



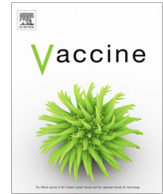
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# Understanding the role of personal experiences and contextual variables in shaping risk reduction preferences



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## ABSTRACT

This article explores how preferences for risk reduction during the COVID-19 pandemic are influenced by personal experiences and contextual variables such as having a close friend or relative who has been infected by the virus (*closeness*), the severity of the illness (*severity*), people's own perceptions of being in a risky group (*risk group*), change in employment status due to the pandemic (*employment situation*), and vaccination status (*vaccination status* and *altruistic vaccination*). We conducted a choice experiment (CE) in Chile, Colombia, and Costa Rica. The attributes of the experiment were risk reduction, latency, and cost. Then, we estimated a mixed logit model to capture preference heterogeneity across the countries. The attributes presented in the CE were statistically significant, with the expected sign in each country. The variables *closeness* and *employment situation* presented homogeneous behavior in each country; however, *severity*, *risk group*, and *vaccination status* showed mixed results. We found that preferences were more heterogeneous for the attributes of the CE than for the personal experiences and contextual variables. Understanding the impact of these variables is essential for generating more effective risk reduction policies. For instance, methodologies such as the value of statistical life base their calculations on society's valuation of risk reduction. We provide evidence that the preferences for risk reduction vary due to the everyday situations that individuals face in the context of the pandemic. The latter may cause distortions in the values used to evaluate policies aimed at mitigating the outbreak.

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## 1. Introduction

The SARS-CoV-2 virus began to spread globally in December 2019. This outbreak triggered the adoption of preventive measures that included social distancing [29], hand hygiene [48], the usage of face masks [34], and even the development and supply of vaccines worldwide [62]. Commitment to these preventive measures and a willingness to be vaccinated are two mechanisms through which individuals can reduce the COVID-19 risks of morbidity and mortality. Participation in strategies to reduce mortality risks depends on sociodemographic, psychographic, and behavioral variables and personal experiences. This study explores how personal experiences and contextual variables during the COVID-19 outbreak impacted preferences for risk reduction programs. We use a stated preference survey conducted in three Latin American countries. These personal experiences and contextual variables

include: (1) whether a respondent's close relative/friend had COVID-19 (*closeness*), (2) the severity of their disease (*severity*), (3) whether a respondent considered themselves as part of the high-risk group in terms of COVID-19 infection (*risk group*), (4) change in employment status because of the outbreak (*employment situation*), and (5–6) vaccination (*vaccination status* and *altruistic vaccination*). We believe this type of preference drivers for risk reduction has not been sufficiently studied in the past and is essential for promoting more effective risk reduction policies.

Enhancing our understanding of preferences for risk reduction programs is relevant for policy evaluation and to improve social acceptance of such policies. For instance, the value of statistical life (VSL), one of the most widely used methodologies to determine monetary values for cost-benefit analysis, depends on people's willingness to pay (WTP) for risk reductions. Besides and the focus of this article, the probability that individuals support a policy aimed to invest in research and development of new vaccines can also be linked to risk reduction preferences. Nevertheless, many studies claim that risk preferences are neither perfectly

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stable [52] nor homogeneous [61]. While sociodemographic variables that explain risk preferences, such as age [18,41,43,53], gender [18,41,50,56], education [21,56], and marital status [15], have been extensively studied, other psychological factors such as feelings, perceptions, and attitudes have received less attention, although they are relevant but more challenging to assess. Lerner and Keltner [33] show that anger and fear are negatively and positively related to perceived risk, respectively. Additionally, Rudisill [47], in the context of the 2009 H1N1 virus, shows that optimism does not impact individuals' intention to be vaccinated.

People's risk preferences are also affected by personal experiences. Buccioli and Zarri [9] demonstrate that people who have suffered adverse experiences, such as being victims of a physical attack or losing a child, are willing to take fewer financial risks even though those negative experiences are not related to financial issues. Similarly, He and Hong [25] conclude that subjects previously exposed to risky environments are more risk-averse than those without that experience. Wang and Yan [64] show that people who have suffered personal shocks have a greater aversion to risk in medium and large bets than do those who have not experienced shocks in their personal lives. They also conclude that social shocks do not affect risk attitudes. If we considered the virus a social shock, it would not significantly affect risk preferences unless it personally affected individuals.

Although preferences for risk reduction have been studied through different methodologies, we are interested in applications that use stated preferences (SP). SP methods include contingent valuation (CV) and choice experiments (CE), which have been used extensively to study risk preferences due to their flexibility and ability to obtain preferences from hypothetical situations [26]. Due to the vast literature on the subject, several studies conduct meta-analyses or systematic reviews to summarize results [6,16,28,59,60]. Some findings in this research area have associated the WTP for risk reduction with population characteristics such as household income, risk reference level, and cultural and demographic variables [1–4,46,54].

Fewer analyses have been performed regarding preferences for risk reduction in pandemic outbreaks using SP methods before the COVID-19 outbreak. During the SARS outbreak, Liu et al. [35] conducted a CV study in Taiwan to estimate the WTP to reduce the risk of infection and death. Another example is Determann et al. [17], who investigated how vaccine characteristics could impact the social acceptance of vaccination programs during pandemic outbreaks. Other articles have investigated preferences for vaccines for the human papillomavirus vaccine [14,36], dengue [31,42], hepatitis B [44], monkeypox [23], among others. Presently, during the COVID-19 outbreak, several studies have used SP methods to estimate preferences (and the WTP) for vaccination in countries such as Australia [8], Chile [13,20], China [19,32,63], Ecuador [51], Indonesia [24], the United States [10,12,57], and the United Kingdom [40], as well as in groups of countries [58].

We contribute to this literature by focusing on the impact of personal experiences and contextual variables on the probability of participation in risk reduction programs. Additionally, we analyze the relevance of altruistic reasons for being vaccinated. To evaluate whether preferences varied across countries, we conducted three surveys in Latin America: Chile, Colombia, and Costa Rica.

## 2. Methods

### 2.1. Surveys

To understand the impact of different personal experiences and contextual variables on preferences for a risk reduction program

during the COVID-19 outbreak, we conducted online surveys in Chile, Colombia, and Costa Rica (henceforth, CH, CO, and CR, respectively). We recruited the respondents through an online panel provided by Offerwise<sup>1</sup>, a leading online research company in Latin America. Offerwise recruits panel members and compensates respondents for remaining on the panel and completing the online surveys. We performed multiple checks on each respondent to avoid potential fraud (e.g., multiple answers from the same IP or delays in answering the questionnaire).

The surveys were conducted between June and August of 2021; our sample comprised people over 18 years old. In CH and CO, we recruited people from cities with severe air pollution problems (Santiago, Concepción, Temuco, and Aysén in CH, and Bogotá, Cali, and Medellín in CO). In the case of CR, we only focused on its capital, San José. The respondents were invited to participate through emails, following quota sampling. We attempted to fill demographic (mainly age and gender) quotas in a manner representative of each country's population.

The survey contained three sections: The first presented the survey and gathered sociodemographic information. Next, we included questions about health status and experiences (those of relatives/friends) with cardiorespiratory diseases and COVID-19. Last, we asked how their employment situation had changed from the beginning of the outbreak and the reasons for their vaccination status. We included a video with training in probabilities and ratios in the second section. We contextualized the current COVID-19 situations in their respective countries (consequences of COVID-19 and cumulative deaths) and presented the CE, which comprised a program aimed at developing and acquiring vaccines to reduce the effects of the disease (more details in the following subsection). The last section included questions to capture the respondents' psychographic characteristics. The survey structure was tested in 376 pilot surveys, divided into 178 surveys in CH, 124 in CO, and 74 in CR.

### 2.2. Experimental design

The CE analyzes the determinants of risk reduction preferences. We provided a reduced set of attributes to keep the CE simple: i) **reduction of the risk of death** due to COVID-19. This quantitative variable (number of deaths avoided compared to the baseline risk) had three levels (low, medium, and high). The baseline risks vary across age groups, then using a constant risk baseline would have been unrealistic since people of different ages face significantly different risks. To avoid this, we built separate baseline risks for respondents between 18 and 59 years old and those older than 60. We generated the baseline risk scenarios based on each country's official COVID-19 mortality data. ii) **Latency** of the program results (one, two, or five years) and iii) a **monthly contribution** to the program (prices varied across the countries; however, on average, they were approximately US\$ 6, US\$ 12, US\$ 18, US\$ 24, and US\$ 30). An explanatory video presented the baseline risks for each age group, while a second video provided the instructions for the CE. An example of the choice sets shown is presented in Fig. 1, and the full Bayesian optimal design used is shown in Appendix B.

The suggested program would finance the research and development of vaccines in the country, the negotiation with foreign firms to ensure the supply of future vaccines, and a long-term research program on vaccines. Each interviewee answered four choice sets (similar to those in Fig. 1). Two alternatives corresponded to the variations of the program described, and a third alternative represented the current situation or status quo (no

<sup>1</sup> <https://www.offerwise.com/>.

	Alternative A	Alternative B	Alternative C
Reduction of the risk of death due to COVID-19	Low death risk reduction Risk decreases from 65 to 60 in 100,000 Reduces 5 in 100,000	High death risk reduction Risk decreases from 65 to 50 in 100,000 Reduces 15 in 100,000	No risk reduction
Latency of program effects	Effects would be seen in 1 year.	Effects would be seen in 5 years.	No program effects
Monthly contribution	US\$ 18	US\$ 12	No monthly contribution

Fig. 1. Choice set example.

additional risk reduction, latency of program effects, or monthly payment). In each step of the survey, we followed the guidelines proposed by Mariel et al. [38], Johnston et al. [27], and Hensher et al. [26].

### 2.3. Epidemiological context during surveys

The surveys were conducted between June and August of 2021. During this period, the countries' pandemic statistics were similar. In panel A of Fig. 2, we note that weekly COVID-19 infection cases decreased in CH and CR at the beginning of the surveys, while CO's cases began to decline at the end of June. The decrease ratios in CH and CO were stable during the survey timeline; however, the weekly cases in CR began to increase again during the last week of July. The weekly deaths related to COVID-19 (panel B) in CO and CR showed similar behavior; however, a decrease in weekly deaths in CH started in July. Therefore, we argue that the surveys were conducted in an improving epidemiological scenario, which may have caused positive expectations for the following months and a relaxation in individuals' concerns about COVID-19.

The apparently improving epidemiological context could be partly explained by the progress of vaccination campaigns in the surveyed countries. In panels C and D of Fig. 2, we present the number of vaccinated (one dose and two doses in panels C and D, respectively) inhabitants per hundred. The vaccination campaign in CH was one of the most effective worldwide in 2021 [11], setting it apart from the campaigns in CO and CR. Despite this difference, the vaccination rate increased consistently in all the countries during the surveys<sup>2</sup>.

### 2.4. Econometrics and model specification

In our experiment, each respondent,  $n$ , faces three alternatives. Following the theory of random utility [30,39], we expect that they will choose an alternative,  $i$ , that maximizes their utility. The utility obtained by an individual,  $n$ , when choosing alternative  $i$  is given by

$$U_{ni} = V_{ni} + \varepsilon_{ni}, \tag{1}$$

where  $V_{ni}$  represents the deterministic component of the utility function, and  $\varepsilon_{ni}$  is the random term that represents the unobserved component by the researcher. Depending on the researcher's interests and assumptions, we can use different econometric models to identify the components of  $V_{ni}$ . Since we hypothesize that preferences for the proposed programs are highly heterogeneous, we esti-

mate a mixed logit model (ML). In this model, the probability that an individual,  $n$ , chooses alternative  $i$  is given by

$$P_{nit}(y = i|x_{nit}) = \frac{e^{\alpha_{ni} + \beta_n x_{nit}}}{\sum_{j=1}^J e^{\alpha_{nj} + \beta_n x_{njt}}}, \tag{2}$$

where  $x_{nit}$  are a set of explanatory variables, including the attribute levels, respondents' sociodemographic characteristics, and other observable variables;  $\alpha_{ni}$  is an alternative specific constant (ASC); and  $\beta_n$  is a vector of parameters to be estimated. To capture preference heterogeneity,  $\beta_n$  is a random parameter defined as  $\beta_n = b + \sigma_\beta \eta_n$ , where  $b$  is the mean,  $\sigma_\beta$  the standard deviation, and  $\eta_n$  a normally distributed random term.

To investigate the effect of personal experiences and contextual variables on risk reduction preferences, we asked if the respondents knew someone who was infected with COVID-19. After that, we asked about the degree of closeness (close or not close relative/friend) and the severity of the disease (severe or mild consequences). The respondents could indicate several known individuals who suffered from the disease, although we focused on the first mentioned. Fig. 3 depicts the flow of these personal experiences and contextual questions.

Furthermore, we asked if they considered themselves among the high-risk group regarding COVID- infection and why. Additionally, we asked about their employment situations before and after (current) the outbreak. Finally, we included some questions about the respondents' vaccination status and reasons for being (or intending to be) vaccinated. We classified the reasons for vaccination into altruistic (those to do with keeping family or other people safe as the first reason) and non-altruistic. Therefore, we included six personal experiences and contextual variables: *severity, closeness, risk group (me), employment situation, vaccination status, and altruistic vaccination*.

To incorporate the personal experiences and contextual variables into the models, it was necessary to interact them with an ASC or attribute. In this case, we interacted each variable with the ASC of the status quo ( $\alpha_3$ ), which allowed us to identify how the different variables impacted the probability of participation in the program. In particular, a positive (negative) sign for the coefficient implies a higher (lower) probability of choosing the status quo and not participating in the program. Hence, the model specification is as follows:

$$V = \alpha_{n,i} + \beta_{reduction,n} reduction_i + \beta_{latency,n} latency_i + \beta_{cost} cost_i + \sum \beta_{contextual,n} * \alpha_3 contextual_n \tag{3}$$

where  $reduction_i$ ,  $latency_i$ , and  $cost_i$  are the CE attributes and  $contextual_n$  groups the personal experiences and contextual variables.

<sup>2</sup> This section was elaborated using data provided by ourworldindata: <https://ourworldindata.org/coronavirus-coronavirus-country-profiles>.

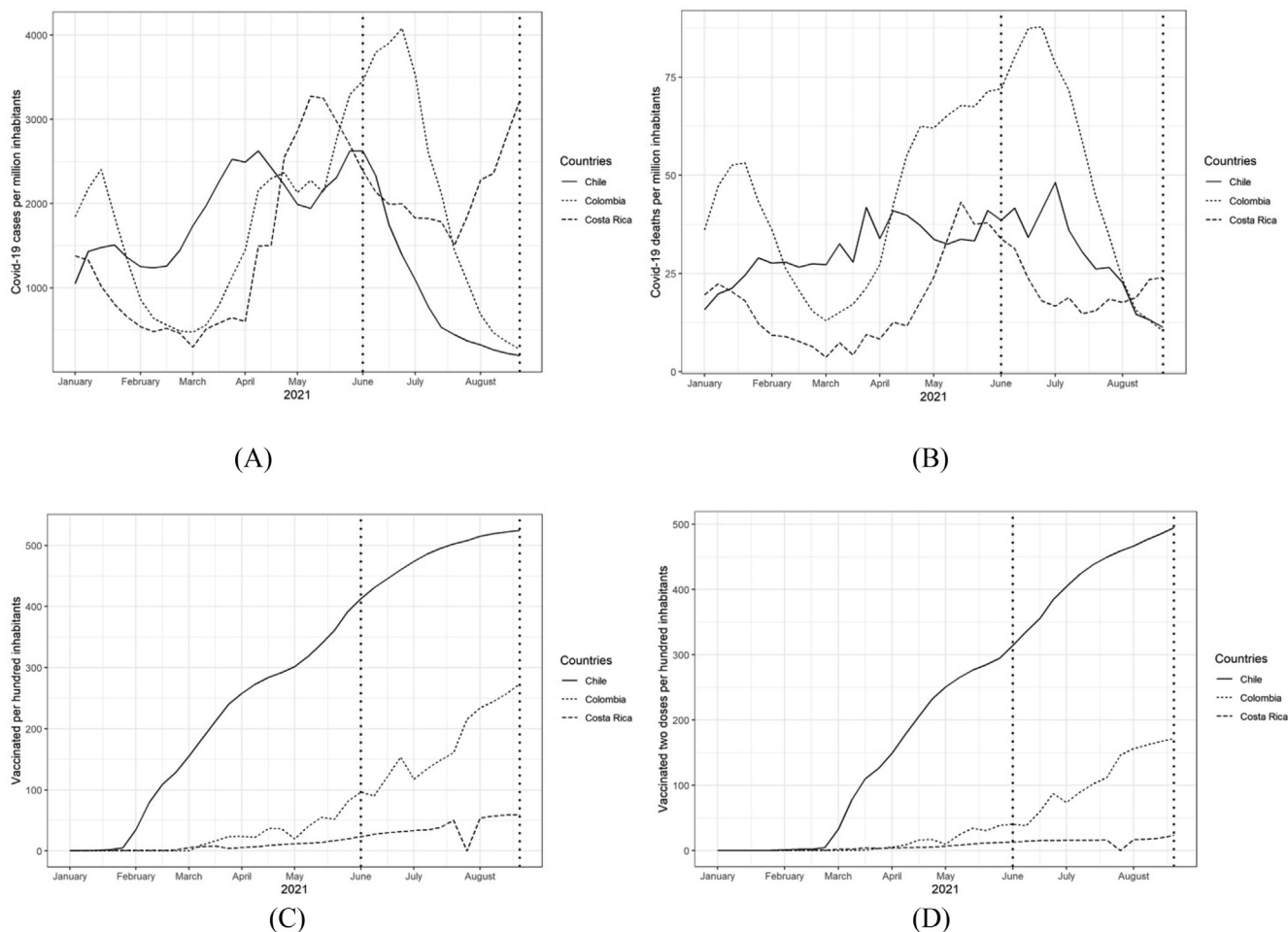


Fig. 2. Panel A and B: Covid-19 weekly cases and deaths per million inhabitants. Panel C and D: Covid-19 weekly vaccinations per hundred inhabitants.

### 3. Results

#### 3.1. Surveys data

We collected 1,629 completed surveys in CH; 1,300 in CO; and 1,301 in CR. Following data cleaning (potential fraud, protest answers, incomplete questionnaires, and respondents with a low certainty in their answers), we obtained a final sample of 1,199; 959; and 887 respondents in CH, CO, and CR, respectively<sup>3</sup>. Since individuals provide four responses in the CE, we have 4,796 observations for CH, 3,836 for CO and 3,548 for CR. Table 1 presents a statistical description of our samples and compares them with national surveys. Considering the difficulties caused by the COVID-19 outbreak and the inherent limitations of online surveys [5,7], we acknowledge that our samples are more representative of the population with access to the internet than of the whole countries' populations. This means that variables such as education and household income are higher in our sample than the values one should find in a population-representative survey.

Generally, most of the socioeconomic variables in the three countries have similar statistical descriptions. Thus, we do not elaborate on these descriptions except for household income. To gather information about household income, we presented ten income ranges to each respondent, adjusted by each country's pur-

chasing power parity. We used the medium value in these ranges to generate the income variable. The highest household income was observed in CR, followed by CO and CH.

Regarding the personal experiences and contextual variables, most individuals ensured that a close relative or friend was affected by COVID-19 (69 %) in CR, while the lowest percentage (55 %) was observed in CH. The latter finding is interesting because CH had the highest percentage of respondents who had met someone who had suffered severe consequences of COVID-19. Moreover, in CH, 27 % of the respondents considered themselves in the high-risk group regarding COVID-19 infection; this proportion was lower in CR (24 %) and higher in CO (32 %).

Additionally, we included questions about the employment situations before the outbreak and at the time of the survey. A quarter of the respondents in each sample stated that they were worse off than before the COVID-19 outbreak. Finally, when we asked if the respondents were vaccinated or willing to be vaccinated when their turns came, over 90 % of them in each sample answered positively. Lastly, between 55 % and 57 % of the respondents in all the samples provided reasons that were considered altruistic. A classification of the reasons for being vaccinated (or not) is presented in Table 2.

The first two reasons for being willing to be vaccinated were altruistic (to protect my family and friends) and individualistic (to protect myself). The rest of the reasons constituted less than 10 % of the preferences.

<sup>3</sup> Further information of the data cleaning is presented in the appendix C.

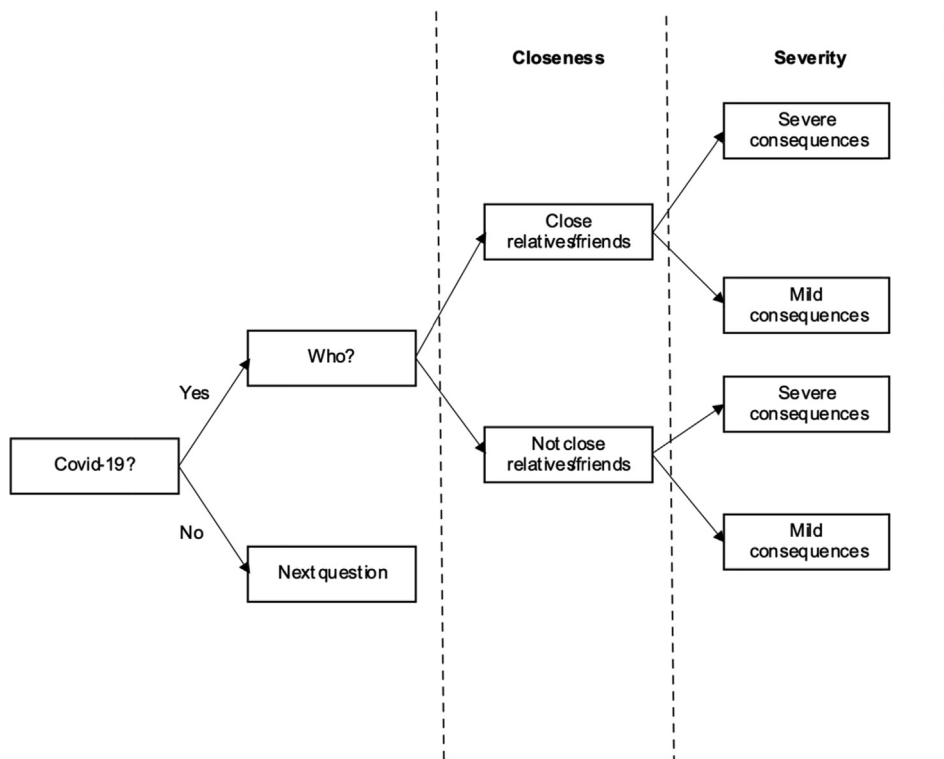


Fig. 3. COVID-19-related cases question flow.

Table 1  
Sample descriptive statistics.

Variables	Chile		Colombia		Costa Rica	
	Our sample	National survey	Our sample	National survey	Our sample	National survey
Age	34.35	38.40	34.45	34.54	34.15	36.26
Household size	3.70	3.70	3.85	3.27	3.79	3.14
# Children in the house	1.03	1.00	1.13	1.32	1.15	1.15
Primary education (1 = yes)	0.07	0.37	0.01	0.51	0.08	0.50
Secondary education (1 = yes)	0.37	0.36	0.38	0.25	0.49	0.34
Tertiary education (1 = yes)	0.56	0.26	0.57	0.24	0.44	0.16
Gender (1 = male)	0.48	0.46	0.51	0.47	0.50	0.49
Household income (in USD)	586	1,373	760	507	919	1,652
Closeness (1 = close relative/friend)	0.55	-	0.69	-	0.65	-
Severity (1 = severe consequences)	0.16	-	0.15	-	0.10	-
Risk group (me, 1 = yes)	0.27	-	0.24	-	0.32	-
Worse employment (1 = yes)	0.24	-	0.25	-	0.26	-
Vaccination status (1 = yes)	0.94	-	0.91	-	0.94	-
Altruistic vaccination (1 = yes)	0.57	-	0.56	-	0.55	-

We present mean values in each category. We used national surveys CASEN 2020, ANDA 2020, and INEC 2020 as the data source for descriptive statistics for Chile, Colombia, and Costa Rica. The conversion rate were US\$ 1 = 792.2 CLP = 3,693 COP = 581.7 CRC.

3.2. Econometric results

The results are summarized in Table 3; as we are interested in the unobserved heterogeneity in the preferences, the estimations are divided into two panels. The upper panel presents the mean value of each parameter, while the lower panel shows each parameter’s standard deviation. A statistically significant standard deviation implies heterogeneity in the coefficient. Note that the cost parameter was considered fixed; thus, we do not estimate its standard deviation.

In each estimated model, we incorporated the variable *ASC status quo*, representing the ASC of the status quo alternative. This variable is always statistically significant, with a negative sign, which means that the respondents have a negative preference for staying in the current situation (without the program proposed in the CE). Regarding the attributes presented in the CE, all were statistically significant and with the expected sign. Risk reductions have a positive sign, which means that the higher the potential deaths from COVID-19 that the program helps reduce, the higher the probability that the respondents will be willing to participate.

**Table 2**  
Distribution of main reasons for being willing/unwilling to receive the COVID-19 vaccine.

Main reasons for being willing to be vaccinated	Chile	Colombia	Costa Rica
To protect my family and friends (altruism)	683 (60.6 %)	534 (61.2 %)	491 (59.2 %)
To protect myself	257 (22.8 %)	242 (27.8 %)	197 (23.8 %)
It was compulsory for me	27 (2.4 %)	8 (0.9 %)	18 (2.2 %)
To go back to normal activities (traveling, concerts, meeting with friends, etc.)	70 (6.2 %)	38 (4.4 %)	31 (3.7 %)
To avoid losing work days	9 (0.8 %)	2 (0.2 %)	3 (0.4 %)
To comply with the Health Ministry's recommendation	73 (6.5 %)	44 (5.0 %)	81 (9.8 %)
Other reasons	9 (0.8 %)	4 (0.4 %)	8 (1.0 %)
<i>Main reasons for being unwilling to be vaccinated</i>			
I prefer other people getting vaccinated	12 (16.9 %)	7 (8.0 %)	11 (19.0 %)
I think there is little information about the COVID-19 vaccines	19 (26.8 %)	21 (24.1 %)	13 (22.4 %)
I am worried about the secondary effects	17 (23.9 %)	26 (29.9 %)	18 (31.0 %)
I have already had the disease and prefer not to get vaccinated	2 (2.8 %)	5 (5.7 %)	1 (1.7 %)
Vaccines are not fully effective	6 (8.5 %)	8 (9.2 %)	1 (1.7 %)
I disagree with vaccines	4 (5.6 %)	6 (6.9 %)	5 (8.6 %)
COVID-19 is not such a serious disease	0 (0 %)	1 (1.1 %)	0 (0 %)
Other reasons	11 (15.5 %)	13 (14.9 %)	9 (15.5 %)
Total respondents	1199	959	887

Respondents faced the question: Have you received, or are planning to receive when your turn comes, some of the available vaccines against COVID-19? If the said yes to this question, we asked: Why did you decide to get vaccinated (or are you planning to do it)? [Select the main reason], and if they said no: Why not? [Select the main reason].

The latency of the program reflects how much time it will take to benefit society. The estimated parameter has a negative sign, implying that the respondents prefer program effects in the short run. Next, the cost parameter has a negative sign, which means that the higher the program cost, the lower the probability of participating.

Among the personal experiences and contextual variables, closeness and severity refer to how COVID-19 could directly impact the respondents' or their relatives' lives. The closeness variable is statistically significant, at 90 % in each country. Its impact is negative, and since it has been interacted with the status quo, it implies that having some close relative, friend or themselves infected by COVID-19 will decrease the probability of staying in the status quo. In other words, people with some close relatives or friends affected by COVID-19 are more likely to participate in the proposed risk reduction program. Meanwhile, the mean severity variable is only statistically significant in Colombia. This means that knowing someone who was hospitalized or passed away because of COVID-19 increases the probability of choosing the proposed program in CO but not in CH or CR.

When we asked the respondents about their self-perception of vulnerability in terms of COVID-19 infection, we found this variable statistically significant, with a negative sign in CO and CR but not in CH. This variable implies that individuals who believe they are vulnerable are more willing to participate in the program. Another personal experience variable is whether the outbreak has affected the respondents' employment situation. In this regard, we used different variables for testing (if their employment situation was the same, if they had a different job than before the outbreak, or if they had the same job but were now working from home). None of them were statistically significant.

Additionally, we included a variable about the respondent's vaccination status (yes or no) and another dichotomous variable for when the respondents mentioned altruistic motivations to be vaccinated. The altruistic vaccination variable was statistically significant in CH and CO but not in CR. Meanwhile, the vaccination variable was only statistically significant in CR. All these parameters negatively affect the probability of preferring the status quo alternative. In other words, in CO and CH, the respondents with altruistic reasons for being vaccinated are always more interested in participating in the project. In CR, merely being (or willing to be) vaccinated is sufficient to increase the probability of accepting the proposed program.

Considering the standard deviation parameters, we observe that the status quo (ASC), risk reduction, and latency all have statistically significant standard deviations in all the countries. This means that there is substantial unobserved preference heterogeneity among the respondents. Regarding personal experiences and contextual variables, we note differences between the countries. Closeness shows consistently unobserved heterogeneity across the countries. By contrast, severity shows heterogeneous preferences only in CO. The effects of the perception of belonging to the high-risk group in terms of COVID-19 infection are heterogeneous in CH; however, they are not statistically significant for CO and CR. Similarly, the standard deviation for having a worse employment situation than before the outbreak is only statistically significant in CH. Besides, the impact of vaccination status is highly heterogeneous across the countries, whereas the altruistic reasons for being vaccinated are not. Note that although vaccination has a non-statistically significant mean in CH and CO, this variable presents high and statistically significant preference heterogeneity in all three countries. Lastly, we estimated the WTP for risk reductions in each country. The values ranged between US\$ 0.1401 in CO to US\$ 0.6671 in CR. These WTPs represent the monthly contributions to finance the research and development of vaccines in the country, the negotiation with foreign firms to ensure the supply of future vaccines, and a long-term research program on vaccines.

Overall, we can assert that all three countries have similar preferences (and heterogeneity) for risk reduction, latency, cost, closeness, and vaccination. Nevertheless, in CH, the respondents are more sensitive to altruism and less affected by risk group variable than in CO and CR. To complement these results, we include [Appendix D](#), where we present the estimation of models including sociodemographic variables such as age, household size, secondary and tertiary education, gender, and income, and also models stratifying the sample depending on the respondent's reported certainty about their responses. We show that most key results are robust to these analyses.

#### 4. Discussion

Our main attributes are not new in the literature. For instance, the extent of risk reduction and costs are essential attributes for any CE study used to calculate the VSL. Primarily, both parameters must be statistically significant to calculate the VSL. Regarding

**Table 3**  
ML estimation results.

		Chile	Colombia	Costa Rica	
Mean Attributes	ASC status quo	−1.693 <sup>***</sup> (−3.98)	−2.438 <sup>***</sup> (−4.31)	−1.313 <sup>+</sup> (−1.87)	
	Risk reduction	0.00678 <sup>+</sup> (1.92)	0.00896 <sup>+</sup> (1.79)	0.0196 <sup>*</sup> (2.06)	
	Latency	−0.133 <sup>***</sup> (−8.68)	−0.101 <sup>***</sup> (−5.76)	−0.101 <sup>***</sup> (−5.42)	
	Cost	−0.0000334 <sup>***</sup> (−4.19)	−0.0000173 <sup>***</sup> (−5.78)	−0.0000505 <sup>***</sup> (−3.74)	
	Personal experiences and context	Closeness	−0.723 <sup>+</sup> (−1.91)	−0.729 <sup>+</sup> (−1.71)	−0.891 <sup>+</sup> (−1.92)
		Severity	−0.0356 (−0.07)	−1.549 <sup>+</sup> (−1.79)	0.543 (0.79)
		Risk group (me)	−0.852 (−1.62)	−0.920 <sup>+</sup> (−2.04)	−0.773 <sup>+</sup> (−1.78)
		Worse employment	−0.310 (−0.61)	0.078 (0.19)	0.287 (0.62)
		Vaccination	−0.609 (−1.30)	0.292 (0.49)	−1.651 <sup>*</sup> (−2.24)
	Altruistic vaccination	−1.239 <sup>***</sup> (−3.74)	−0.990 <sup>*</sup> (−2.53)	−0.337 (−0.82)	
Attributes	<b>Standard Deviation</b>				
	ASC status quo	1.440 <sup>**</sup> (3.00)	2.920 <sup>***</sup> (5.86)	2.860 <sup>***</sup> (6.68)	
	Risk reduction	0.0204 <sup>**</sup> (2.77)	0.0219 <sup>*</sup> (2.08)	0.101 <sup>***</sup> (4.92)	
	Latency	0.207 <sup>***</sup> (8.25)	0.224 <sup>***</sup> (8.10)	0.185 <sup>***</sup> (5.63)	
	Personal experiences and context	Closeness	2.431 <sup>***</sup> (4.48)	3.172 <sup>***</sup> (6.89)	3.663 <sup>***</sup> (5.77)
		Severity	0.924 (0.73)	4.262 <sup>**</sup> (3.05)	1.355 (1.45)
		Risk group (me)	2.622 <sup>**</sup> (3.09)	0.327 (0.42)	−0.513 (−0.60)
		Worse employment	2.464 <sup>*</sup> (2.33)	0.368 (0.35)	−0.678 (−0.66)
		Vaccination	2.891 <sup>***</sup> (8.17)	1.869 <sup>*</sup> (1.99)	2.426 <sup>***</sup> (5.18)
	Altruistic vaccination	0.800 (1.41)	0.547 (0.70)	1.077 (0.90)	
WTP for risk reductions	0.2662 (0.0137, 0.4988)	0.1401 (0.0010, 0.2792)	0.6671 (0.1226, 1.2116)		
Observations	4796	3836	3548		

The personal experience and contextual variables were interacted with the alternative specific constant for the status quo. *t* statistics in parentheses. <sup>+</sup>  $p < 0.10$ , <sup>\*</sup>  $p < 0.05$ , <sup>\*\*</sup>  $p < 0.01$ , <sup>\*\*\*</sup>  $p < 0.001$ . WTP confidence intervals were calculated by Krinsky Robb method. The conversion rate to 2020 US dollars were US\$ 1 = 792.2 CLP = 3,693 COP = 581.7 CRC.

latency, the duration of the COVID-19 vaccine effects and the time until vaccine availability have also been relevant for populations in other studies [8,19].

However, the evidence provided by the literature about personal experiences and contextual variables in a pandemic context is scarce. *Closeness* was statistically significant in its negative impact on the probability of choosing the status quo alternative. Meanwhile, the *employment situation* was not statistically significant. Moreover, *risk group (me)*, *severity*, *vaccination status*, and *altruistic vaccination* had mixed results among the countries. By contrast, Sadique et al. [49] found that the severity of the adverse events associated with vaccination increased a mother’s probability of vaccinating her children; we found the same result in CO but no impact in CH and CR. Similar to our results, in the COVID-19 context, Cerda and García [13] found that individuals who had recovered from COVID-19 had a lower WTP for COVID-19 vaccines. Conversely, in the dengue context, Palanca-Tan [42] found that knowing someone who had dengue does not impact the WTP for a dengue vaccine. Still, in a multi-country study, Lee et al. [31] showed that this effect varies across countries. Furthermore, Machida et al. [37] found a link between the willingness to be vaccinated to protect others and vaccine acceptance.

Regarding heterogeneity, we found that preferences were highly heterogeneous in attributes but less heterogeneous in personal experiences and contextual variables. We discovered that CH presented the highest heterogeneity in the personal experiences and contextual variables (four out of seven were statistically significant) and CR the lowest (two out of seven were statistically significant). These results could indicate a more complex pattern in how the experiences during the COVID-19 outbreak affected the risk perceptions in the population. These differences could be partially due to the cultural aspects of risk perceptions, which is an exciting topic for future research. A relevant factor explaining our results is the mortality and vaccination context related to COVID-19 in each country. For instance, the willingness to vaccination was only statistically significant in CR, the country with the lower vaccination rate when the survey was conducted. At the same time, the altruistic reasons to be willing to vaccinate were significant in CH and CR, countries with a much higher vaccination rate (see Fig. 2). Then, when a country is in the early stages of the vaccination campaign, the vaccination itself is a good determinant for increasing the probability of contributing to a vaccine research and development program. However, when the vaccination rate increases, governments should focus their communication efforts

on expanding the sense of altruism to ensure support for research and development programs for future pandemics.

Although some evidence shows that past events may have eroded trust in the vaccines [8], the respondents in this study present a high commitment to vaccination campaigns. Our samples present a willingness to be vaccinated similar to the acceptance rate in CH (90.6 %) and CR (86.1 %) found by García and Cerda [20] and Guzmán et al. [22], respectively. However, our acceptance rate is higher than the one found by Solís Arce et al. [55] in CO (75 %). Moreover, we asked the respondents about their reasons for being willing (or unwilling) to be vaccinated. We found that, generally, the reasons were homogeneous between the countries.

## 5. Conclusion

As the pandemic evolves, the percentage of individuals showing personal experiences and contextual variables presented in this study will rise. Therefore, our results imply a systematic increase in the social acceptance of programs with similar characteristics to that employed in this study. Nevertheless, this phenomenon could also generate a normalization of the pandemic situation, which could have the opposite effects. We did not find evidence for this except for high heterogeneity in people's preferences. Future studies should analyze how social acceptance evolves through different stages of an outbreak and its relationship to preference heterogeneity since characteristics such as novelty or level of public concern could generate changes in the social valuation of the risk reduction [35].

This study presents evidence of solid consistency in preferences for attributes such as cost, risk reduction, and latency in three Latin American countries. Although the literature has largely discussed the implications of sociodemographic variables in the preferences for risk reduction programs (mainly in VSL studies), more evidence of how different personal experiences and contextual variables impact it is needed. We find that some personal experiences and contextual variables influence the probability of choosing a risk reduction program, and these effects are highly heterogeneous among individuals and countries. This last result is important for enhancing our understanding of preferences for risk reduction programs since it has implications for policy evaluation. In the context of a pandemic, risk preferences may suffer changes due to changes in individual's personal experiences and contextual variables, which in turn affect the values used to evaluate policies aimed at

mitigating the outbreak. Undoubtedly, there is a need for further research on how these variables impact risk preferences. For instance, understanding differences between countries and their heterogeneity regarding how personal experiences and contextual variables affect decisions is relevant for future research.

It is important to note some limitations of this research. Firstly, our online survey may not accurately represent the population of the studied countries. Our findings indicate that our sample group is highly educated and has a higher household income. Secondly, personal experiences and contextual variables can differ throughout the pandemic, so the results reflect only a specific outbreak stage. Thirdly, our research showed high unobserved preference heterogeneity in the CE attributes, personal experiences, and contextual variables. This heterogeneity could be explored further using different questionnaires and statistical methods, such as a latent class model. Finally, in the data-wrangling stage, we discarded many observations because they were potential frauds, protest responses, low-certainty responses, or suffered of missing information. Although this strategy is straightforward, it could be enhanced in future studies. For instance, investigating the reasons behind protest responses in a pandemic context could provide valuable insights.

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## Data availability

Data will be made available on request.

## Declaration of Competing Interest

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

**Appendix A. Questions used to measure personal experience and contextual variables**

**Closeness**

A-1. Have any of your relatives or somebody you know had COVID-19?

Yes \_\_\_\_\_ No \_\_\_\_\_ I prefer not to answer \_\_\_\_\_

**Severity**

A-2. Who had COVID-19 (close relatives, relatives, close friend, friend, others), and which were the effects of the disease? The possible effects could be:

1) No major effects, 2) Home rest, 3) Under a week hospitalization, 4) Over a week hospitalization, 5) Death

Affected 1. Relationship to interviewed \_\_\_\_\_, Level of affectation \_\_\_\_\_

Affected 2. Relationship to interviewed \_\_\_\_\_, Level of affectation \_\_\_\_\_

⋮

**Risk group**

A-3. Do you consider yourself as part of the high risk group if you get COVID-19?

Yes \_\_\_\_\_ Why? \_\_\_\_\_ (age, weight, preexisting diseases, others)

No \_\_\_\_\_

**Employment situation**

A-4. Which of the following alternatives describes your work situation before the Covid-19 crisis better?

\_\_\_\_\_ Full time worker \_\_\_\_\_ Part-time worker \_\_\_\_\_ Unemployed, looking for a job

\_\_\_\_\_ Unemployed, not looking for a job. \_\_\_\_\_ Full time student

\_\_\_\_\_ Housework, not looking for a job out of home \_\_\_\_\_ Retired

A-5. Which of the following alternatives describes your PRESENT working situation?

\_\_\_\_\_ No changes \_\_\_\_\_ Employed, in the same job as before, but from home.

\_\_\_\_\_ Employed, doing different work from home

\_\_\_\_\_ Employed, in a different job, and going out of my home to work,

\_\_\_\_\_ I have been fired, but I will probably return to the same organization/business in the future.

\_\_\_\_\_ I have been fired and am looking (or will look) for a new job. \_\_\_\_\_ I have been fired, and I am not looking for a job.

**Vaccination status**

A-6. Have you received, or are planning to receive when your turn comes, some of the available vaccines against COVID-19?

Yes \_\_\_\_\_ No \_\_\_\_\_ I prefer not to answer \_\_\_\_\_

**Altruistic vaccination**

A.7 Why did you decide to get vaccinated (or are you planning to do it)?

[Select the main reason]

\_\_\_\_\_ To protect my family and friends \_\_\_\_\_ To protect myself \_\_\_\_\_ It was compulsory for me \_\_\_\_\_

To go back to normal activities (travelling, concerts, meeting with friends, etc.) \_\_\_\_\_ To avoid losing work

days \_\_\_\_\_ To comply with the Health Ministry’s recommendation \_\_\_\_\_ Other. Which other reason? \_\_\_\_\_

**Reasons to not vaccinate**

A.8 Why not? [Select the main reason]

\_\_\_\_\_ I prefer other people getting vaccinated. \_\_\_\_\_ I think there is little information about the COVID-19 vaccines.  
 \_\_\_\_\_ I am worried about the secondary effects.  
 \_\_\_\_\_ I have already had the disease and prefer not to get vaccinated. \_\_\_\_\_ Vaccines are not fully effective.  
 \_\_\_\_\_ I disagree with vaccines.  
 \_\_\_\_\_ COVID-19 is not such a serious disease. \_\_\_\_\_ Others. Which other reason? \_\_\_\_\_

**Appendix B. Optimal design output**

Table B1 shows the different attributes and levels combinations presented to the individuals. For instance, in block 1, choice situation 2, individuals faced one alternative with low risk reductions (that varies along the countries and age group), low latency, and

the third level of the cost attribute (that varies along the countries), while in the second alternative they faced the high level of risk reductions, the high level of latency and the second level of the cost attribute. Finally, they also faced a status quo alternative that represents do not support the proposed program.

**Table B1**  
 Optimal design used in the Choice experiment.

Risk reduction	Latency	Cost	Choice situation	Alternative	Block
1	1	3	2	1	1
3	3	2	2	2	1
0	0	0	2	3	1
1	2	2	3	1	1
2	3	1	3	2	1
0	0	0	3	3	1
3	2	2	15	1	1
2	3	1	15	2	1
0	0	0	15	3	1
2	1	4	16	1	1
3	3	5	16	2	1
0	0	0	16	3	1
3	1	3	6	1	2
2	2	1	6	2	2
0	0	0	6	3	2
3	2	5	8	1	2
2	3	2	8	2	2
0	0	0	8	3	2
2	2	1	11	1	2
3	1	4	11	2	2
0	0	0	11	3	2
2	3	3	13	1	2
1	1	1	13	2	2
0	0	0	13	3	2
3	3	4	1	1	3
2	1	5	1	2	3
0	0	0	1	3	3
3	1	5	4	1	3
2	2	4	4	2	3
0	0	0	4	3	3
1	1	2	5	1	3
3	2	3	5	2	3
0	0	0	5	3	3
1	2	5	14	1	3
1	3	3	14	2	3
0	0	0	14	3	3
3	3	4	7	1	4
2	2	2	7	2	4
0	0	0	7	3	4
2	2	4	9	1	4
1	3	2	9	2	4
0	0	0	9	3	4
3	2	1	10	1	4
2	1	3	10	2	4
0	0	0	10	3	4
1	2	3	12	1	4
3	3	5	12	2	4
0	0	0	12	3	4

We performed a Bayesian optimal design using NGENE choosing the design in terms of the smallest d-error.

### Appendix C. Data wrangling

This appendix summarizes the data-wrangling procedures followed in this article. In particular, Table C1 shows the observations discarded as potential frauds, protests, low-certainty responses, and missing information.

We analyzed the time it took for participants to finish the survey and verified if they were on the same internet connection. On average, the survey took around 24 min to complete. To ensure the validity of the responses, we excluded any surveys finished in less than five minutes, which could indicate rushed answers. Moreover, we used IP addresses to detect multiple survey responses from the same household and removed any IP addresses with three or more responses from our sample. After that, we conducted a protest analysis following the guidelines discussed by Mariel et al. [38]. We included an open follow-up question when respondents chose three or four times the status quo alternative. After that, we identified the responses that did not reflect an economic reason for rejecting the alternatives. For instance, protest responses such as

“the government should use our taxes to finance the project” were widespread. Other interesting protest responses were linked to individuals who did not believe COVID-19 was relevant (or real).

Next, we included a question ranging between 1 and 5 to capture how certain the respondents were about their responses in the choice experiment. We discarded observations with a very low certainty (certainty = 1). We know that many other analyses can be conducted based on uncertainty of responses, but that is not the focus of our article. Additionally, we have variables such as vaccination or employment, where respondents had the alternative “I prefer not answer” which were considered missing information. We could try to impute some of these variables, but we preferred to discard them as they represented a low sample percentage.

Lastly, in the lower panel of Table C1, we summarized the opt-in and opt-out behavior in each sample. In general, we found that the data cleaning process reduced the percentage of individuals choosing the status quo. Still, the ratio between opt-in and opt-out behavior is similar between countries.

**Table C1**  
Data cleaning description and analysis of opt-in and opt-out behavior.

	Chile	Colombia	Costa Rica			
<b>Discarded observations because of...</b>	Number of observations (% of the full sample)	Number of observations (% of the full sample)	Number of observations (% of the full sample)			
Potential fraud – time < 5 min	80 (4.91%)	55 (4.23%)	58 (4.46%)			
Potential fraud – same IP	3 (0.18%)	60 (4.62%)	97 (7.46%)			
Protest analysis	146 (8.96%)	142 (10.92%)	149 (11.45%)			
Low certainty	112 (6.88%)	69 (5.31%)	93 (7.15%)			
Missing information	88 (5.40%)	15 (1.15%)	17 (1.31%)			
Remaining observations	1199 (73.60%)	959 (73.77%)	887 (68.18%)			
<b>Opt-in and opt-out behavior</b>	Opt-in (%)	Opt-out (%)	Opt-in (%)	Opt-out (%)	Opt-in (%)	Opt-out (%)
Full sample	72.53	27.48	68.61	31.39	67.33	32.67
After data cleaning	81.23	18.77	78.39	21.61	78.55	21.45

The data cleaning followed the same order as the variables exhibited in the table.

**Appendix D. Additional analyses**

In this appendix, we conducted two additional analyses. First, we evaluated the role of different sociodemographic variables on the probability of participation in risk reduction programs. Second, we evaluated how individuals' responses varied depending on how certain they were about their responses.

In **Table D1**, we estimate models that include sociodemographic variables that interacted with the ASC status quo constant. The variables included were age, household size, secondary and tertiary education, gender, and income. Noticeably, few of these variables are statistically significant.

In general, the attributes are statistically significant and with the expected sign. A notorious change is the reduced statistical significance of the ASC status quo, which can be explained by the inclusion of many variables interacting with this ASC. Most sociodemographic variables are not affecting the probability of choosing the status quo, with the exceptions being age in the three countries and income in Chile. Regarding unobserved heterogeneity, preferences for risk reductions and the latency of these reductions kept being highly heterogeneous, but the heterogeneity of

personal experience and contextual variables is reduced when sociodemographic variables are included. The heterogeneity of sociodemographic variables varies along the countries. Only the variable age is always heterogeneous.

Next, in **Table D2** we analyzed how preferences varied depending on the reported respondent's uncertainty about their choices. We asked them about their uncertainty level regarding their responses in the Choice Experiment. We used a scale between 1 and 5, where 1 is low certainty and 5 is high certainty. Then, we stratified the sample into three subgroups, following the strategy used by Regier et al. [45]. We have a certain (certainty = 5), hesitant (certainty = 3 or 4), and uncertain (certainty = 1 or 2) groups. The filter used in the main results was to discard respondents with very low certainty (certainty = 1). The results of this analysis are presented as follows:

As expected, we found fewer statistically significant variables in this analysis since we are using smaller subsamples. Nevertheless, the choice experiment attributes were mostly statistically significant and with the expected sign. Regarding the personal experience and context variables, altruistic vaccination remained statistically significant, with the expected sign in most estimations,

**Table D1**  
ML estimation results with sociodemographic variables.

	Chile		Colombia		Costa Rica	
	Socio	Socio + contextual	Socio	Socio + contextual	Socio	Socio + contextual
<i>Mean</i>						
ASC status quo	-1.567* (-2.12)	-1.640* (-1.80)	-1.196 (-1.18)	-1.155 (-0.99)	-2.290* (-2.34)	-0.442 (-0.35)
Risk reduction	0.00791* (2.45)	0.00845* (2.57)	0.0101+ (1.94)	0.00982+ (1.90)	0.0192+ (1.84)	0.0195+ (1.86)
Latency	-0.131*** (-8.78)	-0.134*** (-8.84)	-0.102*** (-5.86)	-0.102*** (-5.82)	-0.101*** (-5.43)	-0.0977*** (-5.14)
Cost	-0.000031*** (-3.96)	-0.000034*** (-4.34)	-0.000017*** (-5.82)	-0.000017*** (-5.80)	-0.000049*** (-3.57)	-0.000047*** (-3.35)
Closeness	.	-0.403 (-1.11)	.	-0.334 (-0.88)	.	-0.244 (-0.61)
Severity	.	-0.199 (-0.40)	.	-0.614 (-0.81)	.	0.695 (1.04)
Risk group (me)	.	-0.578 (-1.18)	.	-0.791+ (-1.74)	.	-0.408 (-0.98)
Worse employment	.	-0.152 (-0.43)	.	-0.0584 (-0.14)	.	0.314 (0.71)
Vaccination	.	-0.00964 (-0.02)	.	0.488 (0.81)	.	-1.256* (-1.66)
Altruistic vaccination	.	-0.855** (-2.81)	.	-1.046** (-2.75)	.	-0.552 (-1.37)
Age	-0.0323* (-1.98)	-0.00897 (-0.59)	-0.0508** (-2.65)	-0.0375* (-1.95)	-0.0355 (-1.47)	-0.0447* (-2.04)
Household size	-0.0205 (-0.22)	0.0330 (0.34)	0.0126 (0.11)	0.0724 (0.65)	0.119 (1.14)	0.147 (1.29)
Secondary education	0.267 (0.50)	0.232 (0.41)	-0.0439 (-0.06)	-0.186 (-0.22)	0.00460 (0.01)	-0.555 (-0.74)
Tertiary education	0.0579 (0.11)	-0.0706 (-0.13)	-0.0919 (-0.12)	-0.260 (-0.30)	-0.103 (-0.14)	-0.290 (-0.37)
Gender	-0.255 (-0.76)	-0.159 (-0.51)	-0.270 (-0.77)	-0.388 (-1.09)	-0.0798 (-0.21)	-0.158 (-0.41)
Income	-0.161* (-2.43)	-0.163* (-2.38)	-0.119 (-1.22)	-0.0872 (-0.84)	-0.0987 (-0.95)	-0.0436 (-0.45)
<i>Standard deviation</i>						
ASC status quo	-0.183 (-0.25)	0.406 (0.81)	-1.040* (-2.46)	0.760 (1.25)	0.110 (0.19)	0.331 (0.62)
Risk reduction	0.0158* (2.42)	0.0160** (2.59)	0.0220* (2.34)	-0.0195* (-1.98)	0.0839*** (3.55)	0.0704** (2.65)
Latency	0.204*** (8.37)	0.204*** (8.18)	0.220*** (8.31)	0.222*** (8.23)	0.192*** (6.43)	0.182*** (6.02)
Closeness	.	-2.025*** (-4.11)	.	0.806 (1.61)	.	-0.608 (-0.52)
Severity	.	-0.926 (-1.14)	.	2.256 (1.59)	.	0.476 (0.41)

(continued on next page)

**Table D1** (continued)

	Chile		Colombia		Costa Rica	
	Socio	Socio + contextual	Socio	Socio + contextual	Socio	Socio + contextual
Risk group (me)	.	1.635*	.	-0.377	.	0.912
		(2.45)		(-0.41)		(1.56)
Worse employment	.	-0.491	.	-0.884	.	0.518
		(-0.71)		(-1.47)		(0.79)
Vaccination	.	-0.497	.	0.999*	.	-0.394
		(-1.23)		(2.07)		(-0.92)
Altruistic vaccination	.	-0.413	.	0.330	.	0.390
		(-1.09)		(0.37)		(0.76)
Age	0.113***	0.0943***	0.129***	0.116***	0.128***	0.141***
	(12.76)	(9.72)	(12.06)	(9.96)	(10.11)	(12.08)
Household size	0.152	-0.163	0.196*	0.198*	0.0917	0.0944
	(1.62)	(-1.58)	(1.83)	(1.80)	(0.87)	(1.31)
Secondary education	0.882	-0.827	0.105	0.520	0.305	0.722
	(1.18)	(-1.16)	(0.19)	(0.61)	(0.46)	(1.10)
Tertiary education	0.0800	-0.492	1.040*	1.437*	-2.310***	0.453
	(0.10)	(-0.97)	(1.99)	(2.28)	(-3.73)	(0.42)
Gender	-1.620**	-1.639**	-0.0635	0.581	-0.700	0.538
	(-2.90)	(-3.12)	(-0.11)	(1.00)	(-1.09)	(0.81)
Income	0.0534	-0.0142	0.208**	0.137	0.227*	0.146*
	(0.49)	(-0.17)	(2.84)	(1.23)	(1.91)	(1.89)
Observations	4920	4796	3884	3836	3644	3548

Socio = sociodemographic variables, contextual = personal experience, and contextual variables. All the sociodemographic and personal experience and contextual variables interacted with the alternative specific constant (ASC) for the status quo. t statistics in parentheses. † p < 0.10, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001.

**Table D2**

ML estimation results of certainty subgroups.

	Chile			Colombia			Costa Rica		
	Certain	Hesitant	Uncertain	Certain	Hesitant	Uncertain	Certain	Hesitant	Uncertain
<i>Mean</i>									
ASC status quo	-1.621*	-2.100***	-1.711**	-2.518*	-3.151***	-0.203	-0.390	-1.803*	-0.375
	(-2.20)	(-3.54)	(-2.90)	(-1.73)	(-4.22)	(-0.26)	(-0.31)	(-1.87)	(-0.48)
Risk reduction	0.0101*	0.00378	-0.00550	0.00449	0.0102*	0.00121	-0.0104	0.0425**	0.00180
	(1.97)	(0.69)	(-0.70)	(0.57)	(1.76)	(0.11)	(-0.74)	(2.77)	(0.14)
Latency	-0.148***	-0.125***	-0.111**	-0.0980**	-0.0919***	-0.110*	-0.101***	-0.100***	-0.143**
	(-5.96)	(-6.07)	(-2.86)	(-3.09)	(-4.23)	(-2.05)	(-3.64)	(-3.77)	(-2.72)
Cost	-0.0000194	-0.000037***	-0.0000283	-0.0000236	-0.000021***	-0.000031***	-0.0000046	-0.000069***	-0.000096**
	(-1.45)	(-3.50)	(-1.38)	(-0.45)	(-5.61)	(-3.76)	(-0.22)	(-3.49)	(-3.06)
Closeness	-1.728*	-0.230	0.102	-0.724	0.418	0.309	-0.682	-0.940	-0.0771
	(-2.25)	(-0.54)	(0.14)	(-0.71)	(0.88)	(0.30)	(-1.18)	(-1.44)	(-0.08)
Severity	-0.842	0.465	1.130	-1.645	-1.182	1.880	-2.341	2.158*	-0.826
	(-1.19)	(0.84)	(0.43)	(-1.17)	(-1.15)	(1.53)	(-1.63)	(2.32)	(-0.32)
Risk group (me)	-0.874	-0.378	1.986*	-4.054*	-0.685	-0.975	-0.758	-0.915	0.394
	(-0.99)	(-0.86)	(1.78)	(-1.79)	(-1.13)	(-0.99)	(-1.15)	(-1.21)	(0.30)
Worse employment	-0.271	-0.125	-0.466	0.303	0.322	-1.237	-0.357	0.551	-1.194
	(-0.36)	(-0.28)	(-0.51)	(0.34)	(0.60)	(-1.12)	(-0.50)	(0.87)	(-1.16)
Vaccination	-0.218	-0.812	0.589	0.650	0.251	-0.797	-2.264*	-1.133	-0.478
	(-0.26)	(-1.24)	(0.68)	(0.48)	(0.33)	(-0.75)	(-1.73)	(-1.16)	(-0.36)
Altruistic vaccination	-1.383*	-0.663*	-1.754*	-2.790*	-0.895*	-0.589	0.0209	-0.943	-2.220
	(-2.19)	(-1.70)	(-1.88)	(-2.46)	(-1.92)	(-0.53)	(0.03)	(-1.54)	(-1.33)
<i>Standard deviation</i>									
ASC status quo	1.546**	2.056***	-1.037	3.723**	3.013***	1.787*	3.400***	2.823***	1.671*
	(3.08)	(4.61)	(-1.08)	(2.84)	(5.48)	(1.67)	(6.85)	(5.34)	(2.01)
Risk reduction	0.0234*	-0.0224*	-0.000320	0.0249*	0.00635	-0.0000956	0.0864**	-0.117***	0.000439
	(2.33)	(-1.80)	(-0.04)	(2.13)	(0.32)	(-0.01)	(2.79)	(-4.46)	(0.02)
Latency	0.198***	0.210***	0.147*	0.255***	0.208***	0.255**	0.130*	-0.223***	-0.241**
	(4.81)	(6.48)	(1.73)	(5.28)	(5.96)	(3.04)	(2.26)	(-5.47)	(-2.85)
Closeness	3.640***	2.110**	1.898*	0.152	-0.311	5.337***	0.818	4.621***	0.798
	(3.70)	(3.14)	(2.28)	(0.09)	(-0.43)	(3.39)	(1.12)	(6.63)	(0.77)
Severity	-0.850	0.250	14.23*	1.908*	-3.957**	-0.319	-2.922	-0.254	0.128
	(-0.51)	(0.22)	(2.57)	(1.67)	(-3.04)	(-0.26)	(-1.47)	(-0.27)	(0.07)
Risk group (me)	2.348	0.515	2.691	6.206***	1.177	0.233	-0.134	2.279*	0.372
	(1.63)	(0.46)	(1.46)	(3.38)	(1.32)	(0.23)	(-0.09)	(1.99)	(0.22)
Worse employment	3.370***	0.156	-1.913	0.163	1.624*	0.696	2.111*	-0.0646	1.680
	(3.36)	(0.12)	(-1.40)	(0.12)	(1.66)	(0.57)	(1.90)	(-0.08)	(1.40)
Vaccination	2.057**	2.672***	3.707***	2.502*	2.569***	1.972*	1.274*	2.450***	6.941***
	(2.87)	(5.99)	(5.67)	(1.65)	(3.61)	(1.99)	(2.23)	(4.27)	(4.74)
Altruistic vaccination	1.281	-0.0706	-1.534	1.779	0.826	2.731*	0.537	-0.128	2.763*
	(1.41)	(-0.08)	(-1.16)	(1.22)	(1.45)	(2.08)	(0.54)	(-0.21)	(2.36)
Observations	1748	2684	764	1192	2324	572	1304	1936	640

t statistics in parentheses. † p < 0.10, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001.

while the other variables varied along them. Lastly, most variables still showed a relevant unobserved heterogeneity despite the stratification.

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