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RESEARCH ARTICLE

Migrant children's take-up of social health insurance: Experimental evidence from China

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Abstract

There is mounting evidence on the importance of health insurance for children's health and well-being. However, many disadvantaged families do not enroll their eligible children in social health insurance programs. This study examines the effectiveness of interventions aimed at increasing social health insurance enrollment for disadvantaged migrant children in Guangzhou, China. We conducted a two-stage randomized controlled trial with a 3 × 2 design: (1) randomly assigning parents to a control group or one of two treatment groups, where they received digital information on eligibility or eligibility plus comparative benefits and costs; and (2) nudging half of the parents with text message reminders about the enrollment deadline. Informing parents about eligibility alone did not have any impact. However, providing information on eligibility plus comparative benefits and costs increased enrollment in social health insurance in Guangzhou by over 44% (9.4 percentage points). Nudging produced no significant impact. Exploiting treatment group assignment as an instrument for coverage, we were unable to detect any positive effects of having social health insurance in the first year after the intervention.

INTRODUCTION

Substantial evidence underscores the importance of health insurance in promoting children's well-being (Brown et al., 2020; Currie et al., 2008; Dubay & Kenney, 2001). By lowering the price of healthcare, health insurance is expected to increase healthcare utilization (De La Mata, 2012; Dubay & Kenney, 2001). Additional healthcare utilization may translate into improved health, particularly among disadvantaged children, who often lack access to preventive care or face unmet or delayed healthcare needs (Currie & Gruber, 1996; Goodman-Bacon, 2018). In addition, health insurance can provide financial security by protecting people from catastrophic healthcare expenses if they become

injured or sick (Baicker et al., 2013). Thus, having health insurance may also alleviate parental stress (Lave et al., 1998) and allow families to focus on other aspects of children's well-being.

However, many disadvantaged families in both developing and developed countries fail to take up social health insurance for which they are eligible or struggle to choose appropriate health plans (Bocoum et al., 2019; Chemin, 2018; Currie, 2006; Dao, 2020; Giles et al., 2021; Haushofer et al., 2020). While the standard economic approach focuses on the role of prices and information problems that may lead health insurance markets not to function due to adverse selection or moral hazard, these explanations alone are insufficient to account for the absence of insurance coverage or appropriate insurance choice. Recent research has suggested that behavioral frictions may impede the take-up or choice of the appropriate level of health insurance coverage (Baicker et al., 2012; Handel & Schwartzstein, 2018). First, individuals may lack important information about their eligibility for such programs (Currie, 2006). Second, health insurance cost-sharing rules are often complicated, and disadvantaged families may struggle to understand program benefits (Baicker et al., 2012; Bocoum et al., 2019). Third, comparison frictions may occur when multiple health insurance options are available, as it may be cognitively expensive to process several sets of cost-sharing rules (Handel et al., 2019; Kling et al., 2012). Finally, inattention, inertia, or procrastination may impede individuals' ability to take up or switch plans (Domurat et al., 2021).

In China, although all children can participate in universal social health insurance, more than half of migrant children, who are usually disadvantaged socially and economically, fail to enroll in the social health insurance provided at their current place of residence, which we term their "local social health insurance" (Shen, 2022). Some of these children are enrolled instead in what we term their "hometown social health insurance," which is provided at the place of children's hukou (household registration). However, due to the fragmented nature of social health insurance and its lack of geographic portability, for migrant families, their hometown social health insurance does not provide adequate protection for health or against catastrophic costs, as it does not cover outpatient care and only covers 35% to 55% of inpatient spending outside the municipality of enrollment. Local social health insurance, in contrast, provides a much higher level of reimbursement (for a detailed comparison, see Appendix Table A1).[1] Hence, it is irrational to remain enrolled in hometown social health insurance when a child is eligible for local social health insurance. That migrant families would do so is especially surprising when most of our sampled migrant parents reported worrying that health expenses could threaten their financial well-being. Thus, it is likely that behavioral frictions such as those discussed above are impeding families' decision-making. With over 20 million migrant children in China—accounting for over 30% of children in megacities like Shanghai, Guangzhou, and Shenzhen—advancements in policy designs are urgently needed to increase the take-up of local social health insurance among this population.

In this paper, we present the first experimental study examining whether assisting families in overcoming behavioral barriers increases the take-up of local social health insurance among migrant families in China. We implemented a randomized control trial with 1,703 parents of migrant children in nine randomly selected migrant schools in Guangzhou, one of China's largest cities. We designed three treatment arms in two stages (see Figure 1). First, since adult migrants in our setting are not eligible for local social health insurance, and migrant children become eligible only after enrolling in primary school, migrant families may be unaware that their school-age children qualify for local social health insurance. Therefore, we explored the role of information constraints by emphasizing migrant children's eligibility for local social health insurance through digital communications. Second, as parents may believe that their hometown social health insurance provides protection comparable to local social health insurance, we tailored the information intervention to correct this misconception. In our second treatment arm, in addition to informing migrant families about their children's eligibility, we provided simplified and salient information on the comparative benefits and costs of local social health

[1] All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's website and use the search engine to locate the article at http://onlinelibrary.wiley.com.

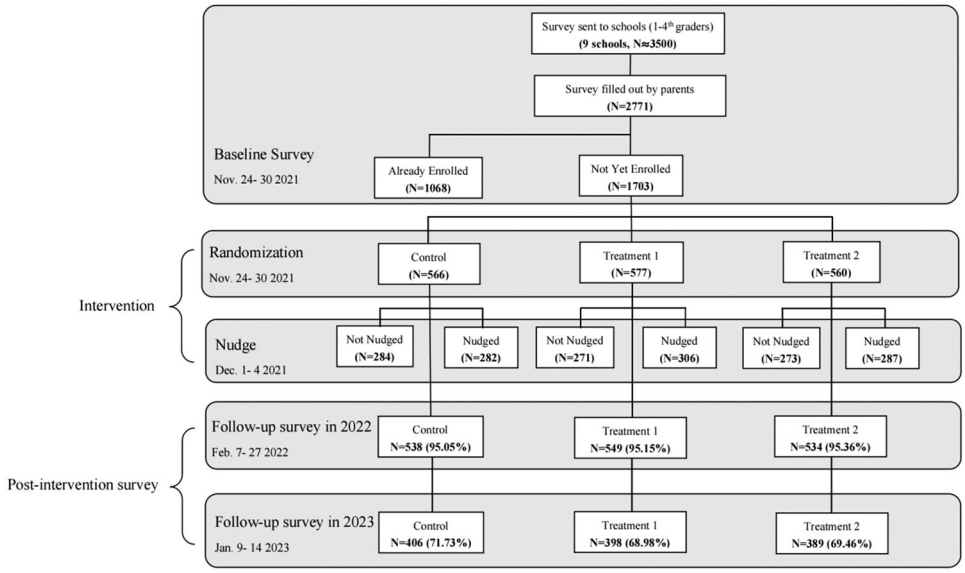

FIGURE 1 Study timeline.

Notes: We drew a random sample of nine migrant schools from a total of 18 migrant schools in two districts in Guangzhou, China. Each parent in the survey was randomly assigned with an equal probability to the control group or to one of two treatment groups. The randomization was automatically performed by the online survey platform and was conducted at the individual level. **Control group** parents were presented with information on insurance prices and deadline reminders. **Treatment 1** parents were presented with control group information plus additional information on their children's eligibility for insurance enrollment. **Treatment 2** parents were presented with Treatment 1 group information plus additional information on comparisons of benefits and costs between Guangzhou Social Health Insurance and their hometown insurance. In the follow-up nudge intervention, each parent was randomly assigned to nudge or control groups. **Nudge group** parents received a text message that further encouraged them to enroll two weeks before the deadline. The survey was first distributed between November 24 and 30, 2021. The **follow-up survey in 2022** was conducted between February 7 and 27, 2022. The **follow-up survey in 2023** was conducted between January 9 and 14, 2023.

insurance versus hometown social health insurance. Third, to examine whether procrastination affects the uptake of social health insurance, we sent parents an enrollment deadline reminder.

We examined the impacts of these interventions by tracking parents' willingness to enroll their children in local social health insurance and their actual enrollment outcomes. We assessed willingness to enroll in health insurance through a survey and gathered information on attempted and actual enrollment via follow-up phone calls. Additionally, we collected information on attempted enrollment, which we defined as a family reporting that they had initiated the enrollment process, to understand whether there are administrative barriers to enrollment. To understand the mechanisms by which the intervention influenced behavior, we posed a series of questions to respondents about their reasons for taking up insurance or not. Furthermore, to understand the effects of having social health insurance in Guangzhou, we conducted follow-up surveys 14 months after the intervention to collect data on children's healthcare utilization, parent-reported children's health, parents' stress regarding healthcare costs for their children in the preceding year, and health insurance enrollment decisions for the subsequent year.

Our interventions yielded four main results. First, we found that only informing families about their children's eligibility did not increase either their willingness to enroll or their actual enrollment. However, providing information about benefits and costs in addition to eligibility increased their willingness to enroll by 7.3 percentage points (or 13.1%) and actual enrollment by 9.4 percentage points (44.3%). We found suggestive but inconclusive evidence that this intervention increased parents' understanding of the benefits and costs of local social health insurance relative to their hometown social health insurance. We also found that it reduced the likelihood of parents reporting they

did not enroll because of their children's default enrollment in their hometown's insurance. This suggests that parents' behavioral responses may be attributable, at least in part, to updated comparative information about social health insurance.

Second, we found that sending a text message as a nudging intervention did not lead to an increase in enrollment, but our study was underpowered to estimate small effects of the nudge.

Third, our survey data suggest that administrative hurdles were a significant barrier to enrollment, with almost half of the parents who attempted but failed to enroll reporting administrative hurdles as their reason. In addition to information interventions, complementary policies designed to ease enrollment processes or make local enrollment the default option are likely needed to further boost enrollment.

Fourth, exploiting treatment group assignment as an instrument for coverage, we did not find any statistically significant effect of having social health insurance on outcomes related to healthcare utilization or parents' stress regarding healthcare costs in the previous year, possibly due to limited statistical power. Also, no significant differences were observed in the use of dental care or parent-reported children's health. The absence of provisions for dental care and preventive care coverage in China's social insurance system, coupled with behavioral frictions faced by migrant parents in making informed medical decisions, might have contributed to the lack of observed effects on health outcomes. Our study detected no differences in enrollment in social health insurance in Guangzhou for the subsequent year, primarily due to increased take-up among the control group and the group exposed to the first treatment arm (eligibility information only).

This study contributes to four sets of literature. First, a burgeoning body of research examines whether providing information can change health insurance take-up patterns (Banerjee et al., 2021; Domurat et al., 2021; Giles et al., 2021). Existing interventions generally require program staff to visit households, send a postcard, or make phone calls. While these approaches are relatively inexpensive to implement, they are not cost-free. In comparison, our intervention was presented digitally, which had zero marginal costs. However, with the increasing prevalence of phishing and disinformation, digital information interventions may be ignored, diminishing their effectiveness. To overcome this challenge, we distributed the information intervention through teacher-parent apps, capitalizing on a trusted information source. Thus, our study suggests an easily scalable approach for providing information to improve decision-making for families with children.

Additionally, our work contributes to the literature on choice friction, which is prevalent in the context of health insurance (Handel & Kolstad, 2015; Heiss et al., 2013; Ho et al., 2017), retirement savings plans (Beshears et al., 2013), and education (Bettinger et al., 2012; Hastings & Weinstein, 2008). Many families may experience comparison friction when the costs and benefits of different options are difficult to evaluate. Building on literature that empirically examined how to reduce choice friction (Domurat et al., 2021; Kling et al., 2012), we designed our intervention to assist families in switching from their default option to a better one. Prior studies have investigated informational and behavioral frictions in complex settings with multiple choices, such as health insurance marketplaces and Medicare Part D prescription drug plans (Handel & Kolstad, 2015; Ho et al., 2017). In these contexts, the sheer number and variety of available plans likely lead to suboptimal decisions (Baicker et al., 2012). In our case, even though parents face only two choices, choosing the optimal plan can be difficult, as different governments with distinct incentives disseminate uncoordinated information about plan benefits. We demonstrate that in such settings, it remains crucial to present key benefits and costs clearly to facilitate decision-making.

This paper also relates to a robust body of work on the impact of administrative burdens on social welfare take-up (Bansak & Raphael, 2007; Currie, 2006; Heinrich, 2018; Heinrich et al., 2022). A growing set of literature points to the policy roots of administrative burdens and shows that some administrative barriers are intentionally created to limit benefit access (Heinrich, 2016; Moynihan et al., 2016; Peeters, 2020). In our research, by eliciting the reasons behind failed enrollment, we were able to identify the role of deliberate administrative hassles imposed by lower-level administrations in restricting access to benefits in a developing country context, where the "bite" of administrative burdens may be pronounced (Heinrich, 2016).

Finally, this paper is connected with the literature that leverages random assignment to assess the impacts of health insurance (Baicker et al., 2013; Finkelstein et al., 2012; Goldin et al., 2021; Malani et al., 2021). Randomized experiments to understand the effects of health insurance are typically costly. Our study demonstrates that an information experiment aimed at increasing take-up can be employed to analyze the downstream effects of the program.

SETTING

To contextualize migrant families' potential behavioral frictions in taking up social health insurance, in this section, we present institutional facts about migrant children in China and China's unequal and fragmented social health insurance system. Since we conducted the experiment in Guangzhou, we also provide details about the enrollment process for migrant children in Guangzhou to offer a clearer understanding of the costs and benefits of adopting or transitioning to social health insurance in this locale.

Disadvantaged migrant children in China

Due to rapid urbanization and industrialization in China, there has been a substantial rural-to-urban migration in the last few decades, leading to the emergence of a new group known as migrant workers. According to the 2020 census, approximately 376 million individuals, or 26.9% of China's population, were working and residing outside their hometowns (National Bureau of Statistics of China, 2021). The majority of migrants in cities do not possess a local hukou and are thus excluded from full access to social benefits where they live.[2]

Many children have also relocated to cities with their parents, becoming in the process migrant children without local hukou. The Education Statistics Yearbook of 2020 states there are over 20 million migrant children aged 6 to 14 in China, accounting for 12.8% of the total child population and over 30% of the child population in megacities like Shanghai, Guangzhou, and Shenzhen (Ministry of Education of the People's Republic of China, 2021). Although all Chinese school-age children are legally entitled to a free and compulsory 9-year education, non-hukou migrant children are not entitled to this free compulsory education in the places they reside.

Consequently, a significant proportion of migrant children in China attend privately operated, lower-quality migrant schools (Chen & Feng, 2017). These schools frequently lack the resources required to provide quality education and often employ inexperienced teachers. Compared with local children, migrant children tend to achieve lower educational test scores, are less inclined to pursue education beyond high school, and face worse outcomes in the job market (Chen & Feng, 2013; Zhang, 2017).

Compared with local children, migrant children are also less healthy (Wang, 2019). Migrant children are more likely to postpone vaccinations and are more susceptible to infectious diseases but often experience delayed treatment (Ke et al., 2020). They are more likely to miss out on preventive care, more prone to conditions like anemia, and more likely to have mental health problems (Hu et al., 2014, 2022).

Unequal and fragmented social health insurance in China

In 2009, amid widespread public discontent about unaffordable access to healthcare and the major financial risks associated with out-of-pocket medical expenses, China established a system of social health insurance with basic benefits to achieve universal coverage with limited public funding

[2] See additional details about hukou and migrant children in Appendix B.

(Yip et al., 2012). This social health insurance is provided through the Urban Employee Basic Medical Insurance (UEBMI) and Urban and Rural Resident Basic Medical Insurance (URBMI) programs. Individuals who are formally employed are required to enroll in UEBMI. Children, the elderly, and those who are unemployed or working in informal sectors can voluntarily enroll in URBMI. In recent years, over 95% of the population has been covered by one of these social health insurance programs (National Healthcare Security Administration, 2022).

The primary goals of establishing this social health insurance system were to reduce individuals' likelihood of incurring catastrophic healthcare costs and to alleviate stress regarding the affordability and accessibility of healthcare services (Yip et al., 2012). As a result, the insurance mainly focused on providing inpatient care benefits while offering outpatient care benefits with a cap coverage and no reimbursements for preventive care.

Because URBMI is largely funded by government subsidies and pooled at the prefecture level, it has traditionally restricted enrollment based on hukou status. Prior to 2016, migrants without a local hukou could not enroll in insurance plans in most cities in which they resided.

Benefits packages and financial protection are not equal across locations within the URBMI scheme due to disparities in economic development (Meng et al., 2015). In more economically developed cities like Beijing, Shenzhen, and Guangzhou, the annual inpatient benefit cap is 680,000 yuan or more, and insurance generally reimburses 80% or more for inpatient admissions at local hospitals. In less developed cities, insurance often has a much lower annual benefit cap for inpatient care (550,000 yuan or less; see Appendix Table A1) and only reimburses 60% to 80% of inpatient admission costs at tertiary hospitals. Furthermore, due to the fragmented nature and limited geographic portability of social health insurance (Giles et al., 2021; Meng, 2012), hometown health insurance typically reimburses only 35% to 55% of costs for out-of-town inpatient visits (see Appendix Table A1). Claims for outpatient visits outside one's social health insurance locality are also not permitted. The differential in inpatient benefits within and outside of one's hometown aims to control the use of healthcare resources beyond household registration areas and to contain rising healthcare expenditures.

However, without outpatient care benefits and with high cost-sharing rates for inpatient care, hometown social health insurance cannot promote the efficient use of healthcare resources, as ambulatory preventive care is paid entirely out-of-pocket. Additionally, it is likely insufficient to offset catastrophic costs for migrant families without local health insurance.

To address this fragmentation in health insurance coverage, the central government issued guidelines in 2016 mandating that cities permit migrants to participate in local social health insurance at their place of residence (State Council of the People's Republic of China, 2016). Presently, many major cities allow the enrollment of migrant children in local social health insurance if they attend schools in that city.

Nevertheless, the uptake of local social health insurance among migrant children remains low. In Guangzhou, for instance, the uptake rate is below 40% for migrant children in primary schools (Shen, 2022). One potential reason could be that information about program eligibility and benefits is not well disseminated. The social health insurance bureau directs schools to distribute a pamphlet detailing program premiums and benefits to every student in November or December, typically ahead of the annual enrollment deadline (Appendix Figure A1). However, given its complexity and lack of information specific to the unique situation of migrant families, migrant parents may overlook the pamphlet, assuming they do not qualify for city-based public programs. Moreover, the pamphlet does not elucidate the differences between hometown and local social health insurance. Migrant families unfamiliar with the limited portability of hometown social health insurance benefits might not grasp the advantages of switching to a local program. Given the intricacies of varying regional social insurance schemes, migrants may find decision-making difficult and consequently opt out of local participation.

Local social health insurance for migrant children in Guangzhou in 2022

Eligibility

Migrant children are eligible to participate in local social health insurance once they start attending primary or secondary school.

Costs and benefits

Similar rules apply to migrant children and those with local hukou: The deadline for enrollment was January 30, 2022, for coverage during the 2022 calendar year. Families pay a fixed annual premium of 363 yuan, and renewal is automatic through bank account deductions. Once enrolled, migrant children are entitled to the same benefits as children with local hukou. To build a tiered healthcare sector and incentivize the use of primary care providers from community health centers, the reimbursement rate for outpatient care at these centers is 80%.[3] For outpatient visits at hospitals, the reimbursement rate ranges from 40% to 50%. The annual benefit cap for outpatient care is 1,000 yuan. Vision and dental care are typically not covered. For inpatient care, the reimbursement rate is 80% for tertiary hospitals, with an annual benefit cap of 680,000 yuan.

Participation

Participation is voluntary. Parents receive a pamphlet announcing the enrollment phase for the upcoming year and can enroll their children at their local subdistrict office using a national identification card.

EXPERIMENT

Study setting and sample

Working with the local government, we drew a random sample of nine migrant schools in two districts of Guangzhou, one of the largest and most developed cities in China. With a population of over 18 million, 9 million of whom are migrants, Guangzhou is the third most populous city and has the second largest migrant population in China.

We chose to carry out the experiment in two of the eleven districts in Guangzhou. There are nine migrant primary schools in each of these two districts. In District A, we conducted the experiment in six randomly selected schools. In District B, we conducted the experiment in three randomly selected schools.

Upon identifying the project schools, we worked with school principals to administer an online survey to parents of students in grades 1 through 4. Principals required head teachers to disseminate the survey to parents and track take-up of the survey through official teacher-parent online chat groups. These chat groups are used to announce important tasks and dates, such as parent-school meetings, upcoming exams, or the end or beginning of the school year. When announcements are sent out, parents are typically asked to report that they have read and understand them. We asked teachers to send out identical pre-prepared notes to parents explaining the purpose of the survey and asking every parent to voluntarily fill it out (see Appendix Figure C1 for the survey poster).

[3] See additional details about cost-sharing rates and community health centers in Appendix A.

The survey was administered in November 2021, two months before the open enrollment deadline. There were approximately 3,500 students enrolled in grades 1 through 4 across the nine schools to which we distributed the survey. Our final sample included 2,771 parents who completed the survey. This indicates a survey completion rate of around 79% among parents.[4] Examining this specific group of parents holds policy relevance, as they demonstrated a willingness to engage with informational outreach efforts. In addition, even though all the data we analyzed were self-reported by parents in surveys or phone interviews, we believe that the data are of high quality because we earned parents' trust. This was possible through close collaboration with the local government and the project schools, as well as through revealing our intentions in the surveys and conversations to help migrant families make better decisions. For example, many parents were willing to have long, detailed conversations with us to share their experiences and thoughts about social health insurance. Some of the parents even called back and asked follow-up questions about how to enroll in social health insurance themselves or how to choose a middle school for their children. In addition, parents' reported willingness to enroll, as indicated in the survey, is predictive of actual enrollment as reported in the phone interviews 3 months later (Appendix Figure C6).

To assess the external validity of this paper, we conducted a comparison of descriptive statistics for the sample employed in this study with data from the China Migrants Dynamic Survey (CMDS) in 2018. (For further details on CMDS, refer to Appendix E.) Our analysis revealed a similar level of education among migrants in our sample compared with those residing in Guangzhou and areas outside of Guangzhou, based on the CMDS data. These reassuring findings suggest the possibility of broader implications for our intervention beyond the specific participants in our study.

Experiment design

Among the 2,771 parents who completed the survey, 1,068 parents had children already enrolled in Guangzhou Social Health Insurance for the next year, and 1,703 parents had children who had not yet enrolled. We conducted the experiment with the 1,703 parents whose children had not yet enrolled in local social health insurance for the next year, 1 month before the deadline. At the end of the baseline survey, these parents were randomly assigned with equal probability to the control group or one of two treatment groups with simple but salient information targeting the informational constraints of insurance take-up: (1) eligibility to enroll in Guangzhou Social Health Insurance; and (2) eligibility plus the comparative benefits and costs of Guangzhou Social Health Insurance relative to parents' default options. Figure 1 summarizes the experimental design.

As we randomized the parents at the individual level, it is plausible that parents may have discussed and disseminated the information received during the intervention. Such potential leakage of information to the control group might have led to an underestimation of the actual effects of the two treatments. Consequently, our findings likely offer a conservative estimate of the treatments' lower-bound effects.

Our information interventions built on the official advertisement from the Guangzhou Social Health Insurance Bureau but added simplified, salient, and comparative information. Expecting limited attention from migrant parents and following the literature on salience (Bettinger et al., 2022), we designed our information intervention to be visually appealing and salient by using a relatively large font in a professional, colorful layout to draw respondents' attention.

In designing and pre-testing the interventions, we conducted focus-group interviews with principals and teachers at all schools to obtain feedback. We also interviewed parents in migrant schools in other districts and conducted a pilot experiment in another migrant school. Additionally, we held extensive

[4] It is important to note that parents who did not complete the survey may differ from those who did participate. Due to the absence of demographic information for non-responding parents, we cannot draw inferences about this particular subgroup, and our study is thus subject to potential nonresponse bias.

consultations with relevant program managers and staff responsible for administering health insurance enrollment, both in Guangzhou and in potential hometown provinces of migrant families.

Control group information

Parents randomly assigned to the control group received information about (1) the importance of social health insurance ("Enrollment in social health insurance can protect your children's health and your financial security"); (2) the insurance premium; (3) the enrollment deadline; and (4) insurance enrollment channels, including a walk-in office and the official app. The last three components were highlighted in a graph (Appendix Figure C2). The information provided to the control group represents the status quo information to which parents should have been exposed through schools or social media advertisements promoted by the Guangzhou Social Health Insurance Bureau.

Treatment 1 (T1): Eligibility information

In addition to all the information presented to the control group parents, T1 emphasized that all students, especially "your children," were eligible for local social health insurance in both the text and the accompanying graph (see Appendix Figure C3). This treatment arm aimed to test whether a lack of information about eligibility contributes to the low take-up of insurance. Although the Guangzhou Social Health Insurance Bureau promoted information about insurance and schools directly communicated this information through brochures distributed to students and their parents, limited access to such information or inattention may cause parents to incorrectly believe that migrant children are ineligible to enroll in Guangzhou Social Health Insurance.

Treatment 2 (T2): Eligibility + benefits and costs information

In addition to all the information presented to control group parents and the eligibility information presented to T1 parents, T2 added details on the benefits and costs of enrolling in Guangzhou Social Health Insurance compared with children's hometown social health insurance (see Appendix Figure C4). Specifically, the advertisement explained that the annual premium in Guangzhou is only 43 yuan extra compared with "your hometown social health insurance." Additionally, the advertisement noted that the Guangzhou Social Health Insurance covers inpatient care at a rate of 80%, which is 30%–45% higher than "your hometown social health insurance." For instance, if someone receives treatment for appendicitis at a cost of 10,000 yuan, they can claim 5,000 yuan more with Guangzhou Social Health Insurance. The advertisement also highlighted that "your hometown social health insurance" does not cover outpatient care in Guangzhou, whereas Guangzhou Social Health Insurance offers outpatient care coverage with a cap of 1,000 yuan. This presentation represents a simplified version of the benefits compared with those outlined in the program's official pamphlet, which displays extensive tables detailing insurance coverage and annual benefits by hospital and referral type (Appendix Figure A1). We emphasized only the annual benefit for outpatient care and the reimbursement rate for tertiary hospitals since these are the most pertinent pieces of information for families in China. This simplified and direct comparison between Guangzhou and hometown social health insurance was intended to alleviate comparison frictions that parents may encounter.

Nudge

In the week following the experiment, we randomly sent nudges to half of the parents via a text message (Appendix Figure C5), reminding them that (1) possessing social health insurance can protect

their children's health and their financial security; (2) the deadline was approaching; and (3) missing the deadline would require them to wait an entire year to obtain coverage for their children. The nudge content was adapted from public promotional messages disseminated by the Guangzhou Social Health Insurance Bureau. We cross-randomized the nudge and control groups with the three groups assigned previously.[5]

Data sources

We collected data in three waves. First, in the baseline survey administered in the first week of November 2021, we asked if parents had already enrolled their children in local social health insurance for the next year. We excluded those already enrolled from our experiment, but we asked basic questions about their family's demographic characteristics, health status, previous healthcare utilization, and knowledge of the social health insurance program to understand selection into social health insurance. Immediately following the informational interventions, we surveyed parents in the experiment sample ($N = 1{,}703$) about their intentions and willingness to enroll their children in Guangzhou Social Health Insurance, their willingness to pay for Guangzhou Social Health Insurance, whether they were concerned that obtaining medical care is difficult and expensive for children in Guangzhou, and whether they felt that living in Guangzhou was stressful.

Second, we made follow-up calls in the first 2 weeks of February 2022, after the health insurance enrollment deadline. At the end of the post-intervention survey, parents voluntarily shared with us their phone numbers and were informed that there would be a follow-up phone call about their enrollment outcomes. The follow-up calls were conducted by six program staff who are college students. We trained these program staff to ask a set of standardized questions and code the outcomes consistently. Specifically, they asked whether families had enrolled their children in Guangzhou Social Health Insurance for the period from January to December 2022. If they had not, program staffs asked whether they had attempted to enroll and their specific reasons for not enrolling. We were successful in following up with 1,621 (95.2%) of the 1,703 parents in the initial experimental sample.[6]

Third, in the second year after the intervention (the first week of January 2023), we conducted a second follow-up survey to gather information on children's healthcare utilization with a 12-month look-back period, including whether the child had used any primary care provider or outpatient services, whether the child had not sought a healthcare provider when sick, whether the child had been hospitalized, and whether the child had received any dental care. We also gathered information on parent-reported children's health and parental stress regarding healthcare costs for children with a 12-month look-back period. In addition, we asked about children's enrollment in Guangzhou Social Health Insurance for the subsequent year (January to December 2023).[7] Initially, the school principals distributed the questionnaires. Our trained program staff contacted parents who did not respond to the questionnaires sent by their principals and asked the exact questions from the questionnaire during phone calls. We successfully conducted follow-ups with 1,193 (70.1%) out of the initial experimental sample of 1,703 parents. Among these, 57.8% of parents responded to the questionnaires distributed

[5] Unlike the first-round randomization, where we randomized parents without using their baseline survey data, for the nudge intervention randomization, we checked the covariate balance using both baseline survey data and first-round randomized group information and selected the randomization plan with the largest balance p-value from 50 randomization draws.

[6] When parents were not reached on a first attempt, program staffs followed a protocol that required repeated efforts at contact by phone every day or every other day over a 1-week period. To increase the probability of contact, calls were made at different times of day. An individual was only classified as lost to attrition if no contact was made after one week of successive efforts.

[7] For Chinese migrants, the new year does not begin until after the Chinese New Year. Thus, even though we conducted the survey in January 2023, we nevertheless used the lunar calendar and asked parents about health enrollment for the next year in our interview.

by their principals, while 42.2% responded to the questionnaires during the phone calls conducted by our program staffs.[8]

Empirical specification

Under our randomized design, the intervention effect is identified by comparing the means of the insurance outcomes (willingness to enroll and enrollment) across the treatment and control groups. We first estimated the following linear model for the primary information interventions:

$$Insurance_i = \beta_0 + \beta_1 T1\,(Eligibility)_i + \beta_2 T2\,(Eligibility + Comparison)_i + X_i\beta_3 + \varepsilon_i \quad (1)$$

where $T1\,(Eligibility)_i$ and $T2\,(Eligibility + Comparison)_i$ are dummy variables equal to 1 if the parent of child i was randomly assigned to the respective treatment group. y_i represents willingness to enroll or enrollment in social health insurance in Guangzhou. Controlling for a vector of pre-randomization child and parent variables as well as school-by-grade fixed effects should yield similar but more precisely estimated results. We present robust standard errors accounting for heteroskedasticity and report *p*-values using the wild cluster bootstrap method with standard errors clustered at the school level to address the challenge of a small number of clusters, as recommended by Cameron et al. (2008). Considering multiple inferences, we defined our primary and secondary outcomes prior to data collection. In addition, we grouped the outcomes into six families of hypothesis tests: intention and actual take-up of social health insurance in 2022; additional outcomes measured in 2022; reasons for willingness to enroll in social health insurance; reasons for not enrolling in social health insurance; and additional outcomes in 2023. We then adjusted for the familywise error rate using Romano-Wolf stepdown adjusted *p*-values. We fitted a linear probability model, as it provides consistent estimates in the absence of covariates or in a fully saturated model (Angrist & Pischke, 2009). As a sensitivity check, we also estimated the results using a logistic regression.

RESULTS ON INSURANCE TAKE-UP IN 2022

Selection into social health insurance

Before examining the effects of the information interventions, it is important to consider selection into our experiment. Our main analyses focus on the experimental sample of parents who had not yet enrolled their children in Guangzhou Social Health Insurance by the time of the intervention. This is a self-selected sample, as most of the parents would not have enrolled in the absence of our informational interventions. This also suggests that conventional policy interventions (e.g., social media advertisements or school promotions) may not work for them.

Table 1 compares the already-insured and uninsured samples prior to our intervention. Consistent with prior literature (Cutler & Reber, 1998; Domurat et al., 2021), we found evidence of both adverse selection and positive selection. Both children and parents who reported inpatient or outpatient visits in the previous year were more likely to enroll, suggesting the possibility of adverse selection. The parents of insured children were more likely to hold a formal job and were more likely to be natives of Guangdong Province, suggesting the possibility of positive selection. Furthermore, parents who had health insurance coverage were more likely to enroll their children in Guangzhou Social Health

[8] Our follow-up with families during this round was less successful due to multiple factors. First, the reduced participation of parents in teacher-parent online chat groups during the vacation session resulted in a lower response rate to our questionnaire. Additionally, China's zero-COVID policy may have contributed to increased unemployment and relocation among migrant families.

TABLE 1 Comparison between the already-insured and uninsured samples prior to intervention in 2021.

	Dependent variable: Already insured in 2021 (= 1)
Child characteristics	
Female	−0.005
	(0.018)
Age	−0.007
	(0.014)
Hukou outside of Guangdong Province	−0.082***
	(0.018)
Number of siblings	−0.014
	(0.012)
Child's healthcare utilization in 2021	
Purchased medicine from a pharmacy	−0.005
	(0.026)
Had any outpatient or inpatient visits	0.094***
	(0.027)
Parent characteristics	
Respondent is mother	0.020
	(0.020)
Parent education: below high school	0.011
	(0.018)
Parent holds a formal job	0.040*
	(0.021)
Parent is healthy	−0.002
	(0.018)
Parent healthcare expenses < 500 yuan	−0.098***
	(0.020)
Parent has URBMI insurance	0.114***
	(0.019)
Familiar with insurance information	0.263***
	(0.020)
N	2,771

Notes: This table compares the observable differences between those who were already insured and who were not insured one month before the deadline using a linear probability model. The sample used for this analysis includes every parent who filled out our survey in November 2021 ($N = 2{,}771$). Robust standard errors are reported in parentheses. The regression controls for school-by-grade fixed effects. *$p < .10$; **$p < .05$; ***$p < .01$.

Insurance. This finding is consistent with existing literature that suggests health insurance is an "experience good" (Banerjee et al., 2021; Delavallade, 2017).

Summary statistics and balance tests

The endline sample ($N = 1{,}621$) collected in February 2022 serves as the primary analytical sample on insurance take-up. Table 2 presents individual-level summary statistics for the sample whose

TABLE 2 Balance tests of the endline sample in 2022.

	All	Control	T1	T2	ANOVA *p*-value
Assignment to nudge group	0.516	0.504	0.536	0.507	0.518
	(0.500)	(0.500)	(0.499)	(0.500)	
Predicted insurance enrollment probability	0.549	0.559	0.534	0.553	0.372
	(0.313)	(0.309)	(0.323)	(0.307)	
Child characteristics					
Female	0.434	0.416	0.435	0.449	0.548
	(0.496)	(0.493)	(0.496)	(0.498)	
Age	7.979	7.996	7.987	7.953	0.853
	(1.317)	(1.286)	(1.324)	(1.342)	
Hukou outside of Guangdong Province	0.499	0.507	0.515	0.474	0.349
	(0.500)	(0.500)	(0.500)	(0.500)	
Number of siblings	1.936	1.894	1.949	1.966	0.252
	(0.745)	(0.741)	(0.755)	(0.737)	
Child's healthcare utilization in 2021					
Did not see a provider or purchase medicine from a pharmacy	0.338	0.346	0.321	0.348	0.566
	(0.473)	(0.476)	(0.467)	(0.477)	
Purchased medicine from a pharmacy	0.291	0.284	0.290	0.298	0.889
	(0.454)	(0.452)	(0.454)	(0.458)	
Had any outpatient or inpatient visits	0.371	0.370	0.390	0.354	0.473
	(0.483)	(0.483)	(0.488)	(0.479)	
Pre-treatment enrollment intention					
Will not enroll	0.213	0.191	0.244	0.202	0.081
	(0.409)	(0.394)	(0.430)	(0.402)	
Still hesitating	0.294	0.322	0.264	0.298	0.113
	(0.456)	(0.468)	(0.441)	(0.458)	
Does not know child is eligible	0.209	0.191	0.220	0.213	0.473
	(0.406)	(0.394)	(0.415)	(0.410)	
Will enroll later (before deadline)	0.284	0.296	0.271	0.287	0.672
	(0.451)	(0.457)	(0.445)	(0.453)	
Parent characteristics					
Respondent is mother	0.713	0.704	0.710	0.725	0.753
	(0.452)	(0.457)	(0.454)	(0.447)	
Parent education: below high school	0.506	0.478	0.541	0.498	0.103
	(0.500)	(0.500)	(0.499)	(0.500)	
Parent holds a formal job	0.217	0.234	0.211	0.206	0.492
	(0.412)	(0.424)	(0.409)	(0.405)	
Parent is healthy	0.590	0.597	0.592	0.582	0.890
	(0.492)	(0.491)	(0.492)	(0.494)	

(Continues)

TABLE 2 (Continued)

	All	Control	T1	T2	ANOVA *p*-value
Parent healthcare expenses < 500 yuan	0.723	0.730	0.719	0.719	0.894
	(0.448)	(0.444)	(0.450)	(0.450)	
Parent has URBMI insurance	0.694	0.716	0.678	0.689	0.380
	(0.461)	(0.452)	(0.468)	(0.463)	
Familiar with insurance information	0.175	0.164	0.182	0.180	0.683
	(0.380)	(0.370)	(0.386)	(0.384)	
Child's current grade					
1st grade	0.349	0.336	0.364	0.345	0.612
	(0.477)	(0.473)	(0.482)	(0.476)	
2nd grade	0.207	0.208	0.199	0.213	0.827
	(0.405)	(0.406)	(0.399)	(0.410)	
3rd grade	0.238	0.249	0.217	0.249	0.352
	(0.426)	(0.433)	(0.412)	(0.433)	
4th grade	0.207	0.206	0.220	0.193	0.536
	(0.405)	(0.405)	(0.415)	(0.395)	
N	1,621	538	549	534	

Notes: This table presents covariate balance tests based on the endline sample collected in February 2022 ($N = 1{,}621$). The last column displays *p*-values obtained from ANOVA analyses, which assess the differences in each variable across the control group and the two treatment groups. The *p*-value resulting from a joint *F*-test, derived from a multinomial logit model predicting treatment assignment using all variables, is reported as .868. The predicted probability of insurance enrollment was obtained from a logit model trained using the control sample and all covariates included in the table. Standard deviations are presented in parentheses.

enrollment outcomes we measured ($N = 1{,}621$) and information about covariate balance in the first-round randomization. Appendix Table D1 presents individual-level summary statistics for the initial experimental sample ($N = 1{,}703$) and information about covariate balance in the first-round randomization. Appendix Table D2 presents information for the six subgroups in the second-round randomization.

The last column in Table 2 checks the covariate balance between the treatment and control groups. The randomization was successful in that the treatment and control groups are quite similar in most respects. Only one out of the 23 ANOVA tests is significant at the 10% level ($p = .081$). A test of joint significance across all variables fails to reject the null hypothesis of equality between the treatment and control groups ($p = .868$). To summarize the covariate information, we predict the insurance enrollment probability for each child in the experimental sample by estimating a logit model using the control sample and all the covariates in Table 1. The average predicted insurance probabilities conditional on baseline covariates are very close across groups (shown in the second row). We present nearly identical results using the baseline sample ($N = 1{,}703$) for outcomes measured in the survey (Appendix Table D1). In addition, Appendix Table D3 suggests that there was no differential attrition between the treatment and control groups.

Effects of the information interventions

The main treatment effects are illustrated in Figure 2, depicting mean outcomes (willingness to enroll and actual enrollment) for the treatment and control groups. In the control group, 55.9% of participants

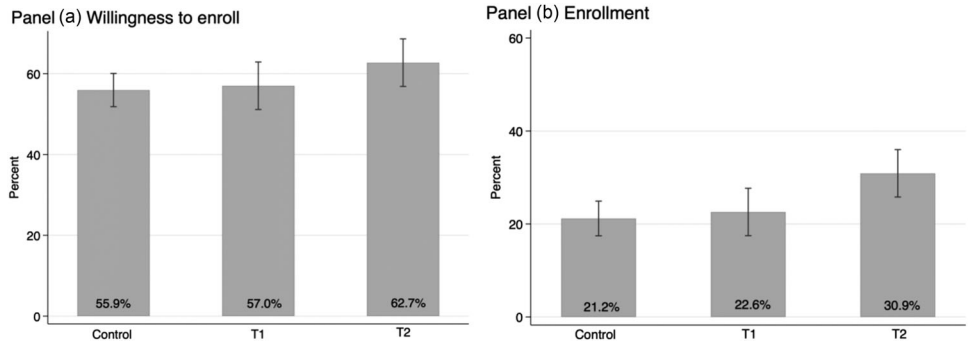

FIGURE 2 Mean difference in willingness to enroll and enrollment in 2022

Notes: The two panels of the above figure show the means and 95% confidence intervals for willingness to enroll (measured in 0/1) and enrollment (measured in 0/1) in social health insurance in Guangzhou among the treatment and control groups. Willingness to enroll was measured in the survey following the informational intervention in December 2021. Enrollment was measured through a phone interview after the enrollment period closed in February 2022.

expressed willingness to enroll in Guangzhou Social Health Insurance. This percentage is 57% in the T1 arm (eligibility information only) and 62.7% in the T2 arm (eligibility plus benefits and costs information). Regarding actual enrollment, only 21.2% of parents in the control arm enrolled their children in Guangzhou Social Health Insurance despite 55.9% expressing willingness to do so. This enrollment figure is 22.6% in the T1 arm and 30.9% in the T2 arm.

Table 3 presents the formal estimates of the impacts of the information interventions on insurance enrollment outcomes using equation 1, with control variables added stepwise. Because of the individual-level randomization, controlling for different pre-intervention covariates yields very similar results. T1 had no statistically significant effect on either willingness to enroll or enrollment. In contrast, T2 substantially increased migrant parents' willingness to enroll their children in Guangzhou Social Health Insurance. Column 3 shows that providing information that migrant children are eligible for insurance coverage is associated with an increase in willingness to enroll by 3.4 percentage points (or 6.1%), but this increase is not statistically significant. On the other hand, T2 more than doubled the impact (7.3 percentage points, or 13.1%, $p = .002$). Panel B of Table 3 reports results on actual enrollment. T2 increased enrollment by 9.4 percentage points ($p < .001$), a 44.3% increase from the control group mean. We also surveyed parents' willingness to enroll using a 4-point scale and found consistent results (Appendix Table D4). A regression using data from the baseline sample also yielded similar results on willingness to enroll (Appendix Table D5). Further, these results are robust when applying a wild bootstrap method, controlling for multipole hypothesis testing (Appendix Table D6), or employing a logistic regression (Appendix Table D7).

The larger impact on actual enrollment compared with willingness to enroll between the treatment and control groups in Table 3 may be due to a greater likelihood of parents in the T2 arm to persist through the enrollment process. In fact, parents in T2 were more likely to persist from willingness to enroll to successful enrollment and were more likely to persist from attempting to enroll to successful enrollment (Appendix Table D8).

On the other hand, our treatment did not increase parents' willingness to pay for Guangzhou Social Health Insurance (column 1 of Appendix Table D9). While a very high percentage of migrant parents indicated that they were concerned that obtaining medical care is difficult and expensive for children in Guangzhou, and that they experienced significant stress living in Guangzhou, our information treatment did not have any impact on these outcomes immediately following the intervention (columns 2 and 3 of Appendix Table D9).

TABLE 3 Effects of informational interventions on willingness to enroll and enrollment in 2022.

	(1)	(2)	(3)
	Panel A. Dependent variable: Willingness to enroll in 2022 (= 1)		
Control mean	0.559	0.559	0.559
T1 (eligibility)	0.008	0.026	0.034
	(0.030)	(0.025)	(0.024)
p-value: robust SE	0.784	0.290	0.170
p-value: wild bootstrap	0.759	0.159	0.099
T2 (eligibility + comparison)	0.064**	0.066***	0.073***
	(0.030)	(0.024)	(0.024)
p-value: robust SE	0.033	0.006	0.002
p-value: wild bootstrap	0.021	0.005	0.004
p-value for T1 = T2	0.062	0.088	0.088
N	1,621	1,621	1,621
	(1)	**(2)**	**(3)**
	Panel B. Dependent variable: Enrollment in 2022 (= 1)		
Control mean	0.212	0.212	0.212
T1 (eligibility)	0.014	0.023	0.023
	(0.025)	(0.024)	(0.024)
p-value: robust SE	0.569	0.324	0.339
p-value: wild bootstrap	0.610	0.334	0.334
T2 (eligibility + comparison)	0.096***	0.098***	0.094***
	(0.026)	(0.025)	(0.025)
p-value: robust SE	<0.001	<0.001	<0.001
p-value: wild bootstrap	0.054	0.020	0.020
p-value for T1 = T2	0.002	0.003	0.004
N	1,621	1,621	1,621
School-by-grade fixed effects	Y	Y	Y
Pre-treatment intention		Y	Y
Full set of controls			Y

Notes: The dependent variables are willingness to enroll in social health insurance in Guangzhou (Panel A) and insurance enrollment (Panel B). Willingness to enroll in social health insurance in Guangzhou was measured in the survey following the informational intervention in December 2021. Enrollment in Guangzhou Social Health Insurance was measured through a phone interview in February 2022. This table uses the endline sample in 2022 (N = 1,621). The list of covariates is presented in Table 2. Robust standard errors are reported in parentheses. Wild bootstrap p-values with standard errors clustered at the school level are reported. *$p < .10$; **$p < .05$; ***$p < .01$.

Potential mechanisms

Appendix Table D10 presents an analysis of the various reported reasons why parents planned to enroll in Guangzhou Social Health Insurance. This information helps reveal the underlying mechanisms by which the information interventions changed parents' insurance intentions.

Parents in the T2 arm were more likely to report a willingness to enroll due to the better outpatient and inpatient coverage offered by Guangzhou Social Health Insurance (columns 2 and 3). This suggests that parents processed and retained information from our information treatment. Parents in T2 were also more likely than control group parents to say that the insurance premium was

reasonably priced (column 4), possibly due to the informational intervention presenting costs relative to their hometown social health insurance and also because they possessed a better understanding of the benefits. Appendix Table D11 presents the endline survey results regarding reasons why parents did not enroll children in social health insurance in Guangzhou. First, consistent with earlier results, parents in T2 were less likely to report that they did not enroll in Guangzhou Social Health Insurance because of their default enrollment in their hometown social health insurance (column 1). This shows that parents not only understood but remembered the benefits of Guangzhou's Social Health Insurance in comparison to their hometown social health insurance, and so were aware that enrollment in their hometowns was not an adequate reason for non-enrollment in Guangzhou. However, none of these differences are statistically significant when we correct for multiple hypothesis testing (Appendix Table D6). Hence, it should be interpreted as suggestive but inconclusive evidences only. Second, parents in T2 were less likely to report that they did not enroll because of administrative barriers in Guangzhou (columns 3 and 4). This difference is statistically significant at the 10 percent level when accounting for multiple hypothesis test.

Heterogeneous treatment effects

Our interventions provided treated parents with information about their children's eligibility for Guangzhou Social Health Insurance and the additional benefits relative to their hometown's default social health insurance plan. Therefore, the interventions should have had a larger impact on parents who had limited access to such information or did not attend to it. To empirically test this hypothesis, we identified parents' pre-intervention intentions by asking them why they had not yet enrolled their children in insurance for the next year and separated them into four groups based on their responses: (1) they were determined not to enroll; (2) they were still hesitating about whether to enroll; (3) they did not know their children were eligible for Guangzhou Social Health Insurance; or (4) they would enroll nearer to the deadline.

Appendix Table D12 presents the impacts of the interventions separately for each group, defined ex-post of the experiment. Panel A examines parents' willingness to enroll. In column 3, among parents who lacked information about eligibility, T1 increased willingness to enroll. T1 had no impact on parents who likely already possessed such information (columns 1, 2, and 4). T2 also increased willingness to enroll among parents who lacked information about eligibility. Among parents who reported feeling hesitant about enrollment and those who were unwilling to enroll before the intervention, the information interventions did not affect them in any statistically significant way.

Panel B shows patterns in actual enrollment. T1 did not increase insurance enrollment, even among parents who did not know their children were eligible to enroll—a group whose willingness to enroll increased substantially. One possibility for this outcome is that affected parents in T1 may have encountered additional barriers in the enrollment process, as discussed in the section on reasons for non-enrollment. T2 increased enrollment by 15.5 percentage points (79.9%) relative to the control mean among parents who did not know their children were eligible to enroll. A change of similar magnitude occurred among parents who expressed hesitation about whether to enroll (10.6 percentage points, 91.4%). While T2 also increased enrollment among parents who reported that they would enroll later, the estimates were imprecisely estimated.

As with the observational differences between already-insured and uninsured children, our findings suggest adverse selection in the treatment effects among uninsured children by the time of the intervention (Appendix Table D14). Children who saw a provider or purchased medicine from a pharmacy, parents who reported being unhealthy, and parents who incurred more than 500 yuan in medical expenses in the previous year were much more likely to respond to T2. We also observed evidence of positive selection: Families with hukou in Guangdong are more likely to have better social networks in Guangzhou, and they were more likely to respond to treatment. Lastly, the intervention effects are concentrated on mothers, suggesting that targeting women is important for effectiveness.

TABLE 4 Null effects of nudge on enrollment in 2022.

	(1)	(2)	(3)
	Dependent variable: Enrollment in 2022 (= 1)		
Control mean	0.212	0.212	0.212
T1 (eligibility)	0.012	0.022	0.026
	(0.036)	(0.034)	(0.034)
p-value: robust SE	0.738	0.522	0.452
p-value: wild bootstrap	0.786	0.603	0.523
T2 (eligibility + comparison)	0.093**	0.104***	0.102***
	(0.037)	(0.036)	(0.036)
p-value: robust SE	0.013	0.004	0.005
p-value: wild bootstrap	0.209	0.124	0.107
T1 * nudge	0.003	0.002	−0.007
	(0.051)	(0.048)	(0.048)
p-value: robust SE	0.947	0.975	0.887
p-value: wild bootstrap	0.936	0.981	0.903
T2 * nudge	0.006	−0.012	−0.016
	(0.053)	(0.051)	(0.051)
p-value: robust SE	0.913	0.805	0.748
p-value: wild bootstrap	0.925	0.828	0.773
Nudge	0.012	0.024	0.023
	(0.036)	(0.034)	(0.034)
p-value: robust SE	0.728	0.484	0.498
p-value: wild bootstrap	0.595	0.117	0.237
p-value for T1 = T2	0.033	0.023	0.036
p-value for T1 = nudge	0.993	0.956	0.938
p-value for T2 = nudge	0.031	0.025	0.028
N	1,621	1,621	1,621
School-by-grade fixed effects	Y	Y	Y
Pre-treatment intention		Y	Y
Full set of controls			Y

Notes: The dependent variable is insurance enrollment. Enrollment in Guangzhou Social Health Insurance was measured through a phone interview in February 2022. This table uses the endline sample in 2022 ($N = 1{,}621$). The list of covariates is presented in Table 2. Robust standard errors are reported in parentheses. Wild bootstrap *p*-values with standard errors clustered at the school level are reported. $^{*}p < .10$; $^{**}p < .05$; $^{***}p < .01$.

Null effects of nudging

As shown in Table 4, nudging did not substantially increase insurance take-up. In column 3, among parents who did not receive first-round information interventions, nudging is insignificantly associated with an increase in enrollment of 2.3 percentage points (10.8% relative to the control mean). In comparison, generic reminders about enrollment deadlines increased the take-up of health insurance coverage by 2.2 percentage points in the Massachusetts health insurance marketplace in a randomized controlled trial (Ericson et al., 2023) and by 1.3 percentage points in California's health insurance marketplace (Domurat et al., 2021). Moreover, the average impact of the 126 RCTs summarized by

DellaVigna and Linos (2022) indicates a 1.4 percentage point increase for larger government implementations. Due to our limited sample size, our study was underpowered to detect small nudge effects, leading to a coefficient that aligns with previous literature but is imprecisely estimated.

An explanation for the small effect of the nudge could be that the nudge intervention was redundant for some parents, as school districts had already sent a separate text reminder before the deadline. According to our endline survey, fewer than 1% of parents ($N = 10$) either forgot to enroll their children in social health insurance in Guangzhou or missed the enrollment deadline, suggesting that forgetfulness and procrastination were not the main reasons parents failed to enroll their children in local social health insurance (Appendix Figure C7).

Reasons for non-enrollment

Even though we found a large increase in the take-up of social health insurance driven by combined information about eligibility and benefits, the overall take-up rate for the T2 arm was only 30.9%. Hence, the intervention was not sufficient to achieve universal health insurance coverage for migrant children. We also observed a large difference in rates of willingness to enroll (55.9% in the control group) and successful enrollment (21.2% in the control group). Thus, it is important to understand the reasons why parents did not enroll their children in social health insurance.

Appendix Figure C7 presents the distribution of reasons for non-enrollment. While cost has been mentioned as an important barrier to obtaining social health insurance in previous literature (Banerjee et al., 2021), less than 1% of parents ($N = 7$) mentioned that the insurance price was too high, suggesting that, in our context, price does not play a major role in parents' decisions regarding insuring their children. In our setting, the annual premium is not large in relative terms (around 0.3% of annual household income for migrants), and many parents were already purchasing their hometown social health insurance at a similar price; thus, the small difference in fee would probably not affect their take-up rate.

Another commonly mentioned barrier to take-up is administrative hassles (Banerjee et al., 2021; Bansak & Raphael, 2007; Heinrich et al., 2022). Thirty-six percent of parents reported that they attempted but failed to enroll. Among them, 41.1% reported that they did not enroll due to various administrative hurdles (Appendix Figure C8). Specifically, 29.9% of parents who attempted but failed to enroll reported that they did not know how to enroll, as they did not know how to use the online app or did not know how to prepare the necessary documents. In addition, 12.4% of those who attempted but failed to enroll reported that they could not enroll because they were unable to exit their hometown social health insurance. Due to the policy of single enrollment in social health insurance, they could not enroll in both hometown and local social health insurance.

Their experiences may mirror broader issues. Health insurance bureaus aim to keep a healthy pool of residents for funding balance. In addition, official policy documents clearly state that bureaucratic promotion within the social security bureau is linked with health insurance enrollment share, using the number of people with hukou in the prefecture as the basis (National Healthcare Security Administration, 2023). Thus, while the central government encourages the facilitation of residents' ability to discontinue coverage online, prefecture-level health insurance bureaus may use their discretionary power to create hurdles for migrants—for instance, by requiring multiple original documents, which sometimes must be presented in person. To understand this issue more clearly, prior to our experiment, we contacted social bureau offices across 29 prefectures to inquire about the procedures involved in discontinuing coverage (see Appendix F). These prefectures are likely origins of the migrants, as they included all 21 prefectures in Guangdong Province, excluding Guangzhou (50% of the parents migrated from prefectures within Guangdong) and four prefectures each in the nearby provinces of Hunan and Guangxi. In 13 out of the 29 prefectures, in order to exit their hometown social health insurance, families would be required to visit the district office in person and present multiple documents, such as proof of attempted enrollment in places where their children reside. Given that parents

would need to buy train tickets and take leave from work, this could create a major administrative challenge.

Thus, in addition to information interventions, complementary policies are needed to improve insurance take-up among migrant families. Simplifying the application process, providing the opportunity to enroll at children's schools, and providing assistance with eligibility and application questions via a telephone hotline or website have been shown to reduce administrative hassles and increase the take-up of social health insurance for children (Banerjee et al., 2021; Bansak & Raphael, 2007). In our context, the central government also needs to coordinate and require the streamlining and simplification of the social health insurance exit process using an online system to ensure a smooth transition in social health insurance enrollment.

RESULTS ON OUTCOMES IN THE SECOND YEAR

Appendix Table D15 presents individual-level summary statistics for the endline sample in the second year ($N = 1{,}193$). The covariates show balance between the treatment and control groups; only one of the 23 ANOVA tests is statistically significant at the 10% level. Furthermore, a joint significance test across all variables fails to reject the null hypothesis of equality between the treatment and control groups ($p = .928$). Neither T1 nor T2 is predictive of attrition (Appendix Table D3).

To understand the impact of having social health insurance coverage, we provide both intention-to-treat estimates and local average treatment effect estimates. The intention-to-treat estimates represent the causal impact of the information intervention, which aims to expand take-up of local social health insurance. In addition, we used the information intervention as an instrumental variable and estimated the local average treatment effect, which identifies the causal impact of having local social health insurance coverage.

We only examined the effects of T2 in the analysis of intention-to-treat and local average treatment effects for two reasons. First, only T2 increased the take-up of Guangzhou Social Health Insurance. Second, we have a weak instrument problem. Appendix Table D16 presents our first-stage estimates. For models with both T1 and T2 or T2 alone as the instrument, the effective F-statistics value is between 3.004 and 4.567, falling below the rule-of-thumb threshold of 23 set by Montiel Olea and Pflueger (2013). There remains uncertainty about how to overcome weak instruments in over-identified models. However, for a single instrument, Anderson-Rubin confidence intervals remain efficient regardless of the strength of the instrument and should be reported regardless of the value of the first-stage F-statistic (Andrews et al., 2019). Hence, we follow the practice of Bursztyn et al. (2020) and report results using only one instrumental variable (T2) and provide the Anderson-Rubin confidence intervals for our local average treatment effect results.

We present intention-to-treat estimates and local average treatment effect estimates in Table 5. T2 is associated with a 4.8 percentage point increase in the likelihood of seeing a primary care provider at a community health center ($p = .078$). However, this association is not statistically significant when we apply the wild cluster bootstrap method or account for multiple hypothesis testing (see Appendix Table D17). While there is a 4.3 percentage point increase in the likelihood of having outpatient visits, a 4.5 percentage point decrease in the likelihood of not seeing a healthcare provider when sick, and a 0.7 percentage point reduction in the likelihood of hospitalization in the previous year, these results are also not statistically significant. To assess whether our null findings reflect the absence of an effect or a lack of statistical power, we provide the minimum detectable effect (MDE) size for each outcome in Appendix Table D18. Our study was designed to detect differences of at least 7.8 percentage points for outpatient care and 1.8 percentage points for inpatient care in our intention-to-treat analysis. Thus, it is possible that we could not detect reasonable effects.[9] We observed no significant differences in dental

[9] To calculate the MDE for the effect of coverage, we would divide the MDE in Appendix Table D18 by the estimate from the first stage. The MDE for the effect of coverage would be 102.6 percentage points for having any primary care visit, 111.8 percentage points for outpatient

TABLE 5 Outcomes in 2023.

	(1)	(2)	(3)
	Control mean	**Intention-to-treat**	**Local average treatment effect**
Had any primary care visit			
T2 (eligibility + comparison)	0.236	0.048*	0.616
		(0.027)	(0.399)
p-value: robust SE		0.078	0.123
p-value: wild bootstrap		0.239	0.284
p-value: Anderson-Rubin			0.166
Anderson-Rubin CI			[−0.196, 3.593]
Had any outpatient visit			
T2 (eligibility + comparison)	0.610	0.043	0.549
		(0.030)	(0.421)
p-value: robust SE		0.151	0.192
p-value: wild bootstrap		0.489	0.470
p-value: Anderson-Rubin			0.377
Anderson-Rubin CI			[−0.740, 3.465]
Did not see a healthcare provider when sick			
T2 (eligibility + comparison)	0.311	-0.045	−0.576
		(0.028)	(0.412)
p-value: robust SE		0.114	0.163
p-value: wild bootstrap		0.424	0.420
p-value: Anderson-Rubin			0.312
Anderson-Rubin CI			[−3.399, 0.491]
Ever hospitalized			
T2 (eligibility + comparison)	0.017	−0.007	−0.096
		(0.006)	(0.089)
p-value: robust SE		0.253	0.285
p-value: wild bootstrap		0.480	0.534
p-value: Anderson-Rubin			0.433
Anderson-Rubin CI			[−0.844, 0.180]
Received dental care			
T2 (eligibility + comparison)	0.304	0.003	0.038
		(0.030)	(0.375)
p-value: robust SE		0.920	0.919
p-value: wild bootstrap		0.911	0.864
p-value: Anderson-Rubin			0.895
Anderson-Rubin CI			[−0.519, 1.829]
Parent-reported child's health			
T2 (eligibility + comparison)	0.992	0.005	0.068
		(0.005)	(0.064)

(Continues)

TABLE 5 (Continued)

	(1)	(2)	(3)
	Control mean	**Intention-to-treat**	**Local average treatment effect**
p-value: robust SE		0.260	0.286
p-value: wild bootstrap		0.397	0.316
p-value: Anderson-Rubin			0.299
Anderson-Rubin CI			[−0.074, 0.263]
Stressed about the cost of seeing a healthcare provider			
T2 (eligibility + comparison)	0.809	−0.050*	−0.714
		(0.026)	(0.480)
p-value: robust SE		0.060	0.137
p-value: wild bootstrap		0.115	0.130
p-value: Anderson-Rubin			0.136
Anderson-Rubin CI			[−5.878, 0.030]
Enrollment in 2023			
T2 (eligibility + comparison)	0.351	−0.017	−0.224
		(0.029)	(0.417)
p-value: robust SE		0.551	0.591
p-value: wild bootstrap		0.670	0.668
p-value: Anderson-Rubin			0.554
Anderson-Rubin CI			[−3.377, 0.380]
N	804	1,193	1,193

Notes: The dependent variables were measured in a survey and phone call in January 2023. This table uses the endline sample in January 2023 (*N* = 1,193). Healthcare utilization, self-reported health, and stress about the cost of seeing a provider were assessed retrospectively for the previous 12 months. Column 2 reports intention-to-treat estimates with T2 (eligibility + comparison benefits and costs) being the independent variable. Column 3 reports local average treatment effect using an instrumental variable approach. The instrumental variable is T2 (eligibility + comparison benefits and costs). The endogenous variable is social health insurance coverage in Guangzhou in 2022. All regressions include the full controls as in column 3 of Table 3. Robust standard errors are reported in parentheses. Wild bootstrap *p*-values with standard errors clustered at the school level are reported. *$p < .10$; **$p < .05$; ***$p < .01$.

care utilization or self-reported children's health. On the other hand, we found a statistically significant 5.0 percentage point ($p = .060$), or 6.2%, reduction in parent-reported stress about healthcare costs for their children in the previous year. However, this association is also not statistically significant when using wild bootstrap *p*-values or accounting for multiple inference corrections.

Similar patterns emerge from the local average treatment effect estimates. While the coefficients for healthcare utilization are not statistically significant, the point estimates suggest that having social health insurance coverage in Guangzhou is associated with a 61.6 percentage point increase in the likelihood of visiting a primary care provider at a community health center and a 54.9 percentage point increase in the likelihood of having an outpatient visit. There is a non-statistically significant 57.6 percentage point decrease in the likelihood of not seeing a healthcare provider when sick and a 9.6 percentage point decrease in the likelihood of hospitalization in the previous year. There is no difference in dental care utilization and no difference in parent-reported children's health by social health insurance coverage status. Health insurance coverage is associated with a 71.4 percentage point

utilization, and 23.7 percentage points for inpatient care. In comparison, the effect of coverage on utilization was 35 percentage points for having an outpatient visit and 2.1 percentage points for a hospital admission (Finkelstein et al., 2012).

(or 88.3%) reduction in parent-reported stress about healthcare costs for their children, but this result is not statistically significant.

With the important caveat of statistical imprecision, these findings provide suggestive evidence that the information treatment may have led to an increase in the probability of visiting a primary care provider at a community health center. Because social health insurance in Guangzhou covers visits to primary care providers at community health centers at a much higher rate than outpatient visits at hospitals, treated migrant families may have increased utilization in primary care settings as opposed to outpatient visits at hospitals. The trend we observed is consistent with previous literature that has found healthcare coverage to be associated with changes in healthcare utilization among disadvantaged children in both developed and developing countries (De La Mata, 2012; Dubay & Kenney, 2001). However, further research is needed to understand the causal relationship between health insurance and healthcare utilization for migrant families in China.

On the other hand, the null results in dental care utilization are expected, as social health insurance in Guangzhou does not cover most dentist visits. We also found no effects on health outcomes. Previous studies have similarly observed changes in healthcare utilization without short-term health impacts (Baicker et al., 2013; Finkelstein et al., 2012). The efficacy of insurance coverage in enhancing health outcomes may be hampered by limited preventive care access, inadequate care, or low adherence to drug recommendations (Baicker et al., 2013). In our context, social health insurance does not cover preventive care. In addition, migrant parents expressed concerns that the social health insurance coverage in Guangzhou remains insufficient (Appendix Table D20), and primary care providers at community health centers are often of subpar quality (Ma et al., 2019). Many migrant families also exhibit low adherence to Western medicine treatment recommendations, sometimes preferring Chinese medicine (Tang et al., 2015). These factors might have created leakages between the potential benefits of insurance coverage and health outcomes.

In our dataset, 80.9% of parents in the control group reported feeling stressed about the costs of seeing a healthcare provider in the preceding year. Previous studies have found that the provision of health insurance improves mental health in the U.S. (Baicker et al., 2013; Finkelstein et al., 2012; Lave et al., 1998) and reduces self-reported stress and cortisol levels in developing countries (Haushofer et al., 2020). While our study points to a possible association between our information treatment and stress linked to healthcare expenses, further research is necessary to examine the effects of health insurance on stress in the context of China.

Lastly, we examined the enrollment rates for social health insurance in 2023. We found no significant differences between groups in the take-up rates for this year, primarily due to an increase in insurance take-up among the control and T1 groups rather than a decrease among the T2 group (Appendix Table D21). Specifically, the take-up rate in the control group was 36.2% in 2023, representing an increase of 15.0 percentage points from 2022. In the T1 group, the take-up rate was 33.9% in 2023, representing an increase of 11.3 percentage points from 2022. The take-up rate in the T2 group for 2023, though similar to that of the T1 group at 34.4%, represents an increase of 3.5 percentage points from 2022. The increased willingness to take up health insurance among the control and T1 groups may have been influenced by peer effects or by the surge in COVID-19 infections in December 2022 in China, as the government ended its zero-COVID policy during that period (State Council of the People's Republic of China, 2022). Furthermore, the deadline for health insurance enrollment in 2023 was postponed from February to March;[10] thus, we have not captured the final take-up rate. Unfortunately, in the absence of another experiment, we are unable to determine with any precision the exact reasons for the take-up increases in the control and T1 groups.

[10] The 2023 enrollment deadline for social health insurance in Guangzhou was moved to February 28. Participants are eligible to receive reimbursement for visits to healthcare providers that took place from January 1 to February 28, 2023, so long as they were enrolled by the February 28 deadline.

CONCLUSION

This paper examines whether information interventions could increase the social health insurance take-up rate for disadvantaged migrant children in China. Our intervention that provided targeted information about eligibility plus comparative benefits and costs of enrolling in local social health insurance in Guangzhou substantially increased take-up among migrant children. This behavioral response may be attributable, at least in part, to updated comparative information about social health insurance. Our findings indicate that a low-cost and targeted intervention has the potential to significantly improve decision-making at scale.

However, while the information intervention proved effective in promoting take-up, it did not lead to universal social health insurance coverage. Administrative hurdles were cited as the primary reason for non-enrollment among almost half of the parents who attempted but failed to enroll. Such obstacles, inherent in the fragmented healthcare system, are likely also present in other contexts where social benefits are locally designed and offered. Our findings suggest the necessity of further research to identify effective strategies for addressing these administrative barriers.

Using the information intervention as an instrument for insurance coverage, we did not find any statistically significant effect of having social health insurance on these outcomes, possibly due to limited statistical power. No effect was observed on dental care utilization or health outcomes. The lack of provision in China's social insurance system for either preventive care or dental care, combined with the behavioral challenges migrant parents face in making informed medical decisions, may explain the absence of observed health effects. Rather than minimizing the importance of health insurance coverage for improved health outcomes, however, this finding underscores the need for China's social health insurance to provide a more comprehensive plan. Furthermore, educating migrant parents about the benefits of health insurance and the healthcare system may be beneficial in overcoming behavioral impediments to achieve the positive health effects that can be conferred by insurance coverage.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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