Swiss health insurance system. Section 4 presents the hypotheses to be tested with our experiment. Section 5 describes the experimental design and data used for the

analysis. Section 6 presents an overview of the econometric methodology. Section 7 describes the main results and findings regarding the choice mechanisms. Section 8 concludes the paper.

2 Related literature

The study of individual choice behavior has been of interest to economists for many decades. Under the neoclassical economic paradigm, individuals are fully rational and process all relevant information to make choices that maximize their expected utility. Individual preferences are assumed to be domain-independent and time-consistent. It is also assumed that preferences only depend on own payoffs and are not influenced by framing (see DellaVigna 2009 for an overview). In the words of Thaler and Sunstein (2009, p.7), "[i]f you look at economics textbooks, you will learn that homo oeconomicus can think like Albert Einstein, store as much memory as IBM's Big Blue, and exercise the willpower of Mahatma Gandhi."

The growing literature on bounded rationality and evidence produced in both field and lab experiments on individual decision-making cast serious doubt on the neoclassical paradigm, which may lead in case of recurring decisions to inertia. In fact, studies on bounded rationality underline that decision-makers face three types of constraints that limit their ability to make utility-maximizing choices. First, decision-makers often only have unreliable or limited information available regarding the possible choice set and corresponding consequences. Second, the processing capacities of the human brain are limited, with some information being discarded and only subsets of the available information being selected for further processing. Third, decisions have to be made under time constraints. The implications of these constraints on individual decision-making have been studied in the psychological and economic literature. For example, Thaler (1981) shows that preferences can be time-inconsistent; Fehr and Gächter (2000) indicate that altruism plays an important role in individual decision-making; Kahneman and Tversky (1979) show that framing and reference points matter for choice behavior; Gabaix et al. (2006) indicate that heuristics are used to make difficult decisions, and Kahneman (1973) highlights that individuals have limited processing power and selective attention. In addition, there exists

comprehensive evidence on the effects of an individual's emotional states on choice behavior. For example, it has been shown that experimental subjects who are placed under stress make less economically rational decisions when forced to choose among different alternatives (Banerjee and Duflo 2011; van den Bos et al. 2009; Porcelli and Delgado 2009).

Regarding health plan choices, recent evidence from the United States and Europe suggests that insurance decisions often deviate from the predictions of the neoclassical model (e.g., Schmitz and Ziebarth 2016; Bhargava et al. 2015; Handel and Kolstad 2015; Heiss et al. 2013; Barseghyan et al. 2013; Ketcham et al. 2012; Abaluck and Gruber 2011; Schram and Sonnemans 2011). Among others, individuals tend to stick to sub-optimal plan choices. Earlier literature has explained this inertia mostly by the existence of switching costs (e.g., Abaluck and Gruber 2013; Ericson 2014). Polyakova (2016) accounts for preference heterogeneity and finds that reducing switching costs in Medicare Part D creates positive welfare effects by lowering the currently high rents of the insurance providers and increasing the consumer surplus in the market. In addition to switching costs, the literature has identified inattention as a key driver for inertia in Medicare Part D (e.g., Heiss et al. 2016; Ho et al. 2017). It is argued that inattention is an important source of inertia as not all consumers are evaluating all health plan alternatives every year so that attention triggers are necessary to induce individuals to re-optimize their plan choice.

Our research builds on this line of reasoning as we expect the provision of personalized information to increase attention and consequently reduce inertia. Similarly, theories of limited or selective attention posit that if individuals face a vast amount of information in a particular decision context, they direct their attention toward certain aspects of the choice setting, and discard other aspects (e.g., Kahneman 1973; Akerlof 1991; Hirshleifer and Teoh 2003; Köszegi and Szeidl 2013; Bordalo et al. 2015; Gabaix 2014). These theories are based on a comprehensive literature in psychology; see Pashler (1998) for an overview. However, the empirical evidence on the effect of limited attention on decision quality is still scarce and mainly focuses on financial investments (e.g., Corwin and Coughenour 2008; Barber and Odean 2008; Hirshleifer et al. 2009, 2011 Stango and Zinman 2014; or DellaVigna 2009 for a review).

As a remedy to limited attention, Sunstein and Thaler (2003) propose a form of libertarian paternalism that leaves individuals free choice but nudges them toward socially desirable options. Among other things, information nudges that reduce the costs of attention by reducing search and comparison costs are proposed (Fung et al. 2007; Hastings and Weinstein 2008; see Thaler and Sunstein 2009 for an overview). As Kling et al. (2012) state, the availability of relevant information does not necessarily imply that the information is also processed. Based on their field experiment, in which they randomly distribute personalized information about possible out-of-pocket savings in other insurance plans, they find that a simple treatment such as a personalized letter can significantly reduce comparison costs and lead to sizable cost savings. In another context, Hastings and Weinstein (2008) show that sending parents information about school quality increases the probability that they will send their child to a school with a higher average test score. This is the case despite the information on school quality being publicly available. A recent study by Karlan et al. (2016) shows that in the case of inattention, simple reminders can increase cost savings and individual utility. We contribute to this literature by analyzing the effects of personalized information on health plan choices in different choice environments and we shed light on the underlying choice mechanisms.

3 Institutional background

The health insurance system in Switzerland can be broadly classified as a managed competition model (Enthoven 1978). Basic health insurance is mandatory for all Swiss residents. At the end of each calendar year, individuals can freely choose among different health plans offered by private not-for-profit health insurance companies.[1] Insurers are obliged to accept any applicant irrespective of his/her risk factors. Coverage is determined by federal law and includes a wide range in- and outpatient services and pharmaceutical products.[2]

Premiums in the basic health insurance system are community-rated, i.e., they may vary

[1] Currently, approximately 60 private health insurance providers are active in the market for basic health insurance, each offering six deductible levels and up to four insurance models.

[2] In addition to not-for-profit basic health insurance, insurers are free to offer supplementary for-profit health insurance. In supplementary health insurance, companies have greater freedom with respect to coverage, premiums and enrollment criteria for the plans on offer (determined by a different law than basic health insurance).

across defined geographical areas but are not adjusted to individual risk factors such as gender, income and age (except for three general age groups[3]). Health plans and premiums for each year have to be approved by the Federal Office of Public Health in advance. Prices may vary across insurers based on the expected costs for the relevant year. Price differentiation within an insurance company is possible according to the specific plan that an individual chooses. Standard plans offer free choice of health care providers. In fact, health insurers have to contract with every licensed provider, and insurees can freely choose among them. Insurers can also offer managed care plans that restrict access to certain groups of providers which in exchange grant premium rebates. Approximately 63% of individuals living in Switzerland chose a restricted-access plan in 2014 (Federal Office of Public Health 2016).

Health plans also differ in their choice-based deductibles. For adults, six levels are available, ranging from CHF 300 to a maximum of CHF 2500.[4] Higher deductibles are associated with a reduction in the monthly premium. Reductions are determined by federal law, with the maximum premium reduction in the highest deductible level being at most 50%. In 2014, almost 60% of the insured individuals 19 years or older chose the lowest (44%) or second-lowest (15%) deductible. Almost 19% opted for the highest deductible (Federal Office of Public Health 2016). In addition to the deductibles, there is a 10% co-payment with a limit of CHF 700 per calendar year.[5] Thus, the yearly maximum out-of-pocket spending in basic health insurance is equal to the co-payments plus the deductibles; all health care costs above this amount are fully covered by insurance.

While there is ample evidence for moral hazard in the Swiss health care system (e.g., Trottmann et al. 2012; Gerfin et al. 2015; Boes and Gerfin 2016), evidence on choice behavior in the context of health insurance is still relatively scarce, with a few notable exceptions. Dormont et al. (2009) show that having supplementary insurance significantly reduces the likelihood of switching the basic health insurance due to selective contracting and additional administrative costs of having basic and supplementary insurance from two different providers. Frank and Lamiraud (2009) find

[3] Children aged 18 or younger, young adults aged 19-25, and adults aged 26 or older.

[4] Deductible levels for (young) adults are CHF 300, 500, 1000, 1500, 2000, and 2500. For children aged 18 and below, the deductible levels are between zero and CHF 600.

[5] For children, the maximum co-payment is CHF 350.

that the switching propensity in basic health insurance is lower with a higher number of available health plans, which is explained by means of choice overload. Wieser et al. (2011) state that some health plans with restricted access to health care providers may significantly increase switching costs as switching the health plan would require choosing a new health care provider. Kaufmann et al. (2017) find that the individuals' deductible choice is affected by the financial incentives incorporated in the payment modalities of the premium subsidies.

4 Hypotheses

The decision-making process of a rational and fully informed decision-maker should not be influenced by the available information being presented in alternative ways. Based on the above literature on bounded rationality, however, this prediction of the neoclassical model is unlikely to hold, e.g., due to information frictions or limited cognitive ability. In this study, we investigate whether information interventions in different health insurance choice environments can improve decision quality. By information, we refer to personalized information that helps the decision-maker to choose the optimal health plan given his/her health status and risk profile.

Our first hypothesis concerning the distribution of personalized information is the following:

Hypothesis I: Providing personalized information regarding optimal health insurance coverage and expected cost savings positively affects (*i*) decision quality and (*ii*) individual wealth.

Concerning the mechanisms by which personalized information potentially affects the decision-making process, we have the following expectation:

Hypothesis II: Personalized information (*i*) directly guides the attention to the health insurance choice, and (*ii*) lowers information and comparison costs, which is reflected in a lower average decision time.

A novelty of our study is to explore the impact of introducing opportunity costs in the choice context by allowing experimental subjects to pursue a secondary task, which is more strongly

incentivized than the health insurance choice. Our expectations for this part of the experiment are based on the rational inattention theory of Sims (1998, 2003):

Hypothesis III: Study participants facing a distraction (*i*) allocate less time to their health insurance choice than study participants not facing a distraction, which (*ii*) decreases the probability of making an active insurance decision, (*iii*) lowers the probability of switching to improving choice options, and consequently, (*iv*) leads to inferior decision quality.

Hypothesis IV: As inattention to health insurance is rational, we expect that the distracted study participants make higher earnings than the undistracted participants.

Under the setup with opportunity costs, we are interested in whether personalized information helps to mitigate the potentially negative effects of distraction. Based on the behavioral literature and related empirical studies, in particular Kling et al. (2012), we state the following hypothesis:

Hypothesis V: The negative effects of imposing opportunity costs on health insurance decisions are mitigated by providing personalized information by (*i*) improving choice quality and (*ii*) increasing individual wealth.

Concerning the mechanisms underlying hypothesis V, we expect that the predictions from hypothesis II hold. To test these hypotheses, we designed and programmed an experimental tool, which is described in greater detail in the next section.

5 Experimental design

5.1 Basic setup

The design of the laboratory experiment seeks to mimic some key features of the Swiss health insurance market, in particular that individuals have the option to adjust their health insurance decision once per year during an open enrollment period. Subjects participated in 12 rounds that resemble these periods. Between rounds, subjects were exposed to health shocks that occurred with certain probabilities. Individuals' risk profiles were characterized by the probabilities of

occurrence of four states of the world: The participant stays healthy (with probability 25%) or experiences one of three health shocks "A" (30%), "B" (27%) or "C" (15%), where "A" is a minor shock, "B" is a medium shock, and "C" is the most severe adverse health event. In every period, exactly one of the four states occurred, determined by a random number draw based on the risk profile. For all the participants, the risk profile remained stable over the 12 rounds. Financial consequences in terms of out-of-pocket payments increased with the severity of the health shock. Participants received a fixed income in every round, which was booked to their virtual bank account. To track changes in the bank account, participants viewed a "period screen" during each round, which gave them an overview of their financial situation, health insurance setting and risk profile (see Figure 1 for an example of a "period screen").

In line with the insurance setup in Switzerland, subjects had to be insured throughout the experiment. At the end of every round, participants faced the decision to either adjust their health insurance or remain inactive and maintain their previous contract for another period (inertia). If participants selected the first option, they were allowed to choose among insurance contracts that differ with respect to the deductible level and the premium paid (see Figure 2 below). Higher deductibles lead to higher premium rebates.[6] If study participants selected the second option, then they simply moved on to the next round with the same health insurance. Further information on the instructions provided to study participants can be found in Appendix A2 in the online appendix.

— Insert Figures 1 and 2 about here —

To ensure that individuals state their actual preferences, we incentivized their decisions by converting the cumulative amount of points they earned throughout the experiment into real money at the end of the session.[7] In line with a typical hourly salary of a student, participants received CHF 25 per hour on average in compensation.[8] This payment consisted of a show-up

[6] For all participants, the premiums of all health insurance contracts increased by 5% between rounds four and five and between rounds seven and eight. These price increases did not alter the ranking of the optimal plans and, therefore, study participants should not react to the premium changes.

[7] The conversion rate was 1 Swiss Franc per 260 points.

[8] Approximately 26 US Dollars or 23 Euros at the time when the experiment was conducted in March 2016.

fee of CHF 10 and the points won throughout the experiment. The final account balance of the points from the experimental tasks was added to the initial show-up fee. In other words, if the final balance from the insurance choices was negative, subjects left with less than CHF 10. For two study participants, the final payment would have been negative, which was set to a zero balance at the end (this procedure was not communicated beforehand). Further details on the steps participants went through during the experiment are provided in Appendix A1.

To capture the differential effects of information, we applied a between-subjects design that uniquely allocated participants to either a control or one of three treatment groups.

Control group

The control group in our study is defined as facing a choice among six health insurance contracts (with deductibles as given in the Swiss health insurance system), no opportunity costs (no secondary tasks during the rounds), and no additional information.

Treatment groups

To better understand the effects of information, we study the participants' health insurance decisions along two dimensions. First, we investigate the effects of personalized information. The former refers to information that is directly related to the health insurance decision to help decision-makers to find more suitable insurance coverage given their risk profile. Second, we investigate the effects of limited attention in the context of health insurance decisions. For this purpose, we imposed opportunity costs in the choice environment by allowing experimental subjects to perform secondary tasks that are incentivized. In this setup, participants' attention is drawn away from the insurance decision to mimic the situation of individuals pursuing other tasks that are potentially more satisfying to them than addressing health insurance issues. The question then arises of whether providing personalized information mitigates the potentially negative effects of facing opportunity costs. To measure the different effects, we randomly assigned the following three treatments to participants in our experiment.

Treatment 1: Personalized information

This group of participants received personalized information about the optimal insurance contract given their hypothetical health status. In particular, subjects were shown a pop-up on their period screen during periods three and eight containing the following personalized information:

> *"Given your health profile the contract with the lowest expected costs is: XY. With this contract your expected savings are: ZY"*

To enhance the validity of the information and convince study participants to follow our suggestions, in round six, the same group received the information that in the past rounds, participants saved a substantial amount of points by switching their contracts according to our recommendations. The pop-up remained on the screen until clicking on an "OK" button.

Treatment 2: Incentivized distraction

Participants in this treatment group had the option to pursue a secondary task during each period, which was incentivized. Subjects could answer a maximum of 20 general knowledge questions during each round (see Figure 1 for an example). These quiz questions were randomly chosen from a database containing more than 600 questions in the categories of geography, history, science, movies, music, celebrities, literature and sports. Our tool was designed such that repeated questions were not possible. We purposely chose a broad scope of categories to ensure that no particular group of participants had an ex ante advantage given by their field of study. For every correct answer, subjects received 20 points, imposing opportunity costs on the health insurance decision, as the overall time spent on both tasks was fixed at two minutes. Participants therefore faced a trade-off between optimizing health insurance coverage and earning bonus points.

Treatment 3: Personalized information and incentivized distraction

To test the hypothesis of whether personalized information has the potential to improve decision quality when individuals are distracted, we combined the two former treatments. Thus, the third treatment group was exposed to both personalized information and the secondary task.

5.2 Outcome variables

Decision quality

Based on the probabilities of the different health states and the associated costs, we can calculate the expected costs of each health insurance contract. The variable *decision quality* is a continuous variable that captures the point difference between the expected costs of the chosen insurance contract and the contract with the lowest expected costs, which we refer to as the optimal contract. In the optimal case, when an experimental subject chooses the contract with the minimal expected costs, the difference is zero. It follows that larger values of the variable *decision quality* indicate a larger distance to the optimal contract and, therefore, inferior decision quality. In addition to the distance to the optimal contract, we constructed the variable *bank account*, which represents the cumulated points that the participant earned up to a certain time in the experiment. In other words, this variable measures the sum of the fixed income (and bonus points in the case of the treatment groups with the secondary task) minus the paid health insurance premiums and health care expenditures at a given point in time (round of the experiment).

Active decision-making

After the evaluation of health care costs in a given round, the individual chooses between viewing the different health insurance contracts or going directly back to the period screen. Within 20 seconds, the individual can indicate her decision by clicking on a button. If the individual does not decide within this time span, he/she will be automatically transferred to the period screen. The active decision to view the health insurance contracts and, thereby, become informed about the different insurance options, is a precondition for switching ones contract. However, after viewing the different contract options, the individual can still remain with the status quo. From this information, we construct a binary variable *active decision* that takes value one if the individual decided to view the contracts, zero otherwise.

Decision time

Decision time is a continuous variable that captures the time in seconds that a participant views the available contracts. The time is recorded from the point at which the contracts included in choice are displayed until the individual selected a new contract or left the insurance choice screen with the same contract (deductible level). The decision time is 0 for all individuals who decided not to view the list of contracts. The maximum decision time is 2 minutes; if the study subject has not made a decision by then, the insurance contract remains unchanged (status quo).

Switching with improvement

After each round, participants have the option to switch their deductible level. The variable *switching with improvement* is binary and takes value one if the individual switched to a contract with lower expected costs at the end of a round, zero otherwise.

5.3 Background characteristics

Overall, 128 students participated in the experiment and were randomly assigned to the four groups, 34 to the control group, 32 to the personalized information group, 34 to the group with distraction, and 28 to the group with distraction and personalized information. Students were recruited from the University of Zurich and ETH Zurich from various fields of study, with economics (8%), mechanical engineering (8%), computer science (6%), architecture (6%), German language and literature (6%), and geography (4%) being the most common fields.

After the 12 rounds of the experiment, students were asked to complete a brief survey, which included questions on demographic and socio-economic background, health status, and risk preferences. Health-related risk preferences were measured using sequential questions, where the participants could choose between two treatments for an intermediate health state (according to EQ-5D, it was coded as 22222). The first treatment reduced the number of ill days with certainty; the second treatment fully cured the illness but was only partially effective. On five occasions, the participants had the option to choose between the two treatments or to state indifference between

the two options. The question remained constant, but the likelihood of a cure in the event of the second treatment decreased gradually from 5 out of 6 in the first question to 1 out of 6 the last time the question was posed. Based on the individual's selection of the preferred treatments, and especially based on the switching point, we determined the individual's risk preferences. For further information, see van der Pol and Ruggeri (2008). An overview of all variables including the outcomes and summary statistics by the treatment and control groups are given in Table 1.

— Insert Table 1 about here —

6 Econometric Analysis

The data from the experiment can be analyzed using standard regression techniques and graphical tools. In particular, we measure the treatment effects by estimating regression equations of the following form:

$$y_{it} = \beta_0 + \beta_1 treatment_i + \varepsilon_{it} \tag{1}$$

where y_{it} is the outcome variable of interest such as the distance to the optimal contract for participant i in round t; $treatment_i$ is a binary indicator for a specific treatment or can also be understood as a vector containing all three treatments, and ε_{it} is a classical error term. For continuous outcomes such as the distance to the optimal insurance contract or the decision time, we estimate equation (1) using ordinary least squares methods with cluster-adjusted standard errors at the individual level. For binary outcomes such as our indicator for active decision-making and switching with improvement, we use standard probit regressions and report average probability effects. Note that due to the random assignment of treatments, the estimator of $\hat{\beta}_1$ is unbiased for the causal effect of the treatment on the outcome variable because strict exogeneity is fulfilled by the experimental design. In addition, we also estimate equation (1) including a rich set of background characteristics, the corresponding results can be found in Appendix A3, Tables A1 to A3, in the online appendix. The findings of these regressions are practically identical

to the simple bivariate specifications, which is expected for an experimental design under strict exogeneity.

We complement the regression evidence using graphs displaying the treatment effects for each round of the experiment. This allows us to investigate not only the average decision quality but also the development of decision quality over time for a specific treatment. From a technical perspective, this is implemented in a regression framework with time-varying treatment effects, i.e., interactions of the treatment variables with indicators for the rounds. Corresponding confidence intervals are shown for each of the averages of the outcomes by group and by time in the graphs.

7 Results

7.1 Effects of personalized information

Decision quality

In a first step, we analyze the effects of providing personalized information on individual decision behavior and decision quality. Figure 3 displays the decision quality for the personalized information group (red line) and the control group (blue line) for all rounds of the experiment.[9] Note that the larger the distance, i.e., the higher the curve, the less optimal the insurance decision. Figure 3 indicates that the insurance choices do not differ between the two groups in rounds two and three. During the third round, participants in the treatment group received the first personalized information. The effect of this information on decision quality does not seem to immediately materialize, as there are no systematic differences in choice behavior between the treatment and control groups in round four. A significantly positive effect of personalized information on decision quality is observed with a one-period lag. After period five, the treated slightly revert to the previous level of decision quality. A similar pattern can be observed after subjects were exposed to the second dose of personalized information during period eight: the positive effects are not immediately realized in period nine but, again, with a one-period lag before they slightly revert

[9] We discard decision quality in the first round, as we allocated the exact same contract to all individuals at the beginning of the experiment, i.e., subjects were first able to make a decision at the end of period one.

in the last two periods of the experiment.[10]

— Insert Figure 3 and Table 2 about here —

To support our graphical findings, Panel 1 of Table 2 depicts the estimated average treatment effect over all rounds starting from round three after the intervention. The first column shows the personalized information effect on decision quality. The statistically significant and negative value of the coefficient indicates that receiving personalized information leads to an increase in average decision quality. Column two reports the average effect of personalized information on the individuals' bank accounts. Here, the effect is small and statistically insignificant, providing no strong evidence that, on average, subjects receiving personalized information had systematically higher payoffs (or lower out-of-pocket expenditures) than the control group. However, we find that in the last rounds of the experiment, payoffs were slightly higher in the treatment versus the control group (480 points, or approximately 16%, p-value = 0.064).

Choice mechanisms

Apart from the reduced-form effects reported in the previous section, we want to explore potential mechanisms explaining the observed choice behavior. We seek to address the following three substantive questions: 1) How does personalized information affect the likelihood of making an active decision? 2) Are individuals who receive personalized information more likely to incorporate this information into their decision-making and, therefore, switch to better-fitting plans? 3) Do individuals who receive personalized information experience less difficulty in responding to the complex insurance choice problem and are able to make faster decisions?

To answer these questions, we estimate the effects of personalized information on the outcomes *active decision*, *decision time*, and *switching with improvement*. Panel 2 of Table 2 summarizes the results. We find that the likelihood of making an active decision is lower for the participants

[10] In round six, participants received the information that individuals who followed our recommendation saved a substantial amount. The main idea of this information was to reinforce the trustworthiness of the information provided. As expected, this information has no immediate effect on decision quality. However, our data does not allow us to analyze if the information in round six affected the trust in the information provided in round eight.

receiving personalized information than for those not receiving it. However, regarding the insurance choice activity in each period, the share of individuals addressing their health insurance choice increases sharply, from 52% in round three to approximately 71% in rounds four and five, before returning down to pre-information period levels. Thus, providing personalized information seems to increase the awareness of the choice setting immediately after receiving the information, but the effect only lasts for two periods. The overall effect of personalized information on the likelihood of making an active decision is negative. As health profiles are stable over time, this might indicate that study participants in the treatment group correctly anticipated that no further adjustments were necessary once they had chosen optimal coverage.

Our results do not support the claim that individuals who received personalized information are more likely to switch their insurance plan toward a better contract on average. However, by examining the treatment effects in each round and then comparing the treatment and control groups immediately after the information intervention reveals a higher probability of switching to a lower-cost contract in the group with personalized information. The difference is most pronounced in round five, when 39% of the treatment group switched to a more suitable plan, compared with 21% in the control group. The last column of Table 2 shows that personalized information significantly reduces decision time on average, which plausibly might be explained by the reduction in the time required for analyzing and comparing the different contracts.

In summary, we find clear evidence in favor of the first part of hypothesis I. Providing personalized information significantly increases decision quality. Regarding the second part, personalized information increases individual wealth (or decreases health care spending), at least as a cumulative effect over the entire experiment. The positive effects of personalized information on decision quality can be explained by subjects being more likely to switch to a better plan in the periods immediately after the information was provided. Moreover, the treated seem to have realized that with a time-constant risk profile, no further adjustments are necessary once the optimal contract has been chosen, which is captured in the lower likelihood of making an active decision and the lower decision time on average, providing evidence in support of hypothesis II.

There are two possible explanations for the lagged effects. One explanation is related to information frictions and delayed decision-making of individuals, who need time to fully understand why certain contracts are better than others. The additional round and realization of health shocks may be sufficient in this process. Related, all participants faced a premium increase between rounds four and five, which did not alter the ranking of plans, but again increased awareness of the choice problem and hence might have triggered a revision of the insurance choice. A second explanation may be derived from the psychological literature, which states that different levels of stimuli can affect performance and information in an inverted u-shaped form (e.g., Broadhurst 1957). In our context, there is a relatively low level of stimulus, which may lead to slower actions and decision-making on the part of study participants. In particular, there is no distraction from an additional task; study participants have two minutes to choose the contract, and once they make their choice, they simply remain on the period screen showing their bank account and health status. Unfortunately, our data does not allow us to provide conclusive evidence on the lagged effects, also because statistical uncertainty in the time-varying effects is relatively high (see also Appendix A4 in the online appendix).

7.2 Effects of incentivized distraction

Decision quality

In a next step, we add an incentivized secondary task to the choice environment. Specifically, a random subsample of individuals could gain bonus points by correctly answering quiz questions. This secondary task has the character of opportunity costs, as the time devoted to the quiz is deducted from the time available for the insurance choice.

Figure 4 provides evidence for the negative effects of incentivized distraction on decision quality, as measured by the average distance to the optimal health insurance contract. In every round of the experiment, the decision quality in the distraction group (red line) is lower than that in the control group (blue line), and in most periods, the difference is statistically significant. This effect is not unexpected, as the attention of participants is drawn away from the insurance

decision and toward the secondary task. The findings of the graph are confirmed by the regression estimate of the average effect over all periods (Table 3, panel 1). Imposing opportunity costs on the health insurance decision has a highly significant and positive effect on the distance to the optimal health insurance coverage. In numbers, the average distance to the optimal health insurance is approximately 85 points higher under the distraction environment than in the control group. For the distracted group, Figure 4 indicates that the distance to the optimal contract is relatively stable or slightly increasing over the rounds. In sharp contrast, the decision quality in the control group increases steadily over time, indicating positive learning effects over the course of the experiment that are either absent in the distraction group or overcompensated by the negative effects of distraction. The negative learning effects in the setup with distraction are in line with the real-world findings of Abaluck and Gruber (2016), who report only small learning effects among the elderly in the Medicare Part D Prescription Drug Program over time.

— Insert Figure 4 and Table 3 about here —

Choice mechanisms

Regarding the potential mechanisms explaining the differences in choice quality under distraction, we observe that the likelihood of making an active decision is significantly lower for individuals confronted with the secondary task. Specifically, the secondary task reduces the probability of making an active decision by 27 percentage points on average (Table 3, panel 2). Second, we find that individuals facing opportunity costs spend approximately 36 fewer seconds on their health insurance decision than the control group. This effect is sizable considering that the average decision time in the control group is approximately 42 seconds per period, indicating that individuals who were allowed to perform secondary tasks during each round proceed significantly faster through their insurance decision.[11] Third, individuals facing incentivized distraction are less likely to switch to more suitable insurance plans, as indicated by the lower probability to switch

[11] Note that the average decision time of the control group in the regression sample differs from the decision time of the control group reported in Table 1 because in the regression only rounds 4 to 12 were included for comparison reasons with the personalized information intervention; see also the next subsection.

with improvement. Table 3 shows that the probability of making beneficial health insurance switches is approximately 10 percentage points lower for those under distraction relative to the control units. This effect is sizable because, on average, only approximately 20% of individuals switched to more valuable options per round in the control group without distraction.

The observed choice behavior of distracted study participants might be fully rational if they optimized their overall payoffs, as the secondary task was financially incentivized. Comparing the bank accounts of the control group to those of the group with distraction might be indicative of the individuals' rational allocation of (in-)attention. Table 3, panel 1 shows that the average bank account balance of those in the group with secondary task is 793.1 points higher than that of the control group, and thus the distracted group has higher overall wealth.

To summarize, the results provide a consistent picture of the negative effects of incentivized distraction on the quality of health insurance choices. Individuals facing opportunity costs are significantly less likely to make an active decision; they spend significantly less time on the decision and are less likely to switch to better insurance options, providing evidence in favor of hypothesis III. However, since solving the quizzes is more strongly incentivized than choosing the optimal health insurance contract, the individuals' allocation of time can be assumed to be a rational decision and in line with the theory of rational inattention. This is supported by the result that gains through the quiz outweigh the potential losses caused by inattention to the health insurance decision, and thus, we also find support for our expectations regarding hypothesis IV.

7.3 Effects of personalized information when individuals are distracted

Decision quality

The results of the last subsection demonstrate that an incentivized secondary task rationally draws away the study participants' attention from the health insurance decision. A choice environment under such an incentivized distraction may be interpreted as real-life situation in which individuals are not being forced to make an active health insurance decision but may instead simply pursue other competing tasks that are more valuable to them. We now seek to address the question

of whether the provision of personalized information has the potential to mitigate the adverse effects of distraction on the quality of health insurance decisions.

Figure 5 depicts the average decision quality, measured by the distance to the optimal insurance contract, for individuals who were only exposed to the incentivized distraction (blue line) compared to distracted individuals who also received personalized information (red line). The figure indicates a positive effect of personalized information, with better decision quality in nearly all periods. This finding is supported by the regression estimates shown in Table 4, panel 1. The average effect of personalized information is nearly twice the size in the choice environment with incentivized distraction relative to that in the choice environment without distraction (cf. Table 2). Furthermore, the effects are immediately realized after the information was provided and the effects are longer lasting than in the scenario without distraction. As discussed in section 7.1, this might be due to the level of stimulus directed at the participants. In fact, decision quality is significantly improved for two periods after providing the first dose of personalized information (in periods five and six) and even for three periods after the second dose of information (in periods 10-12). The lower distance to the optimal health insurance contract translates into a higher overall wealth of individuals in the personalized information group. We find that the average number of points on the bank account for individuals distracted but supported by personalized information is on average and in each round after the provision of information higher than for individuals without the additional information.

— Insert Figure 5 and Table 4 about here —

Choice mechanisms

When comparing the average likelihood of making an active health insurance decision, we find a negative but insignificant difference between the distracted groups with and without personalized information on average (Table 4, panel 2). However, as in the setup without distraction, we find a slightly higher share of study subjects actively considering a new contract immediately after the information interventions. Regarding switches that improve the insurance coverage, we find

a positive and significant effect of personalized information on average. This is underlined by the share of individuals who switched to a more optimal contract immediately after receiving the personalized information, which increases from 18% in round three to 43% in round four. A similar effect is visible for the information treatment in round eight. In contrast, the share of improving switches remains relatively constant or even decreases slightly during these periods in the group with distraction only. Decision time is on average marginally lower for individuals who received personalized information, but the estimate is statistically insignificant.

Overall, providing personalized information to subjects whose attention is drawn away from the health insurance decision toward secondary tasks has a large, positive and statistically significant effect on decision quality, providing evidence in favor of hypothesis V. Unlike in the scenarios without opportunity costs, the positive effects of personalized information are immediately realized and are more persistent, as experimental subjects consistently make better health insurance decisions than those without the information, which also increases overall wealth.

7.4 Optimal choice behavior and risk preferences

So far, we refer to the optimal health plan as the one that minimizes expected costs in a given period, thereby implicitly assuming risk neutral decision makers. However, this optimality criterion does not necessarily reduce the scope of our findings as we explicitly parameterized the experiment such that the optimal contract under risk neutrality is the same as under risk aversion when basing the analysis on a standard constant relative risk aversion (CRRA) utility function.[12] At the end of the experiment, we measure risk preferences based on the lottery approach proposed by Holt and Laury (2002). Using this measure of risk preferences, we classify 49% of the participants as risk averse, 36% as risk neutral and the remaining 15% as risk loving, which is largely in line with findings in similar choice experiments (e.g., Schram and Sonneman 2011). Consequently, the conclusions that we have drawn above regarding the beneficial effects of personalized information are not only valid for the small fraction of risk neutral individuals but more importantly also for

[12] The standard CRRA utility function is defined as $U(x) = \frac{x^{1-\alpha}}{1-\alpha}$, where the parameter α measures the degree of relative risk aversion (Rothschild and Stiglitz 1970).

the large majority of risk averse study participants.

7.5 Who are the best and worst decision-makers?

To gain further insights into the determinants of observed choice behavior, we shed light on the question of how the best and worst decision-makers can be characterized. To this end, we compare the background characteristics of the 25% best and 25% worst decision-makers, measured by their distance to the optimal contract within each of the treatment groups and the control group.

— Insert Table 5 about here —

Table 5 summarizes the results. When comparing the characteristics of the 25% best decision-makers in the control group, all with the optimal contract, to the worst 25%, with a distance to the optimal contract of at least 260 points, we observe a higher share of male and older individuals among the former. The best decision-makers also have a higher number of doctor visits on average, and are less physically active. In the personalized information group, the best decision-makers are also on average less healthy (as indicated by the significantly higher number of doctor visits and chronic illnesses) than the worst decision-makers. This result makes intuitive sense, as poor health insurance plan choices might have more severe financial consequences for the less healthy, and thus they have a higher incentive to optimize their health insurance contract. On the other hand, in the personalized information group, the best decision-makers are younger on average, more likely female and engage less often in bad health behaviors such as smoking and drinking than the worst decision-makers, and they are significantly more satisfied with their health insurance decision at the end of the experiment. The overall pattern is largely confirmed for the two treatment groups under distraction, although for the group that is only distracted by the incentivized secondary task (bottom left panel), the comparison shows that the difference in health is not as accentuated between the top and worst 25% decision-makers.

7.6 Neutral framing and external validity

In a final step, we address the question whether our findings can be transferred to other non-health related contexts, such as buying a car or an indemnity insurance. We re-ran the experiment using a neutral framing, keeping the basic choice problem and incentive structure, but we eliminated the loaded language from the instruction and the screens shown during the experiment. For example, while we labeled the probability that no health shock occurs as "healthy" in the original health insurance context, the same event was now coined "no negative event" in the neutral framing. Likewise, the term "health insurance" was replaced by "insurance". If the insurance choice behavior of the participants is similarly affected by the distraction and the information treatments as in the health insurance context, then this provides some evidence for the external validity of our findings to more general insurance choice contexts.

— Insert Figure 6 and Table 6 about here —

Figure 6 and Table 6 show the time-varying and average effects of providing personalized information to participants who were distracted under the neutral framing. Overall, the results in the neutral framing setup are almost identical to the main findings in the health insurance-related context: First, we again find that the decision quality is significantly reduced when participants are distracted and there is no evidence for positive learning effects in the distraction group as the decision quality, at best, remains constant over the course of the experiment. Moreover, the comparison of the decision quality among those who are distracted between the health-specific and the neutral framing shows no statistically significant differences in choice quality, thus indicating robustness of our findings to framing effects. Second, providing personalized information has beneficial effects on decision quality and mostly eliminates the adverse effects of distraction, like in the main analysis above. It should be noted that the estimates under neutral framing are based on a slightly smaller number of participants (25 in each cell), and thus the precision in our estimates under neutral framing is slightly lower than before. In conclusion, the experimental findings using a neutral framing indicate that the provision of personalized information has the

potential to also improve the decision quality in other non-health related contexts, thus pointing towards external validity of the main findings in this study.

8 Conclusion

Decisions about health insurance are inherently difficult because of the uncertainty over future health and potential health care costs. Choice-based health insurance systems provide individuals with the opportunity to choose a health plan that fits their needs. However, bounded rationality and limited attention may lead to sub-optimal health plan choices, higher-than-expected out-of-pocket expenditures and ultimately welfare losses.

This paper contributes to the literature on health insurance choices and the ongoing debate about the interrelations between inertia, (in)attention and plan choices. Our results impart new knowledge on the differential effects of information on health insurance decisions. We find that providing personalized information has positive effects on decision quality. By contrast, imposing opportunity costs significantly reduces choice quality as subjects allocate part of their attention to the incentivized secondary task. In terms of the interaction between personalized information and distraction, we find that the effect of personalized information more than doubles relative to the setting without distracting tasks. Thus, personalized information can mitigate the negative effects of distraction and lead to better health insurance decisions. Furthermore, our experiment indicates that the information interventions under distraction make individuals more aware of the insurance choice task leading to a higher level of attention towards the task. This is in line with findings in Ho et al. (2017) and Heiss et al. (2016) who identify inattention as a major source of inertia and thus sub-optimal health plan choices. In particular, Heiss et al. (2016) show that forcing individuals to make a plan choice increases switching but leads to lower decision quality on average. In light of these findings, it might be more favorable to provide personalized information triggers instead of forcing active decision-making.

Our study also has several limitations. First and foremost - as common in any experimental study - we necessarily simplify the choice problem to make it feasible for a laboratory environment.

While this clearly reduces the real-world complexity of health insurance decisions, we capture some key features of choice-based health insurance systems that make our experiment meaningful in this context. In particular, different deductible levels with associated premium reductions, regular enrollment periods, and decision-making under uncertainty with aspects of limited attention are relevant for all such systems. Second, our study population consists of students who have high cognitive abilities relative to other members of the population. However, they have less experience in making health insurance decisions. We acknowledge that comparing health plans and choosing a suitable contract is a task that involves relatively high cognition but may also be based on certain levels of experience. A further peculiarity of students is that they tend to be financially worse off than other groups of the population. Wealth and income may impact individuals' preferences and, consequently, their health insurance choices. We would therefore support future research efforts that explore the potential mechanisms of this paper in a broader population. Third, apart from being restricted to a student population, our sample size, although comparable to related experiments, is small. This prevents us from detecting statistically significant effects in some of our outcomes, although the practical relevance of the effects is non-negligible (e.g., in the choice mechanisms by period). Moreover, we cannot further delve into subgroup analyses to study, for example, choice differences by gender, age, or health status.

Despite these limitations, our findings have implications for countries with choice-based health insurance systems, including the Netherlands, the US, and Germany. In Switzerland, the need for better evidence on the determinants of individual health insurance choices has formally been stated by the Federal Council and has been reinforced in the recent policy debate. People face a growing amount of information, which they might not be able to process. Therefore, individuals have to decide where to best allocate their limited resources and attention. As we have shown in this study, individuals tend to be easily distracted which maps onto poor health insurance decisions and inertia. In such environments, personalized information can help individuals to make better choices by directing the attention toward the health plan decision and thus reducing inertia. In line with the findings of Kling et al. (2012) and Heiss et al. (2016), our results make

a strong case for policy makers to use personalized information to improve health insurance decisions. As demonstrated, providing personalized information offers the benefits of (*i*) reducing out-of-pocket health care expenditures, leaving more disposable income for, e.g., healthy food and sports activities, (*ii*) increasing health insurance literacy in the population, (*iii*) decreasing governmental expenditures on health care through cuts in insurance subsidies and finally (*iv*) reducing the tendency for over-insurance and moral hazard.

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Tables and Figures

Table 1: Variable definition and mean values by group

Variable	Description	Control	Information	Distraction	Distraction and information
Outcomes					
Active choice	= 1 if the individual got informed about HI	0.66	0.54	0.40	0.33
Decision time	Time in seconds taken for deductible choice	35.03	21.26	5.25	3.67
Switching with improvement	= 1 if individual switched to a superior HI contract	0.19	0.20	0.11	0.15
Distance to optimal contract	Distance of expected costs relative to optimal contract	151.99	107.68	221.57	147.96
Bank account	Points earned minus the premiums and health care costs	2211.46	2392.82	2873.80	2957.51
Background					
Age	Age in years	24.48	24.07	22.53	23.71
Female	= 1 if respondent is female	0.35	0.53	0.44	0.61
High school	= 1 if high school is highest educational degree	0.48	0.53	0.56	0.54
Good health state	= 1 if at least good health status	0.90	0.93	0.88	0.93
Doctor visits	Number of doctor visits in past 12 months	2.29	2.13	1.69	1.93
Alcohol	= 1 if respondent drinks alcohol at least weekly	0.48	0.37	0.47	0.43
Physically active	= 1 if respondent is physically active at least twice per week	0.68	0.63	0.53	0.61
Risk preferences	= 1 if risk averse; = 6 if risk loving	2.13	2.89	1.81	1.85
Health Shock					
Shock A	= 1 if shock *A* occurred	0.33	0.34	0.33	0.38
Shock B	= 1 if shock *B* occurred	0.24	0.29	0.22	0.24
Shock C	= 1 if shock *C* occurred	0.10	0.08	0.10	0.11
Number of individuals		34	31	34	28

Notes: Reported numbers are mean values by each group (control and treatment goups). The outcomes and information about health shocks are directly taken from the health insurance experiment. The background variables including risk preferences are collected in the ex-post survey.

Table 2: Effects of personalized information

Panel 1: Decision quality

	Distance to optimal plan	*Bank account*
Information	-54.35**	218.34
	(24.34)	(269.79)
Number of Observations	522	522

Panel 2: Choice mechanisms

	Active choice	*Switching with improvement*	*Decision time*
Information	-0.12*	0.01	-16.23***
	(0.06)	(0.04)	(5.67)
Number of Observations	522	522	522

Notes: Ordinary least squares estimates of the effect of personalized information on the distance to the optimal contract, the bank account and decision time. Average marginal probability effects of personalized information on the probability of taking an active health insurance decision and switching to a better insurance coverage. In all models, rounds 1 to 3 are excluded. Standard errors are clustered at the individual level. Significance levels: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$.

Table 3: Effects of incentivized distraction

Panel 1: Decision quality

	Distance to optimal plan	*Bank account*
Distraction	84.32***	793.14***
	(25.09)	(245.67)
Number of Observations	558	558

Panel 2: Choice mechanisms

	Active choice	*Switching with improvement*	*Decision time*
Distraction	-0.30***	-0.09***	-35.68***
	(0.06)	(0.03)	(4.92)
Number of Observations	558	558	558

Notes: Ordinary least squares estimates of the effect of the incentivized distraction on the distance to the optimal contract, the bank account and decision time. Average marginal probability effects of personalized information on the probability of taking an active health insurance decision and switching to a better insurance coverage. In all models, rounds 1 to 3 are excluded. Standard errors are clustered at the individual level. Significance levels: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$.

Table 4: Effects of personalized information when distracted

Panel 1: Decision quality

	Distance to optimal plan	*Bank account*
Information	-91.63***	70.06
	(28.56)	(263.76)
Number of Observations	522	522

Panel 2: Choice mechanisms

	Active choice	*Switching with improvement*	*Decision time*
Information	-0.06	0.05*	-1.69
	(0.06)	(0.03)	(1.25)
Number of Observations	522	522	522

Notes: Ordinary least squares estimates of the effect of personalized information on the distance to the optimal contract, the bank account and decision time. Average marginal probability effects of personalized information on the probability of taking an active health insurance decision and switching to a better insurance coverage. In all models, rounds 1 to 3 are excluded. Standard errors are clustered at the individual level. Significance levels: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$.

Table 5: Characteristics of best and worst decision-makers

	Control			Information		
Distance to optimal contract	Worst 25% ≥ 260	Top 25% $= 0$	Δ	Worst 25% ≥ 260	Top 25% $= 0$	Δ
Age	24.03	26.08	*	24.91	23.51	**
Female	0.51	0.30	***	0.36	0.59	***
Doctor visits	1.66	2.40	*	1.55	2.16	**
Chronic illness	0.32	0.28		0.17	0.25	*
Physically active	3.11	2.22	***	1.93	2.27	*
Alcohol	3.21	3.47		3.45	2.88	***
Smoker	0.20	0.22		0.31	0.21	**
Satisfaction with HI decision	0.50	0.56		0.27	0.51	***

	Distraction			Distraction and information		
Distance to optimal contract	Worst 25% ≥ 312	Top 25% $= 0$	Δ	Worst 25% ≥ 292	Top 25% $= 0$	Δ
Age	22.51	22.08		24.17	23.42	
Female	0.55	0.27	***	0.71	0.54	***
Doctor visits	1.89	1.69		1.60	2.08	*
Chronic illness	0.17	0.15		0.11	0.19	
Physically active	1.83	1.94		2.87	1.96	***
Alcohol	3.54	3.15	**	3.52	2.96	***
Smoker	0.25	0.08	***	0.17	0.21	
Satisfaction with HI decision	0.38	0.54	***	0.21	0.53	***

Notes: Reported numbers are mean values of background characteristics for the top 25% and worst 25% of decision-makers in the distribution of the distance to the optimal contract within the control group (top right) and the three treatment groups: personalized information (top left), distraction (lower left), personalized information and distraction (lower right). Significance levels for differences in means: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$.

Table 6: Neutral framing:
Effects of personalized information when distracted

Panel 1: Decision quality

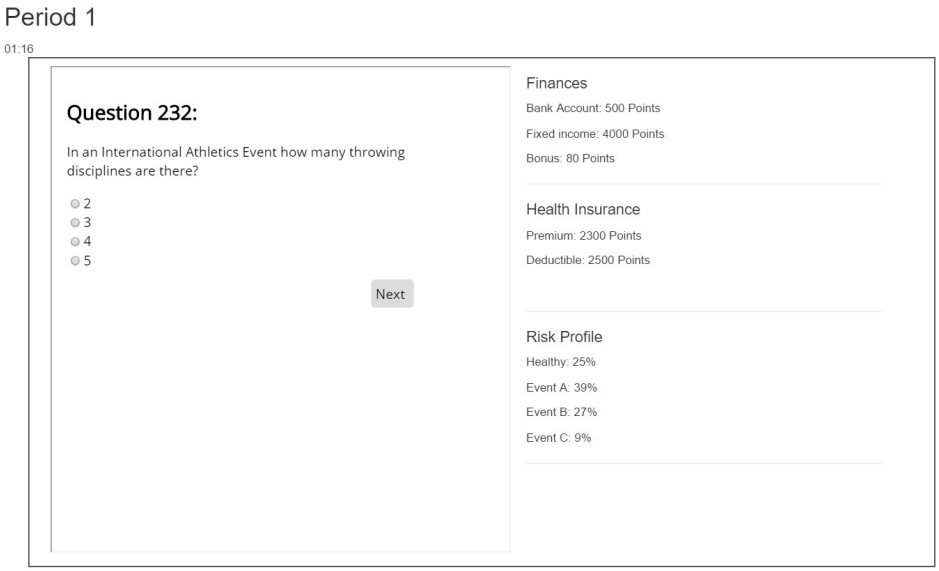
	Distance to optimal plan	*Bank account*
Information	-47.69**	25.51
	(20.86)	(261.30)
Number of Observations	636	636

Panel 2: Choice mechanisms

	Active choice	*Switching with improvement*	*Decision time*
Information	0.05	0.03	0.35
	(0.06)	(0.03)	(1.57)
Number of Observations	636	636	636

Notes: Ordinary least squares estimates of the effect of personalized information on the distance to the optimal contract, the bank account and decision time. Average marginal probability effects of personalized information on the probability of taking an active health insurance decision and switching to a better insurance coverage. In all models, rounds 1 to 3 are excluded. Standard errors are clustered at the individual level. Significance levels: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$.

Figure 1: Screenshot of the period screen



Notes: The figure shows a typical example of the "period screen" in the limited attention treatment setup, where participants have the possibility to answer quiz questions during each round of the experiment.

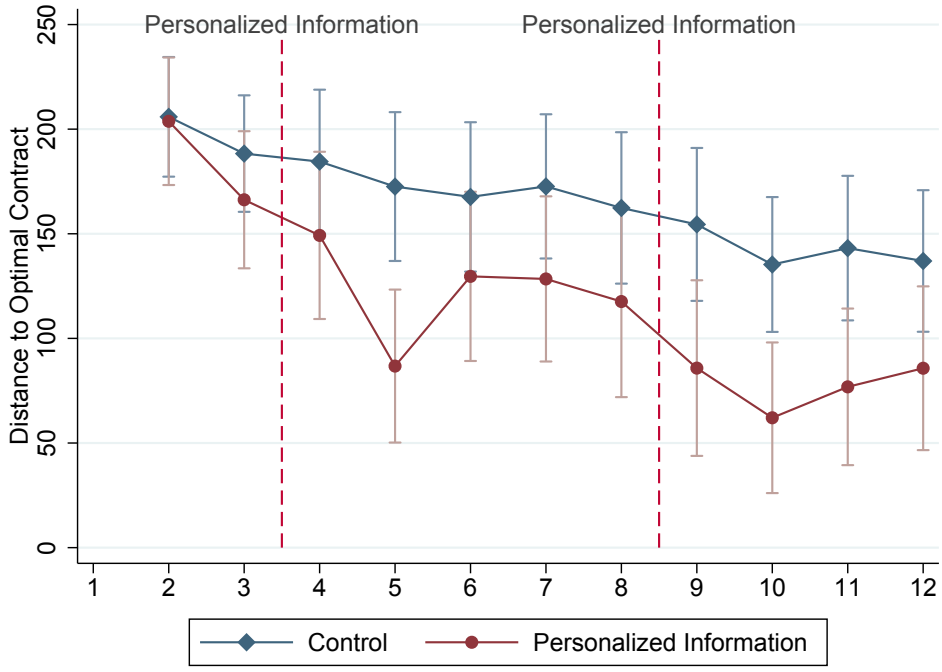
Figure 2: Screenshot of a typical insurance choice screen

Insurance Choice Screen - for periode 2

Contracts	**1**	**2**	**3**
Premium	3700	3000	2300
Deductible	300	1500	2500
Risk profile			
Healthy: 25%	0	0	0
Event A: 39%	300	600	600
Event B: 27%	300	1200	1200
Event C: 9%	300	1500	2500
Choose a contract:	Contract: 1	Contract: 2	Contract: 3

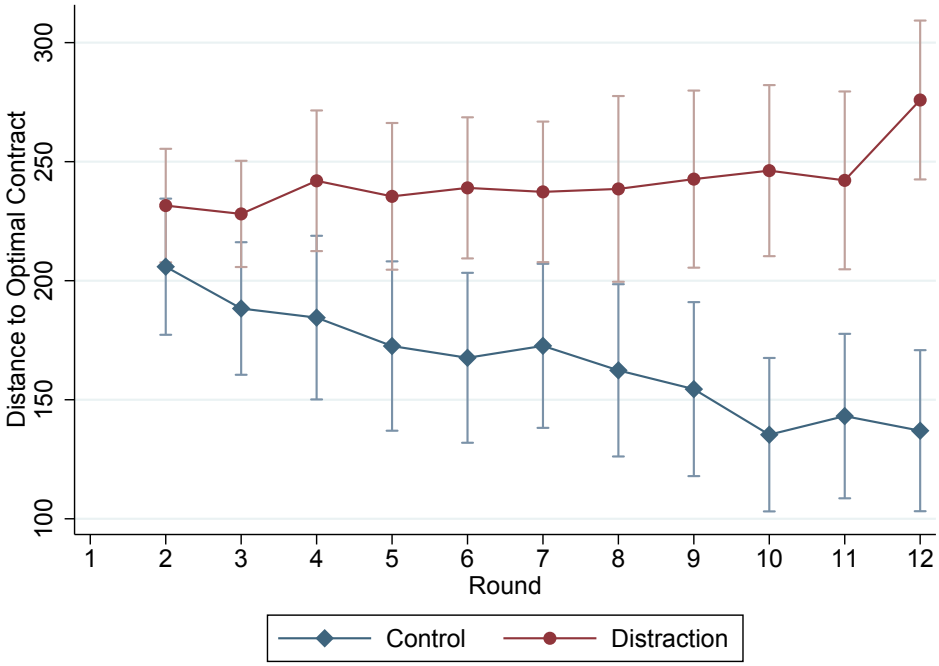
Notes: The figure shows a stylized version of the "insurance choice screen" where the participant has the possibility to choose between three different health insurance contracts that differ with respect to the premium paid, the deductible level and the out-of-pocket payments.

Figure 3: Time-varying effects of personalized information



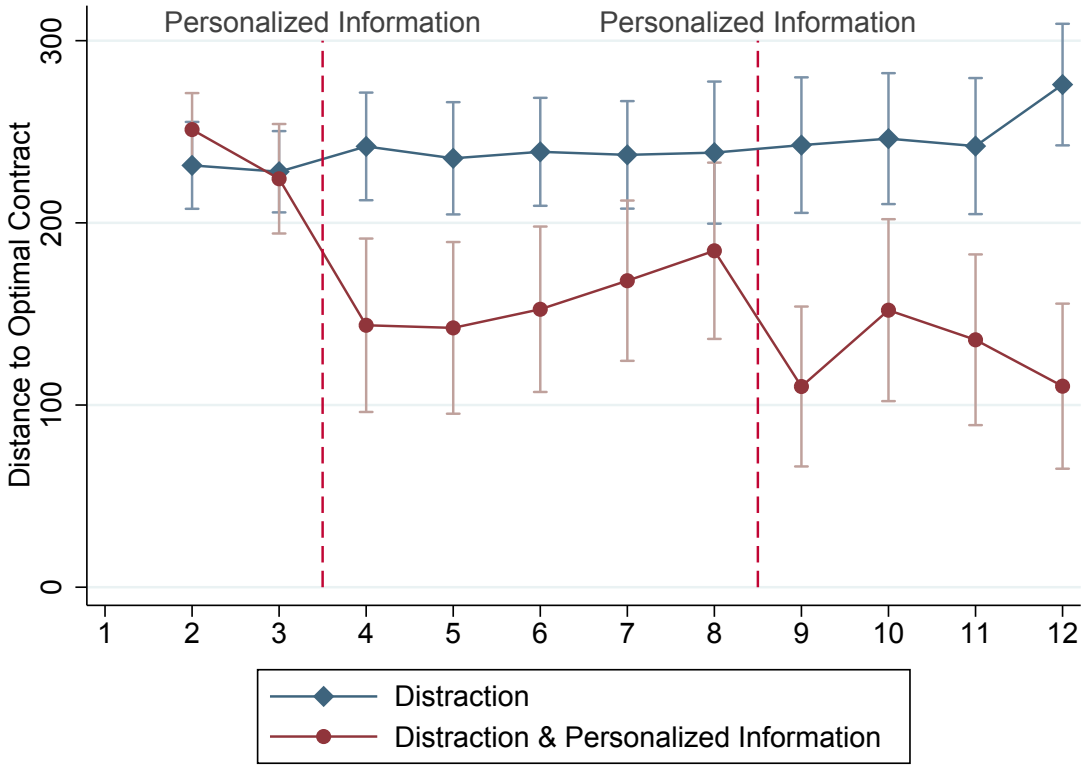
Notes: The figure shows the average distance to the optimal health insurance contract for each round of the experiment for the group receiving personalized information in rounds three and eight (red line) and the control group (blue line). The whiskers represent the 90% confidence interval.

Figure 4: Time-varying effects of incentivized distraction



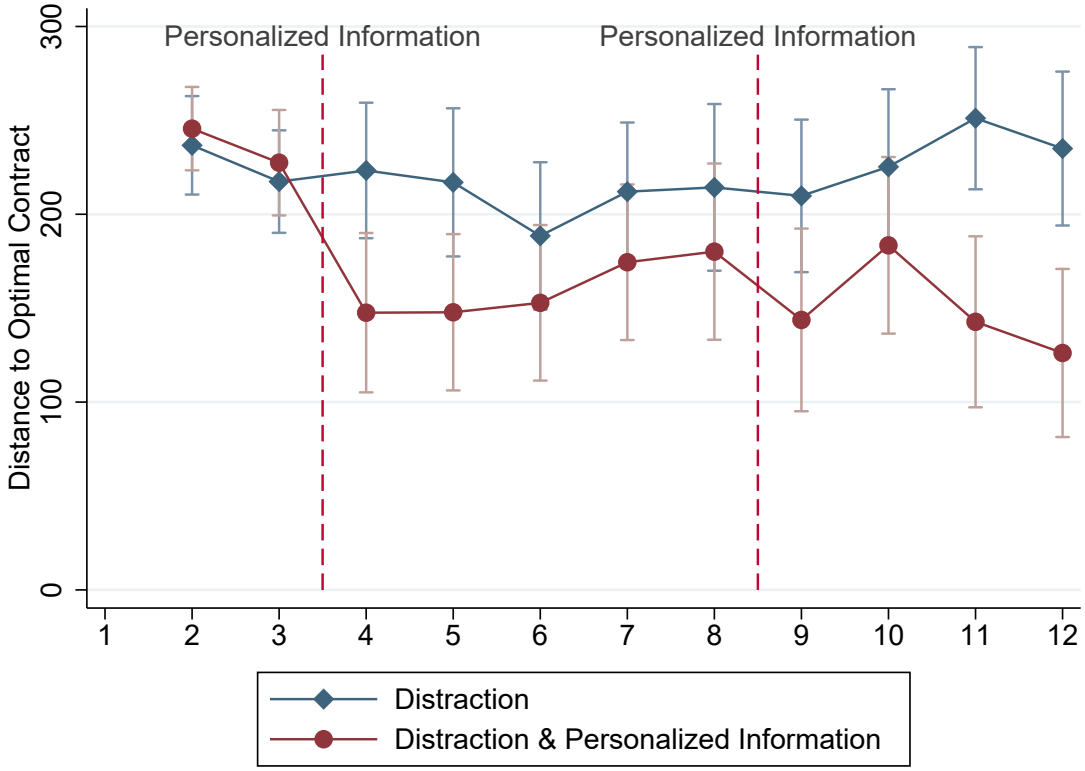
Notes: The figure shows the average distance to the optimal health insurance contract for each round of the experiment for the group facing incentivized distraction (red line) and the control group (blue line). The whiskers represent the 90% confidence interval.

Figure 5: Time-varying effects of personalized information when distracted



Notes: The figure shows the average distance to the optimal health insurance contract for every round of the experiment for the group with incentivized distraction and personalized information (red line) and the group with incentivized distraction only (blue line). The whiskers represent the 90% confidence interval.

Figure 6: Neutral framing:
Time-varying effects of personalized information when distracted



Notes: The figure shows the average distance to the optimal health insurance contract for every round of the experiment for the group with incentivized distraction and personalized information (red line) and the group with incentivized distraction only (blue line). The whiskers represent the 90% confidence interval.

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Appendix A1: Steps in the Experiment

Step 1: At the beginning of every period, participants see the "period screen", which is separated into three parts (see Figure 1): the finances section, the health insurance section, and the risk profile. The finances section shows the individual bank account, the fixed income and the potential bonuses earned in a given period. The health insurance section provides information about the insurance premium that must be paid and the deductible level that applies to the current period. Finally, the risk profile shows the probability for each of the adverse health events "A", "B", "C" and the probability for staying healthy.

Step 2: After two minutes on the "period screen", the round ends and participants reach the "evaluation screen". At this stage, actual health care costs for the past round are evaluated based on the risk profile. The experimental tool determines, based on a random number draw, which of the four states of the world ("A", "B", "C", "Healthy") occurs. Once the state is determined, an overview of the current financial situation is presented to the participant. Then subjects decide whether they want to (i) switch their insurance contract, or (ii) stick to the previous health insurance contract and return to the "period screen".

Step 3: If participants opt for (i), they enter the "insurance choice screen" (see Figure 2). On this screen, subjects face the decision between different health insurance contracts. In total, they have a maximum of two minutes to decide upon the contract. The contracts differ with respect to the premium paid and the deductible individuals pay in case of a health shock. Moreover, the "insurance choice screen" displays the exact amount of out-of-pocket payments individuals would have to pay in case of the three adverse health events for every contract. Once subjects are done with their insurance decision, they return to the period screen for the remaining time (to complete the two minutes). After the two minutes, they return to the "evaluation screen" and the cycle repeats itself.

Step 4: If participants opt for (ii), they return to the "period screen" and stay there for two minutes. After that they return to the "evaluation screen" and the cycle repeats itself.