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Research Paper

Healthy self-interest? Health dependent preferences for fairer health care

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ABSTRACT

Health status can alter individuals' social preferences, including individuals' preferences regarding a fair financing of health care. If individuals follow a *healthy self-interested rationale*, health improvements can weaken individuals' support for fairer health care financing, insofar as they perceive a reduced need for healthcare. Conversely, healthier people might anticipate facing greater opportunity costs if their health declines in an unfairly funded system, and hence may endorse fairer financing in anticipation of future health challenges—which we label as the '*unhealthy self-interest*' hypothesis. We draw on a dataset of 73,452 individuals across 22 countries and a novel instrumental variable strategy that exploits variation in health status resulting from cross-country and cohort-specific exposure to the national childhood Bacillus Calmette–Guérin (BCG) vaccination schedules. We document causal evidence consistent with the *unhealthy self-interest hypothesis*, namely that better (worst) health increases (reduces) preferences for a fairer health care system. We estimate that a one-unit increase in self-reported health increases support for fair health care access by 11 % and the willingness to support fair financing by 8 %. Our findings suggest that improving population health may give rise to stronger support for interventions to improve equitable health system access and financing.

1. Introduction

In resource-constrained settings, fair funding of and access to publicly funded resources is primarily determined by social preferences and shared understandings of justice (Olsen, 2011; Starmans et al., 2017). Consistently, empirical research demonstrates that attitudes towards the distribution of scarce resources are shaped by individual perceptions of fairness, with people often accepting unequal outcomes when they are viewed as legitimate or merit-based, while rejecting unequal outcomes when deemed arbitrary or unjust (Starmans et al., 2017). Fairness concerns are observed across cultural and national contexts (Eriksson and Simpson, 2012; Kiatpongsan and Norton, 2014; Norton et al., 2014) and, extend across the political spectrum, suggesting that the concern lies less in reducing inequality per se than in avoiding unfairness (Norton and Ariely, 2011).

One of the areas where fairness is important is in the allocation of scarce health care resources, as they can influence individuals' quality of life and can carry life-or-death consequences. However, achieving fair access to and financing of health care is not without

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costs, as it inevitably entails investments that come at the expense of other programs that could improve the overall health of the population. Although ensuring fairness in health care access and financing remains a core mission of any health system, as emphasized by the World Health Organization (WHO) (Commission on Social Determinants of Health, 2008; Olsen, 2011), understanding the conditions, both collective and individual, that shape individuals' preferences for fair financing of health care is essential for responding to the growing fiscal pressures that rising health care expenditures place on national budgets.

In democratic settings, population preferences play a central role in shaping health system priorities, with policy outcomes expected to reflect the collective views of citizens, even though some bias exists, mainly due to organised interest groups which continue to exert an influence over the decision-making process (Burstein, 2003). Such preferences shape the public demand for additional funding and, more generally, the welfare valuation of how best to improve access to healthcare programs, even when they benefit only a minority (e.g., neglected conditions, highly deprived groups). However, to date, we still know little about how individuals form such normative assessments. Hence, it is appropriate to understand whether certain circumstances, such as changes in individuals' own health status, shift their preferences regarding fairness in the financing of health care.

Preferences with regard to health system fairness have been shown to be affected by patients' specific socioeconomic circumstances (McIntyre and Mooney, 2007). Nonetheless, it remains unclear whether such individuals' preferences hinge on broader personal motivations, particularly their perceived current of future health needs (Hudson and Jones, 2002). Given that health technology is expected to improve population health over time, the effect of health status on preferences is increasingly important. Consistently, this paper examines whether improvements in health status - resulting from health programs such as new vaccines -modify individual's preferences for a fair financing of health care.

Health status can shape financial fairness preferences in two competing ways. The first behavioural mechanism, which we label the 'healthy self-interest hypothesis', posits that individuals in poorer health tend to support redistributive or fairer health care financing because they directly benefit from such an arrangement, while those in better health may see limited short-term advantage from devoting more health care resources to healthcare in the short term. That is, they are more likely to prioritise their own financial interests over broader collective healthcare needs. Alternatively, a second behavioural mechanisms , which we term the "unhealthy self-interest hypothesis," draws on a justice-based perspective. It holds that - in sharp contrast to the 'healthy self interest hypothesis'- individuals in poorer health tend to focus on immediate recovery, which may, in turn, lead to lower support for a fair health system financing. This reflects a narrowing of focus toward personal health needs rather than system-level equity concerns. In contrast, healthy individuals would be more likely to support a fairer health system financing because they might perceive a higher opportunity cost of their future health deterioration, and hence adhere more closely to normative principles of fairness in health care access and financing.

Both hypotheses find some support in existing literature on health status and public preferences, particularly in studies examining attitudes towards redistribution and priorities within the health care system. Lu et al. (2021), drawing on a choice experiment to measure preferences for health care funding in the UK, document a generalised normative preference for a redistributive health system. While their study examined the effect of age and socioeconomic characteristics, limited analysis was conducted on the role of health status in driving such preferences. Related to our study, Gyrd-Hansen and Slothuus (2002) show that poorer self-reported health in Denmark is linked to a stronger preference for curative over preventive care. Similarly, Luyten et al. (2015) find that poor health increases support for curative measures in Belgium. However, only Asaria et al. (2023) identify a causal link, showing that individuals affected by COVID-19 became less inequality-averse, likely due to their stronger focus on personal recovery (Bekkers, 2006).

In this paper we study how perceived health influences preferences for two dimensions of health system fairness, namely fair access and financing. The former, is assessed by the individual's support for income-based differences in access to health care, which reflects normative judgments without an explicit personal cost. In contrast, the latter dimension explictly makes the cost to the individual more salient, and refers to the willingness to pay higher taxes for better healthcare for all, which captures behavioral intentions involving some personal financial sacrifice. For simplicity, we refer to these two dimensions as preferences for healthcare fairness while recognising their distinct conceptual nature throughout our analysis. To estimate causal effects, we exploit exogenous variation resulting from differences in cross-country exposure to Bacillus Calmette–Guérin (BCG) vaccination across 22 countries, using data from the International Social Survey Programme (ISSP) on Health and Health Care (2011 and 2021), encompassing 73,452 observations. Our key variable of interest is self-reported health (SRH). Our results include a series of robustness checks including several definitions of our health variable, as well as instrumenting BCG exposure using alternative health measures such as an indiviuals Body Mass Index (BMI), which, compared to SRH, is a closer to a more objectively measured metric for health status.

Our study makes several contributions. First, we provide a novel examination of the extent to which preferences health system financing fairness are health dependent, and more specifically, establishing whether individuals preferences are consistent with the healthy or unhealthy self-interest hypothesis. Second, we contribute to the growing literature on health status's impact on attitudes and behaviors, extending recent work by Ivlevs (2024), who found that better health leads to more positive attitudes toward immigration. Third, we introduce a new instrumental variable strategy using BCG vaccination timing, which appears to be a strong instrument which allow us to retrieve causal estimates. Finally, its worth mentioning, that this is the first large-scale, cross-national study examining preferences for health system fairness, which is important because perceptions of fairness vary significantly across cultures (Henrich et al., 2010; House et al., 2013; Schäfer et al., 2015).

Our estimates support the "unhealthy self-interest" hypothesis: individuals in poorer health show reduced support for healthcare financing fairness, while those with better health support a fair health care financing. Specifically, we document that a one-point increase on the self-reported health scale is associated with an 11 % increase in attitudes towards fair access and an 8 % increase in willingness to support fair financing. These findings carry important implications for health policy design, suggesting that as population health improves, support for a fairer healthcare system may naturally increase.

The structure of the article is as follows. Section 2 provides the paper background. Then, Section 3 discusses the data and empirical strategy, followed by the results and robustness checks (Section 4), and conclusions (Section 5).

2. Related literature

Fairness in Health and Health Care. The notion of fairness in the allocation of healthcare resources has multiple interpretations (Olsen, 2011). The predominant view aligns with an egalitarian perspective of equity in the distribution of health outcomes and resources, commonly adopted in publicly funded tax systems. Alternative interpretations include libertarian approaches (Mill, 1859; Nozick, 1974), where fairness is defined as actuarial equity, individuals pay premiums equal to their expected costs, and forced redistribution considered unfair.

Nonetheless, ultimately what constitutes a fair distribution of health care resources depends on population views (Olsen, 2011; Starmans et al., 2017). Richardson and McKie (2005) suggest that population preferences should be elicited to minimise the gap between institutional definitions of fairness in health care and those generally accepted by the population. This can take place through an iterative process that reflects evolving societal values. In an attempt to describe US respondents' beliefs about fairness in the health domain, Lynch and Gollust (2010) document that among US respondents, 38.4 % defined fairness as "equal opportunity" rather than equal treatment (18.5 %). However, 71 % considered inequalities in healthcare access and quality unfair, compared to only 31 % viewing inequalities as unfair. This suggests that normative considerations of fairness, rather than pure self-interest, can shape preferences for healthcare financing fairness.

Other studies find that people often prioritize fairness over pure outcome maximization in healthcare contexts. Ubel and Loewenstein (1996) found that when asked about organ allocation, UK participants preferred a random distribution of scarce livers rather than allocation based on survival probability (e.g., patients with an 80 % chance of survival after surgery vs. patients with a 20 % chance). Such findings suggest that, again, normative considerations of fairness, rather than pure self-interest or health maximization, can profoundly shape preferences with regards to health care access.

Health Status and Self-Interest. In analysing attitudes toward fairness in health care, the interplay between personal self-interest and collective societal interests emerges as a key determinant of preferences (Spivak et al., 2018). Old political economy models predict that individuals' positions within risk and resource distributions fundamentally shape their policy preferences (Meltzer and Richard, 1981; Rehm, 2016). However, in healthcare financing contexts, self-interest would manifest as healthy individuals' reluctance to subsidize care for the unhealthy, perceiving illness as a form of moral hazard that socializes risks and imposes costs on the healthy. Consistently Jordan (2010) demonstrates that personal health risks, influence healthcare financing preferences, with higher-risk individuals typically favouring more expansive public coverage.

An alternative framework for understanding how health status influences preferences stems from Grossman's (1972) seminal health capital model. In this framework, individuals invest in health as a form of human capital that yields utility directly (by improving well-being) and indirectly (through increased productivity and earnings). The model predicts that healthier individuals face higher opportunity costs of health deterioration and greater incentives to maintain their health stock. This framework points to an explanation for health status to systematically influence preferences for health care, namely: as individuals with different health endowments face varying expected returns from healthcare investments and insurance mechanisms.

Behavioural approaches further enrich this perspective, suggesting that current health status may create "projection biases" in how individuals assess their future healthcare needs (Loewenstein et al., 2003). People in good health might systematically underestimate their future health risks and consequently undervalue the financial fairness of insurance mechanisms, and this applies to publicly funded healthcare too. Consistently, Handel and Kolstad (2015) document that consumers face systematic biases when choosing health insurance plans due to information frictions and cognitive biases, further illustrating how misperceptions about health risks can influence healthcare decisions. These cognitive biases too influence attitudes toward healthcare system fairness, and might trump other rational self-interest calculations.

Finally, self-interest approaches to health care take two main forms (Stephens et al., 2012), namely, an individual explanation, that predicts that personal circumstances and abilities primarily determine behavior (assuming equal self-efficacy), and a systems explanation, whereby environmental conditions shape behavior, further suggesting that resource provision benefit both individuals and society as a whole. To date, evidence shows that socioeconomic status affects self-efficacy perceptions, with lower-status depressing preventive behavior (Grembowski et al., 1993). However, we still know little about the effect of changes in health status on health system preferences.

Two competing Hypotheses: Healthy vs *Unhealthy Self-Interest.* As announced in the introduction, we propose two competing hypotheses regarding how health status influences preferences for healthcare financing fairness.

The "Healthy Self-Interest Hypothesis" suggests that individuals in good health, seeing no immediate personal need for health care, tend to place less value on improving fairness in health care financing.[1] That is, healthier loss averse individuals feel potential losses more heavily than equivalent gains (Kahneman and Tversky, 1979), and their preferences might depend more on the potential tax burden (a certain financial loss) than on uncertain future health benefits that a fairer health system entails, thereby prioritizing their financial interests over collective healthcare needs.

Conversely, the "Unhealthy Self-Interest Hypothesis" predicts that individuals with poorer (better) health, tend (not) to focus on

[1] This aligns with evidence that suggests that better health correlates with lower risk aversion (Cen et al., 2021; Rice & Robone, 2022), which in turn correlates with lower inequality aversion.

their immediate recovery needs, and hence, exhibit reduced (increased) support for broader system fairness. That is, when facing health challenges, individuals narrow their focus to personal health needs rather than system-level equity concerns. This hypothesis is consistent with Cappelen et al.'s (2007) findings that individuals' fairness ideals are malleable and context-dependent, potentially shifting toward more self-serving interpretations when personal stakes are high. According to this hypothesis, individuals' preference for fairness in healthcare financing would be expected to rise as their health improves.[2]

So far limited empirical evidence exists testing these hypotheses. Shiell and Seymour (2002) found that healthier individuals (who would benefit more from private insurance) preferred publicly funded healthcare in Sydney, suggesting societal interests may outweigh self-interest. Similarly, Spivak et al. (2018) found that both current and former smokers opposed cigarette taxes, suggesting attitudes reflect both self-interest and broader social identification. However, to date, no study has established causal effects of health status on preferences for healthcare financing fairness using a robust empirical design, a gap that our research addresses.

3. Data and empirical strategy

The Data. To evaluate the impact of health status on preferences for healthcare access and financing fairness, we rely on the International Social Survey Program (ISSP) data. The ISSP is a cross-national collaboration programme conducting annual cross-sectional surveys on diverse topics relevant to social sciences, of which data are publicly available. For our investigation, we use the two available waves of the survey related to Health and Health Care, conducted respectively in 2011 and 2021 (ISSP Research Group, 2015, 2024). These two surveys focus on questions about individual health and the health care system, including information about respondents' health status (i.e., self-reported health, as well as presence of chronic conditions), health behaviors (i.e., physical activity, drinking, and smoking), utilisation, and attitudes towards health care, encompassing equality, satisfaction with the healthcare system, trust towards it and medical staff, and trust in the government, as well as respondents' sociodemographic information. The dataset provides information about the party voted for in each country's last general election and places these parties on a left-right political scale. Sampling procedures and mode of data collection vary by country. Detailed information about the survey methodology can be found in the ISSP webpage (ISSP Research Group, 2015, 2024). The advantage of this survey is that the questions used to collect this information are the same in the two years, providing robust and standardised data. Moreover, the ISSP is the only global survey comparable in scope to the World Values Survey that specifically targets healthcare attitudes and system preferences.

In our data, we included only respondents from countries that participated in both waves, resulting in a total of 73,452 observations from 22 countries. The countries included are: Australia (AU), China (CN), Croatia (HR), Czech Republic (CZ), Denmark (DK), Finland (FI), France (FR), Germany (DE), Israel (IL), Italy (IT), Japan (JP), Netherlands (NL), Norway (NO), Philippines (pH), Poland (PL), Russia (RU), Slovak Republic (SK), Slovenia (SI), South Africa (ZA), Switzerland (CH), Taiwan (TW), United States (US).

Variables. The ISSP data include a few measures of individuals 'health status. The first one is an individual's self-reported health (SRH), which is elicited using following wording: "In general, would you say your health is". Respondents had to select their answer from the following items: (1) 'poor', (2) 'fair', (3) 'good', (4) 'very good', (5) 'excellent' or (−1) 'can't choose'. To maximize the number of observations, we recoded respondents who selected the 'can't choose' option ($n = 1637$) to the neutral option 'fair'. Although this approach might introduce measurement uncertainty, it allows us to maximize the sample size in our cross-national analysis. To account for this methodological choice, we generated a dummy variable equal to 1 for observations where we recoded 'can't choose' responses and included this control variable in all regressions to capture any systematic differences in these responses. We used the 5-point response as a continuous variable (*self-reported health*). The variable is approximately normally distributed with most respondents reporting good health (see Table S1 in the Supplementary Material (SM)). We also created an alternative dummy variable for robustness purposes (*Good health*) equal to 1 for respondents in good, very good, or excellent health status and 0 otherwise. Table 1 reports the descriptive statistics for SRH. In our sample, respondents self-rated their health a good (mean=3.1) and approximately 70 % of the sample was in the good health category.

The use of SRH measures lies in that they are straightforward to elicit and easy to administer and interpret for respondents. Unsurprisingly, it is commonly applied in general population surveys and applied health, epidemiology, and social science research. Despite its simplicity, SRH has been shown to be a strong predictor of all-cause mortality, morbidity, or use of medical care (Ganna and Ingelsson, 2015; Idler and Benyamini, 1997; Lorem et al., 2020; McCallum et al., 1994). Similarly, it has been shown to be stable across cultures, communities, and different age groups (Vie et al., 2014). However, the measure has also been criticised due to its proneness to response and social desirability biases, which may lead to response unreliability (Crossley and Kennedy, 2002). When used in comparative analysis, differences in reporting styles across countries may yield misleading results (Jürges, 2007). Lastly, researchers have highlighted challenges in interpreting this measure, particularly in identifying which factors are taken into account in self-ratings, and how they are weighted (Huisman and Deeg, 2010; Jylhä, 2009).

Finally, to ensure the robustness of our estimates, we coupled our subjective measures of health with another more objective measure: the BMI. Using self-reported weight and height measures reported in the survey, we calculated the BMI as weight in kilograms divided by height in meters squared. While BMI has some well-documented limitations as a health status measure (Burkhauser and Cawley, 2008; Kopinska et al., 2024), it has been shown to predict overall mortality and a number of health risks (Bhaskaran et al., 2018; Murray, 2024). We then classified respondents with a BMI in the normal weight range (18.5–24.9) as healthy. Accordingly, in

[2] Its worth noticing that ross-national differences in healthcare system preferences might also reflect different cultural interpretations of fairness and solidarity, as Alesina and Glaeser (2004) document in their comparison of European and American welfare states. These differences underscore the importance of examining healthcare fairness preferences across diverse institutional contexts.

Table 1
Descriptive statistics.

	Observations	Mean	SD	Min	Max
Preferences for healthcare financing fairness					
Attitudes toward fair access	71,112	3.58	1.29	1	5
Willingness to support fair financing	70,494	2.68	1.25	1	5
Health status variables					
Self-reported health status	73,452	3.05	1.02	1	5
Good health (1 = Good, Very good, Excellent)	73,452	0.70	0.46	0	1
Healthy BMI (1 = 18–24.9)	73,452	0.44	0.50	0	1
	Observations	Percentage			
Individual controls					
Female	73,452				
0- Male	33,487	45.65			
1- Female	39,872	54.35			
Old Age (≥60 years)	73,452				
0- No	50,474	68.72			
1- Yes	22,660	30.85			
2- Not reported	318	0.43			
Highest education	73,452				
0- Primary education	22,094	30.08			
1- Secondary education	27,824	37.88			
2- Tertiary education	22,629	30.81			
3- Education not reported	905	1.23			
Household income class	73,452				
0- Low income	13,062	17.78			
1- Middle income	33,645	45.81			
2- High income	9599	13.07			
3- Income not reported	17,146	23.34			

Note: This table presents descriptive statistics for the variables included in the analysis, including the number of observations, mean, standard deviation, minimum, and maximum values. In the top panel, we show descriptive statistics for our dependent variables ("Attitudes toward fair access" & "Willingness to support fair financing") and our key independent variables: "Self-reported health" (SRH); "Good Health" (a dummy variable equal to 1 if SRH is Good, Very Good, or Excellent); and "Healthy BMI" (a dummy variable equal to 1 if the respondent's BMI falls within the normal range of 18.5–24.9). In the bottom panel, we provide descriptive statistics for the individual controls included in the analysis (female, age above 60, educational level, household income level) and their distribution across categories.

our sample, 46 % of respondents fell within this normal weight range.

Support for fair health care access and financing. A central question in this paper lies in measuring preferences for healthcare financing fairness, defined as attitudes toward fair access, and the specific willingness to support fair financing.[3] Attitudes toward fair access are assessed through the following question: "Is it fair or unfair that people with higher incomes can afford better health care than people with lower incomes?". Respondents reported their degree of agreement through a 5-point Likert scale from 'Very fair' to 'Very unfair,' with an additional neutral option, 'Can't choose.' For simplicity, we excluded respondents who selected the 'Can't choose' option ($n = 2340$).

The second question we focus on refers to the individual willingness to pay for a fair health care financing, which is collected through the following question: "How willing would you be to pay higher taxes to improve the level of health care for all people in [country]?". Analogously, a 5-point Likert scale was used, ranging from 'Very unwilling' to 'Very willing', with the 'Can't choose' option included. Again, we excluded respondents who selected the 'Can't choose' option ($n = 2958$). Table 1 reports descriptive statistics for both variables. As expected, attitudes towards fair access showed higher levels of support than willingness to support fair financing, as the latter entail an explicit individual sacrifice.

Empirical strategy. The main empirical challenge in estimating the causal effect of health status on preferences for health care system fairness is the potential endogeneity of health status. Both health status and preferences for financing and access fairness could be influenced by omitted variables. These include behavioral traits like optimism and risk attitudes (Costa-Font and Costa-Font, 2011; Costa-Font et al., 2023). Similarly, they might be driven by previous health shocks that influence both current health status and attitudes toward healthcare systems (Angelini and Costa-Font, 2023; Darden and Gilleskie, 2016), alongside political beliefs that shape both reported health and views on fairness.[4] Beyond the common concerns of self-reported measures, research has shown that individuals upholding a conservative ideology are more likely to inflate their self-reported health status compared to those holding a liberal ideology (Wojcik et al., 2015). Lastly, its worth noting that SRH might serve as an imperfect proxy for actual health status due to reporting biases that vary systematically with factors relevant to our research question. These potential sources of endogeneity can

[3] In what follows, we adopt a definition of fairness entailing solidarity and equity in the distribution of health and health care.

[4] While less central to our analysis, one could envisage instances where time and social attitudes influence both health and attitudes towards health fairness. For example, individuals who are less patient or more prosocial are more likely to delay or forgo medical care due to cost concerns, leading to worse health outcomes over time.

lead to biased OLS estimates that fail to identify the causal relationship of interest.

To account for omitted variable bias, we employ an instrumental strategy exploiting information about the historical rollout of the BCG vaccination into the childhood immunisation schedule in each country. This provides for an exogenous source of cross-country and cohort variation in later life health status. The BCG vaccine, primarily used against TB, was first administered to a newborn in Paris in 1921 (Lange et al., 2022), and subsequently introduced at different times across countries which provides exogenous variation that can be exploited in an instrumental variable design. Information on the implementation of national BCG vaccination in childhood immunisation schedules was retrived from the BCG World Atlas (Zwerling and Pai, 2011) for each country. Where this source did not provide complete information, we supplemented it with additional searches of existing literature and policy documents. Table 2 reports the start and end date of the BCG immunization schedule per country.

Identification and First stage estimates. Using the information reported in Table 2, we then created a dummy variable for exposure to BCG vaccinantion, equal to 1 for respondents born in the year of or after the introduction of the BCG vaccination into the national immunisation schedule. We then use this variable to estimate the following first-stage equation:

$$Health_{ict} = \gamma_1 V_{ic} + X_{ict}\beta_1 + \delta_{1,t} + \theta_{1,c} + \varepsilon_{1,ict} \quad (1)$$

Where $Health_{ict}$ is our measure of adult self-reported health of individual i for survey t, in country c. V_{ic} is the introduction of the national vaccination in country c experienced by individual i as a child. X_{ict} is a vector of covariates that includes respondents' age dummy (i.e., $\geq$60 years), sex dummy, and education and income groups dummies. $\delta_{1,t}$ are time (i.e., survey year) fixed effects. $\theta_{1,c}$are country fixed effects. Given that the variation of SRH is at the individual level, we use robust standard errors bootstrapped with 10,000 replications.

The validity of our instrumental variable strategy rests on three key criteria. First, regarding relevance, the BCG vaccine has shown to exert a significant impact on population health and, it is particularly suitable as an instrument because it does not require extensive health system infrastructure to to roll out. The vaccine is relatively simple to administer and can be delivered even in resource-constrained settings (Lancione et al., 2022). Beyond its primary efficacy against childhood tuberculosis, epidemiological studies have demonstrated its broader health benefits of BCG vaccines, including the reduction of all-cause mortality as well as protection against other communicable and non-communicable diseases. According to WHO, a widespread BCG vaccination rollout could prevent over 115,000 TB deaths per birth cohort during the first 15 years of life (World Health Organization, 2018). Controlled medical trials have demonstrated BCG's specific efficacy against childhood TB (Colditz et al., 1994), with meta-analyses showing 73–77 %

Table 2
Countries included and BCG vaccination campaigns.

		National BCG vaccination in childhood immunization schedule	
Country ($n = 22$)	**Obs.**	Start date	End date
AU-Australia	2996	1956	1985
CH-Switzerland	4561	1960	1996
CN—China	8309	1949	ongoing
CZ-Czech Republic	3066	1953	2010
DE-Germany	3425	1951–53 (East) 1955* (West)	1990 (no longer mandatory) 1998 (discontinued)
DK-Denmark	3060	1946	1986
FI-Finland	2342	1950	2007
FR-France	4903	1950	2007
HR-Croatia	2311	1948	ongoing
IL-Israel	2407	1955	1982
IT-Italy	2324	1970	2001
JP-Japan	2759	1951	ongoing
NL-Netherlands	2741	1951±	1979
NO—Norway	3352	1947	1995
pH-Philippines	3000	1979	ongoing
PL-Poland	2213	1955	ongoing
RU-Russia	3108	1962	ongoing
SI-Slovenia	2102	1947	2005
SK-Slovak Republic	2141	1953	2012
TW-Taiwan	3803	1965	ongoing
US-United States	2696	1950±	-
ZA-South Africa	5833	1973	ongoing

Note: The table reports the year when BCG vaccination was introduced into the national immunization schedules of the countries included in the analysis, as well as the end date of the national policy if applicable. As TB incidence has declined and new technologies for monitoring, tracing, and treating TB have been developed, some countries have discontinued universal BCG vaccination and now only provide it to specific at-risk groups (e.g., children born in highly endemic TB countries, children with at least one parent from such countries, or children with a family history of TB, etc.). The primary source for the dates was the BCG World Atlas (Zwerling and Pai, 2011).

* In West Germany the vaccination was mainly recommended. ±In the Netherlands and the US, the BCG vaccine was never recommended at a national level. We have noted the year when the vaccine was widely adopted in these countries, despite the absence of a general recommendation (Bryder, 1999; Hauer et al., 2020).

effectiveness in preventing severe forms of childhood TB (Trunz et al., 2006). Natural experiments comparing vaccinated and unvaccinated populations with similar socioeconomic trajectories have found significant mortality differences attributable to BCG, suggesting effects beyond those explained by general development indicators. Additionally, immunological research has identified BCG's non-specific immune system effects that provide protection against multiple pathogens beyond just TB (Netea et al., 2020), distinguishing its health impact from other contemporaneous improvements.

Second, the timing of BCG vaccination introduction varied across countries primarily due to either institutional and policy constraints, scientific acceptance patterns, and administrative capacity, all factors exogenous to individual preferences for healthcare financing fairness. The implementation timing was largely determined by public health authorities responding to TB burden, WHO recommendations, and administrative capabilities rather than population preferences or attitudes towards healthcare financing fairness. This variation provides plausibly exogenous identification.

Third, the exclusion restriction requires that BCG vaccination affects preferences for financing fairness only through its effect on health status. Several factors support this assumption. Individuals are unlikely to be aware of their own BCG vaccination status from childhood. Unlike more visible or controversial vaccines, BCG vaccination typically takes place in early childhood and leaves minimal salient lasting effects that would directly shape adult policy preferences. While national vaccination programmes might correlate with healthcare system and/or country development, our country fixed effects are likely to absorb such time-invariant factors. We also conduct additional tests interacting our instrument with healthcare system typologies to ensure that the effect is not driven by systematic differences in how vaccination programs were implemented across different healthcare systems. Our empirical specification further controls for key socio-economic factors (education, income, age) that might be affected by early-life health interventions and independently influence preferences for financing fairness. Additionally, our robustness tests using the Local-to-Zero approach (Conley et al., 2012) confirm that even with substantial deviations from strict exogeneity, our main findings remain valid.

Given that health status deteriorates with age (Idler and Benyamini, 1997; Zajacova and Woo, 2015), it is important to control for age in our analysis. Additionally, female respondents tend to report relatively lower SRH than males (Case and Paxson, 2005; Gorman and Read, 2006; Napier and Jost, 2008). Similalrly, low levels of education, as well as both household and individual income, are also associated with worsening SRH (Ettner, 1996; Gallagher et al., 2016; Giordano and Lindstrom, 2010).

In the survey, age was reported based on respondents' year of birth, which we used to calculate age as the difference between birth year and survey year. Highest educational attainment was collected following the International Standard Classification of Education (ISCED) (UNESCO, 2012). We operationalized this into three categories: primary education, secondary education, and tertiary education. Income was reported in local currency specific to each country. To standardize this variable across countries, we first constructed household income quintiles at the country level (Huijsmans et al., 2022), then grouped these into three categories—low income, middle income, and high income—by minimizing the sum of absolute deviations from the expected proportions of 20 %, 60 %, and 20 % respectively (Kudrnáč and Petrúšek, 2023).

Missing values were present for all three variables: 318 observations (0.4 %) for age, 905 observations (1.2 %) for education, and 17,146 observations (23.3 %) for income. Rather than using listwise deletion or imputation, we created separate categories for missing observations ('Age not reported,' 'Education not reported,' 'Income not reported'). This approach preserves our full cross-national sample and allows us to examine whether non-response patterns are systematically related to health status or our dependent variables.

Fig. 1 presents a directed acyclic graph (DAG) that visualizes our identification strategy, illustrating the causal pathway from BCG vaccination to health status to preferences for financing fairness, as well as potential confounding factors that our methodology addresses.

The relevance of the instrument can be initially assessed looking at the relationship between the instrument and the outcome variables. This relationship, commonly defined as the reduced form, can be estimated via the following equation:

$$Y_{ict} = \gamma_1 V_{ic} + X_{ict}\beta_1 + \delta_{1,t} + \theta_{1,c} + \varepsilon_{1,ict} \tag{2}$$

The only difference from Eq. (1) is that the dependent variable is our outcome of interest Y_{ict} (preferences for financing and access fairness). Fig. 2 illustrates this relationship showing a positive association between exposure to the BCG vaccination and both dimensions of financing fairness preferences. The association is particularly pronounced for attitudes toward fair access, which also reveal a higher average scores compared to those of individual's willingness to support a fair health system financing. The graphical inspection of the reduced form already indicates that our instrument may be a valid candidate for the analysis. Later, we will provide further evidence supporting the notion that the instrument used (exposure ot the BCG vaccine) is not weak.

Instrumental Variable (IV) estimates. Building on the first-stage relationship we examine the effect of health status on respondents' support for fair access to and financing of health care, using exposure to BCG vaccination as an instrument for health status. Specifically, we estimate the following two-stage least squares (2SLS) empirical specification:

$$Health_{ict} = \gamma_1 V_{ic} + X_{ict}\beta_1 + \delta_{1,t} + \theta_{1,c} + \varepsilon_{1,ict} \tag{3}$$

$$Y_{ict} = \alpha_2 Health_{ict} + X_{ict}\beta_2 + \delta_{2,t} + \theta_{2,c} + \varepsilon_{2,ict} \tag{4}$$

Where Y_{ict} reports attitudes toward fair access YA_{ict} or willingness to support fair financing YF_{ict} for individual i, in country c, in survey t. $Health_{ict}$ is our measure of health instrumented by V_{ic}, the exposure to the national BCG vaccination for individual i in country c. X_{ict} includes the same covariates used in the first stage regression, and $\delta_{1,t}$, $\theta_{1,c}$ represent time and country fixed effects, respectively. As before, standard errors are bootstrapped with 10,000 replications. Our coefficient of interest, α_2, reflects the effect of a 1-unit increase in SRH (or being in good health, such as within the healthy BMI range) on preferences for financing fairness. The validity of our

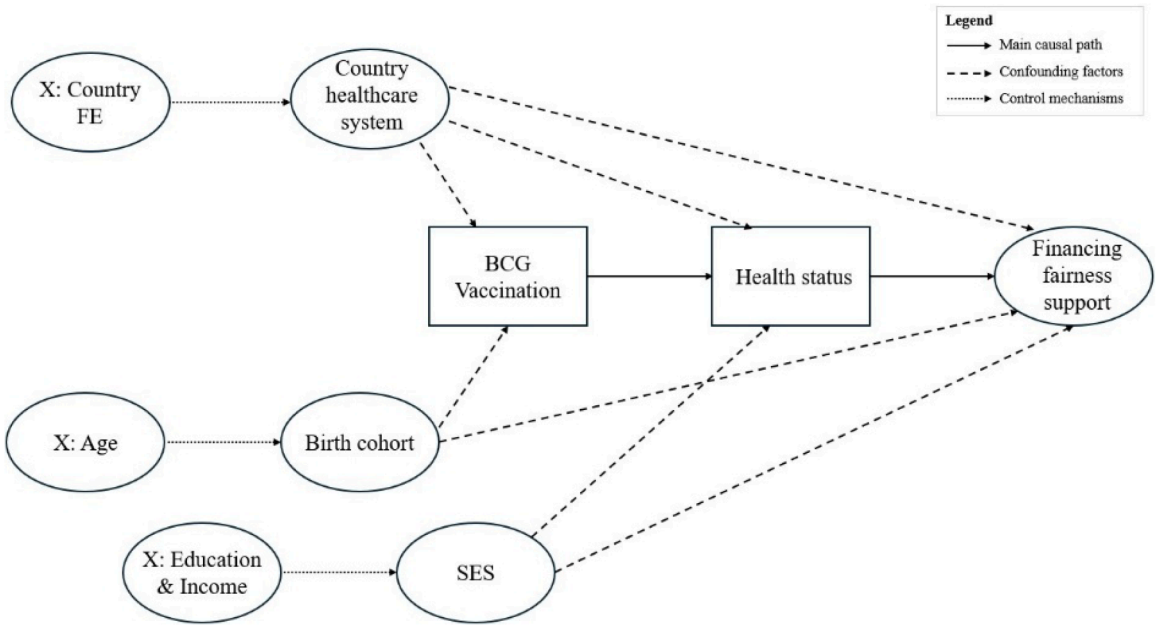

Fig. 1. Directed acyclic graph of BCG vaccination instrumental variable strategy.

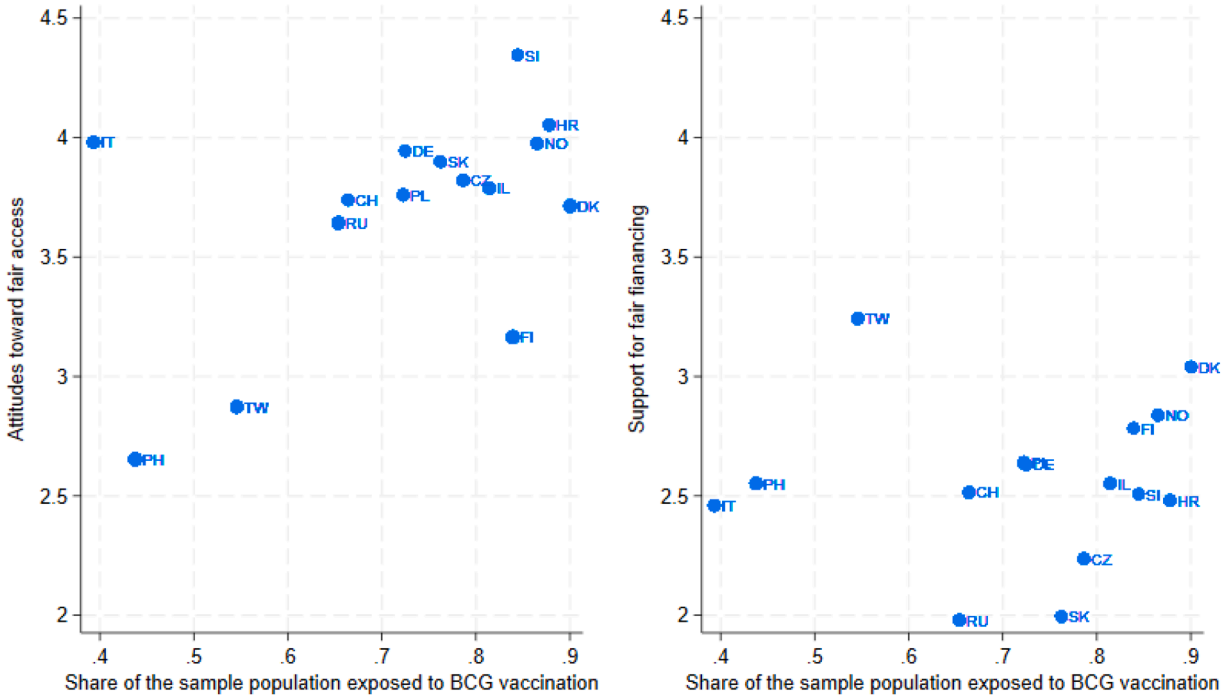

Fig. 2. Association between instrument (exposure to BCG vaccination) and outcomes (Attitudes toward fair access and Willingness to support fair financing) at the country level—reduced form.

Notes: The figure depicts a scatter plot of the instrument (exposure to BCG vaccination) against the key outcomes of the analysis, attitudes toward fair access (panel 1) and willingness to support fair financing (panel 2), at the country level. The size of the circles reflects the standard deviation of the two outcome variables measured in each country. To create this scatter plot, we first calculated the average for both outcomes for each country. Subsequently, we plot the mean values of the outcome variables on the y-axis and the share of the population exposed to BCG vaccination on the x axis.

Table 3
Reduced form regression of the instrument (BCG exposure) on individual attitudes toward fair access (column 1) and willingness to support fair financing (column 2).

	Attitudes toward fair access (1)	**Support for fair financing** (2)
BCG exposure	0.066	0.039
	(0.016)	(0.016)
Individual controls	Yes	Yes
Time FE	Yes	Yes
Country FE	Yes	Yes
Observations	71,112	70,494
Adjusted R-squared	0.14	0.08

Notes: This Table reports results from the OLS regressions of the instrument (exposure to BCG vaccination) on individual attitudes toward fair access and willingness to support fair financing with bootstrapped (10,000 replications) standard errors clustered at the person level in parentheses. Individual controls: age above 60, female, highest education level, household income. Complete econometric output is available in Table S2 of the Supplementary Material.
* $p < 0.01$. ** $p < 0.05$, *** $p < 0.01$.

instrumental variable strategy hinges on the assumption that exposure to the BCG vaccine affects respondents' preferences solely through its impact on health status, conditional on our control variables.

Given that our dependent variables are ordinal by construction, we also perform ordered probit and IV ordered probit regressions to test the robustness of our results. In these models, the effect of interest is the impact of a 1-unit increase on the SRH Likert scale. As an additional robustness check, we also implement an IV probit strategy by dichotomizing the two dependent variables and running an ordered probit on SRH in the first stage.

4. Results

Descriptive evidence suggests that preferences for financing fairness vary with SRH at the country level. Indeed, Fig. S2 in the Supplementary Material (SM) illustrates a positive correlation between SRH and attitudes toward fair access. However, the association weakens as SRH levels improve. Conversely, we find a negative correlation between SRH and willingness to support fair financing, indicating that the relationship between health and fairness preferences differs across our two outcome measures.

Reduced form estimates. To validate our IV strategy, Table 3 displays the results of the reduced form regressions for both measures of health system fairness. We show that the effect of the instrument on both preferences for financing and access fairness is positive and statistically significant, confirming its relevance for our analysis consistent with the initial results shown in Fig. 1. That is, as expected, the rollout of BCG vaccination does give rise to a change in preferences for healthcare financing fairness.

Baseline results. Next, Table 4 reports our baseline 2SLS and IV ordered probit estimates. The first-stage results show positive and significant coefficients for BCG vaccination exposure on SRH, with F-statistics well above critical values (F=197), confirming that our instrument is not weak.

Comparing OLS and IV estimates reveals that correcting for endogeneity makes a difference to our estimates. Indeed, estimates using OLS show divergent effects. That is, improved SRH is associated with reduced attitudes toward fair access but increased willingness to support fair financing, though effect sizes are small (−2 % and 2 %, respectively). This is suggestive of the presence of attenuation bias coming from unobserved confounders such as optimism, risk attitudes, prior health shocks, and political beliefs.

As expected our preferred IV specification shows larger, positive effects of health status on both outcomes. A one-unit increase on the individual SRH Likert scale raises support for fair access by 0.39 units (approximately 11 %) and willingness to support fair financing by 0.23 units (approximately 9 %). These results remain consistent using IV ordered probit estimation (coefficients of 0.33 and 0.22, respectively). Again, the significant difference between IV and OLS estimates confirms the presence of attenuation bias in the OLS approach. Alternative specification using IV probit with the ordered probit in the first stage, are reported in Table S5 of the SM, and reveal consistent results.

Among covariates, female respondents show greater support for fair access but a lesser willingness to individually support a fair financing compared to males. Older individuals report higher preferences for both dimensions of fairness than younger respondents.[5] Education exerts divergent effects: more educated individuals show lower support for fair access but higher willingness to support fair financing compared to those with only primary education. As expected, income primarily affects attitudes toward fair access, with wealthier individuals showing less support.

Other health measures. To address potential reporting bias, we use alternative health measures: specifically, a dummy variable for being in good health (Good health = 1 if SRH is reported as good, very good, or excellent) and healthy BMI. The results are presented in

[5] As a robustness check for age specification, we tested 25-year generational cohorts and estimates are comparable across both outcomes even though a slight loss of precision for the support for fair financing that becomes statistically significant at 10% significance level. This robustness check confirms that our identification strategy remains valid when controlling for generational effects (see Table S19 in the Supplementary Material).

Table 4
IV estimates of the effect of health status on individual attitudes toward fair access (column 1–2) and willingness to support fair financing (column 3–4).

	Attitudes toward fair access		**Support for fair financing**	
	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)
Panel A: OLS & 2SLS				
Self-reported health	−0.084***	0.390***	0.045***	0.229**
	(0.005)	(0.100)	(0.005)	(0.0951)
Individual controls	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	71,112	71,112	70,494	70,494
Adjusted R-squared	0.14		0.08	
*		**Self-reported health**		**Self-reported health**
		(1)		(2)
Panel B: First stage				
BCG exposure		0.156***		0.165***
		(0.012)		(0.012)
Individual controls		Yes		Yes
Time FE		Yes		Yes
Country FE		Yes		Yes
Observations		71,112		70,494
F-statistic		197		198
	Ordered Probit	IV Ordered probit	Ordered Probit	IV Ordered probit
	(1)	(2)	(3)	(4)
Panel C: Ordered probit & IV ordered probit				
Self-reported health	−0.076***	0.328***	0.042***	0.220***
	(0.004)	(0.072)	(0.005)	(0.079)
Individual controls	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	71,112	71,112	70,494	70,494
AIC	205,054	398,405	210,197	401,708
		Self-reported health		**Self-reported health**
		(1)		(2)
Panel D: First stage				
BCG exposure		0.169***		0.170***
		(0.012)		(0.012)
Individual controls		Yes		Yes
Time FE		Yes		Yes
Country FE		Yes		Yes
Observations		71,112		70,494

Notes: This Table reports results from the IV estimates of the effect of health status on individual attitudes toward fair access and willingness to support fair financing. Panel A and panel B report OLS and 2SLS regressions of self-reported health on individual attitudes toward fair access and willingness to support fair financing with bootstrapped (10,000 replications) standard errors clustered at the person level in parentheses (panel A). In panel B, we report the results from the first stage regressions. Panel C and panel D report ordered probit and IV ordered probit regressions of self-reported health on individual attitudes toward fair access and willingness to support fair financing with bootstrapped (10,000 replications) standard errors clustered at the person level in parentheses (panel C). In panel D, we report the results from the first stage OLS regressions. Individual controls: age above 60, female, highest education level, household income, self-reported health not reported. Complete econometric output is available in Table S3, Table S4, and Table S5 of the Supplementary Material.

* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

Table 5, with the first stage results available in the supplementary material (SM) in the appendix. Panel E displays the results using the "Good health" cut-off, which addresses an additional limitation of SRH by relaxing the assumption that the effect of SRH on our dependent variables is linear. We find that the results are consistent with those obtained for SRH. Similarly, when we replace SRH for healthy BMI (Panel F) we continue to find positive effects, though our estimates are less precise for willingness to support a fair health system financing.

Heterogeneity. Given that individual preferences for fair healthcare financing may vary across demographic and socio-economic groups, we examine whether the relationship between SRH and preferences for financing fairness vary across gender, education level, and income. The results of these heterogeneity checks are presented in columns 1–6 of Table 6.

Our results suggest that better health status significantly increases support for fair access across most analyses (columns 1–6). The exception is for willingness to support fair financing by gender, where women on average exhibit lower support than men, although healthier women exhibit a higher support than healthier men.

Similarly, we document differences by socio-economic background. More educated respondents are more likely to support a fairly

Table 5
IV estimates of the effect of health status on individual attitudes toward fair access and willingness to support fair financing using alternative health measures: panel E: good health; panel F: healthy BMI.

	Attitudes toward fair access (1)	**Support for fair financing** (2)
Panel E: 2SLS (Health = Good health)		
Good health (ref= bad & fair health)	0.929***	0.547**
	(0.242)	(0.229)
Individual control	Yes	Yes
Time FE	Yes	Yes
Country FE	Yes	Yes
Observations	71,112	70,494
F-statistic	172	173
	Attitudes toward fair access (3)	**Support for fair financing** (4)
Panel F: 2SLS (Health = Healthy BMI)		
Healthy BMI (ref= healthy BMI=0)	3.096	1.704*
	(7.621)	(1.018)
Individual controls	Yes	Yes
Time FE	Yes	Yes
Country FE	Yes	Yes
Observations	71,112	70,494
F-statistic	14	15

Notes: This table presents the results from the 2SLS regressions of our alternative health measures on attitudes toward fair access and willingness to support fair financing with bootstrapped (10,000 replications) standard errors clustered at the person level in parentheses. In Panel E, we use the dummy variable "Good Health" (equal to 1 if self-reported health (SRH) is Good, Very Good, or Excellent) as the individual health variable. In Panel F, we use the dummy variable "Healthy BMI" (equal to 1 if the respondent's BMI falls within the normal range of 18.5–24.9), which provides an objective measure of health (as opposed to the subjective measure reported via SRH). Individual controls: age above 60, female, highest education level, household income, self-reported health not reported. The complete econometric output is available in Table S6 and Table S7 of the Supplementary Material.

* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

financed health system compared to less educated ones, but the effect of health status diminishes, even becoming non-significant with higher education levels. In contrast, all groups above a low-income exhibit a higher support for fair financing, and similar effects are found for access fairness except among high-income respondents. Consistent with the estimates of interactions with education, the interaction terms between income and health status reveal negative and statistically significant effects across all income groups compared to the low-income reference group, yet the effect does not absorb the positive effect of health status.

Finally, individuals' preferences for fairness in healthcare financing may also differ depending on the typology of the healthcare system prevalent in their country, as these systems are underpinned by distinct notions of solidarity and equity. Consistently, we have classified countries into three groups based on their main source of financing: a) tax-funded systems; b) social health insurance (SHI) systems; c) mixed systems.[6] Our estimates reported in Table S11 of the SM suggest that, on average, respondents in SHI and mixed healthcare system countries reveal a higher support for fair access compared to respondents from tax-funded systems, but again this effect reverses for those with better health. Individuals in SHI and mixed systems exhibit lower willingness to support a fair financing than those in tax-funded systems. Overall, these results indicate that healthcare system level choices can moderate the relationship between health status and preferences for financing fairness.

Robustness checks. To test the robustness of our findings on the impact of SRH on respondents' preferences for financing fairness, we conduct two sets of robustness checks. First, we run the 2SLS model excluding the Netherlands and the US, the two countries where BCG vaccination was not mandated at the national level. The results, reported in Table S12 of the SM, confirm our baseline findings. Next, we narrow our sample to countries within the European single market, which share similar institutions (e.g., core human rights and common legislation). Again, estimates displayed in Table 7 confirm our main findings, but the effect is statistically significant only on attitudes toward fair access in this revised sample.

Instrument validity. To address potential threads to the validity of our instruments (exposure to BCG vaccination) we employ the Local to Zero Approach (LTZ) method proposed by Conley et al. (2012). This method allows us to assess the robustness of the estimations in cases where the instrumental variables may not fully satisfy the exogeneity restriction. When the instrumental variables are approximately exogenous, an effective instrumental variable estimator can still be obtained by specifying a prior distribution for the correlation coefficient between the disturbance term and the instrument. Overall, the regression results reported in Table S14 and Fig.

[6] Tax-funded systems (AU, DK, FI, IT, NO): primarily funded through general taxation and typically free at point of service; social health insurance systems (CZ, DE, FR, HR, IL, JP, NL, PL, SI, SK): funded through mandatory payroll contributions, often supplemented by taxation or private insurance; mixed systems (CH, CN, PH, RU, TW, US, ZA): funded through combinations of taxation, social insurance, and private insurance components.

Table 6
IV estimates of the effect of health status on attitudes toward fair access and willingness to support fair financing by sex (panel G), education (panel H), and household income group (panel I).

	Attitudes toward fair access (1)	**Support for fair financing** (2)
Panel G: 2SLS Heterogeneity (Female)		
Self-reported health	0.269***	0.131
	(0.101)	(0.095)
Female	−0.463***	−0.599***
	(0.156)	(0.150)
SRH*Female	0.212***	0.176***
	(0.051)	(0.050)
Individual controls	Yes	Yes
Time FE	Yes	Yes
Country FE	Yes	Yes
Observations	71,112	70,494
F-statistic	99	99
	(3)	(4)
Panel H: 2SLS Heterogeneity (Education)		
Self-reported health	0.426***	0.305***
	(0.102)	(0.100)
Secondary education	0.142	0.494***
	(0.196)	(0.188)
Tertiary education	−0.025	1.225***
	(0.294)	(0.282)
Education not reported	−0.206	0.865
	(1.009)	(0.830)
SRH* Secondary education	−0.079	−0.142**
	(0.065)	(0.063)
SRH* Tertiary education	−0.059	−0.317***
	(0.091)	(0.087)
SRH*Education not reported	0.053	−0.306
	(0.397)	(0.277)
Individual controls	Yes	Yes
Time FE	Yes	Yes
Country FE	Yes	Yes
Observations	71,112	70,494
F-statistic	42	42
	(5)	(6)
Panel I: 2SLS Heterogeneity (Income class)		
Self-reported health	0.665***	0.537***
	(0.135)	(0.125)
Middle income	0.722***	1.351***
	(0.242)	(0.223)
High income	0.685	1.555***
	(0.463)	(0.451)
Income not reported	0.996***	0.419*
	(0.248)	(0.238)
SRH*Middle income	−0.298***	−0.466***
	(0.086)	(0.079)
SRH*High income	−0.366**	−0.521***
	(0.146)	(0.141)
SRH*Income not reported	−0.411***	−0.201**
	(0.089)	(0.085)
Individual controls	Yes	Yes
Time FE	Yes	Yes
Country FE	Yes	Yes
Observations	71,112	70,494
F-statistic	47	48

Notes: This table reports the results of the 2SLS regression heterogeneity analysis on attitudes toward fair access and willingness to support fair financing with bootstrapped (10,000 replications) standard errors clustered at the person level in parentheses. In Panel E, we report estimates based on sex heterogeneity, interacting the dummy sex with SRH and regressing them on the attitudes toward fair access and willingness to support fair financing. In Panel, G and H we run the same analysis, but the estimates are based on education level heterogeneity (Panel H) and income class heterogeneity (panel I). Individual controls: age above 60, female, highest education level, household income, self-reported health not reported. Complete econometric output is available in Table S8, Table S9, Table S10 of the Supplementary Material.

* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

Table 7
IV estimates of the effect of self-reported health status on individual on attitudes toward fair access and willingness to support fair financing constraining the sample to countries belonging to the European single market.

	Attitudes toward fair access (1)	Support for fair financing (2)
Panel J: 2SLS		
Self-reported health	0.329**	0.064
	(0.128)	(0.124)
Individual controls	Yes	Yes
Time FE	Yes	Yes
Country FE	Yes	Yes
Observations	35,359	34,848
F-statistic	112	113

Notes: This table reports the results of the 2SLS regression of SRH on attitudes toward fair access and willingness to support fair financing restricting the sample to countries belonging to the European single market. Standard errors are bootstrapped (10,000 replications), clustered at the person level, and reported in parentheses. Countries included: Croatia, Czech Republic, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Poland, Slovak Republic, Slovenia, Switzerland. Individual controls: age above 60, female, highest education level, household income, self-reported health not reported.. Complete econometric output is available in Table S13 of the Supplementary Material.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Fig. 3. Potential mechanisms through which SRH may affect individuals' attitudes toward fair access and willingness to support fair financing.
Notes: This figure summarises the potential mechanisms through which SRH may affect individuals' support for fair access and financing. We distinguish the mechanisms dimensions: 1) Trust in health care providers and others 'use of health care services; 2) Economic conditions, via income and employment; 3) Political attitudes, including party political affiliation and active participation to last elections

S3 of the SM confirm that, even with substantial deviation from the exclusion restriction, the instrument still has a considerable effect on the outcome variable.

Potential mechanisms. Finally, we investigate three potential mechanisms explaining how health status affects preferences for financing fairness. The first mechanism is that individuals' preferences reflect broader concerns regarding trust in the healthcare system (external effect). The second mechanism focuses on the role of changes in health status on income and current employment. Lastly, the third mechanism is that health influences political attitudes. Fig. 3 summarises the evidence retrieved for these potential mechanisms.

First, individuals who perceive themselves to be in better health might reveal a higher level of confidence in healthcare services and providers (Hall et al., 1993; Xiao and Barber, 2008). We test this using three variables: trust in receiving best treatment if seriously ill, trust in doctors, and beliefs about healthcare overuse by others. Our results (Panel K, Table 8) show that better SRH is negatively associated with trust in the healthcare system and doctors, while we find no statistically significant association with beliefs about overuse. These findings suggest that healthier individuals, possibly due to their lack of direct experience with healthcare services, may develop different perspectives on financing and access fairness due to their weaker institutional trust.

Second, health plays a critical role in influencing income and employment outcomes due to its direct impact on productivity, absenteeism, and overall workforce participation (Bloom et al., 2004; Grossman, 1972). Since previous studies have documented a positive relationship between income and prosocial behaviors (Andreoni et al., 2021; Falk et al., 2018; Kosse et al., 2020), we examine whether economic factors mediate the health-financing fairness relationship. Using IV probit regressions, we find (Panel L, Table 8) that better SRH significantly increases both the probability of being in higher income deciles and being employed, confirming that socioeconomic status is an important pathway through which health influences preferences for financing fairness.[7]

Third, health can influence political attitudes, including support for a specific political party or ideology. While most literature

[7] For completeness, we present in Table S18 of the SM a test of whether income and employment directly affect attitudes toward healthcare financing fairness. We specifically estimated an IV specification including above 5th income decile and current employment as additional controls. The coefficients reveal comparable effects to our original specifications, although we lose precision for support for fair financing.

Table 8
IV estimates of the effect of health status on potential mechanisms. Self-reported health effect on confidence in health care mechanism (panel K); self-reported health effect on income and employment mechanism (Panel L); self-reported health effect on political attitudes mechanisms (Panel M).

	Get the best treatment available if seriously ill	**Doctors can be trusted**	**People use more health care services than necessary**
	2SLS	2SLS	2SLS
Panel K: Mechanisms (Trust)			
Self-reported health	−0.340***	−0.251***	0.131
	(0.081)	(0.066)	(0.082)
Individual controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Observations	70,639	72,309	69,327
F-statistic	203	208	189
	Above 5th income decile	**Employed at the time of the survey**	
	IV-probit	IV-probit	
Panel L: Mechanisms (Economic)			
Self-reported health	0.425***	0.976***	
	(0.094)	(0.016)	
Individual controls	Yes	Yes	
Time FE	Yes	Yes	
Country FE	Yes	Yes	
Observations	56,306	73,452	
Wald Chi2	5595	72,954	
	Conservative/right/far-right voter	**Voted at last election**	
	IV-probit	IV-probit	
Panel M: Mechanisms (Political)			
Self-reported health	−0.291**	−0.908***	
	(0.137)	(0.022)	
Individual controls	Yes	Yes	
Time FE	Yes	Yes	
Country FE	Yes	Yes	
Observations	36,106	71,635	
Wald Chi2	2199	46,255	

Notes: This table reports the results of the mechanism analysis. Panel K reports the 2SLS results from the trust mechanism. The first column reports the results from the regression of SRH on respondents 'perception that they would get the best treatment available in the country if seriously ill (from (1) "It's certain I would not get" to (5) "It's certain I would get". The second column reports the results from the regression of SRH on the stated trust in doctors (from (1) "Strongly disagree" to (5) "Strongly agree"). The third column reports the results from the regression of SRH on the respondents 'agreement that people use health care services more than necessary (from (1) "Strongly disagree" to (5) "Strongly agree"). Panel L reports the IV-probit results from the economic mechanism. The first column reports the results from the regression of SRH on the probability of being above the 5th income decile in the country. The second column reports the results from the regression of SRH on the probability of employment at the time of the data collection. Panel M reports the IV-probit results from the political mechanism. The first column reports the results from the regression of SRH on the probability of voting for a right/conservative or far right party. The second column reports the results from the regression of SRH on the probability of having voted at the last election in the country. In all regressions, standard errors (in parentheses) are bootstrapped with 10,000 replications and clustered at the person level. Individual controls: age above 60, female, highest education level, household income, self-reported health not reported. Household income was not included in the individual controls when using the probability of being above the 5th income decile. Complete econometric output is available in Table S15, Table S16, and Table S17 of the Supplementary Material.
* $p < 0.01$. ** $p < 0.05$, *** $p < 0.01$.

focuses on how political attitudes affect health, fewer studies, investigate the reverse relationship. However, the evidence exhibits mixed results: some studies find that areas exposed to reduced life expectancy and increasing mortality rates are more likely to give rise to a higher share if Republican vote (Bilal et al., 2018; Bor, 2017), while individual-level studies show healthier people more likely to identify as Republican (Pacheco and Fletcher, 2015). Childhood health also appears to influence adult political ideology, with healthier children (again from the US) more likely to develop conservative views later in life (Kannan et al., 2022). As liberal or leftist ideology typically supports policies favouring disadvantaged populations, we can expect health to affect preferences for financing fairness through political orientations. However, the relationship between health and political engagement is complex: poor health may lead to political disengagement (Burden et al., 2017; Mattila, 2020), or alternatively activate political participation as suggested by the "reversed health gap" hypothesis (Söderlund and Rapeli, 2015). Hence, it is important to test this mechanism with our data.

More specifically, we test this mechanism using two variables: voting for right-leaning parties and electoral participation in the last election. In both cases, we employ IV probit regressions to account for the binary nature of our dependent variables. Our analysis (Panel M, Table 8) shows that better SRH correlates with higher likelihood of voting for right-leaning parties but lower probability of electoral participation. This suggests that while health influences political orientation, it does not fully explain the observed "unhealthy self-interest" effects. Instead, these effects appear to be driven by the influence of health on socio-economic status and employment. Another explanation, which we cannot test with our data, relates to the role of optimism. Research shows that optimism can improve

health in the long run (Costa-Font and Vilaplana-Prieto, 2022) and, therefore, it may it may also increase support for financing fairness. That is, individuals with a more optimistic outlook might be more inclined to support fairness in health care financing, perhaps because they perceive broader social benefits or believe in the effectiveness of collective systems. This suggests that psychological factors, such as one's general outlook on life, could interact with health status to influence preferences for equitable resource distribution, highlighting a potentially important but unmeasured mechanism in shaping public support for health system fairness.

5. Conclusion

This paper has examined whether preferences for a fair health system financing are health dependent, namely whether they vary with individual's health status. To date, the only known evidence regarding the role of an individual's health status in shaping societal preferences relates to attitudes towards migration (Ivlevs, 2024). In this paper we study whether health status shapes preferences for healthcare access and financing fairness. Using data from 73,452 individuals across 22 countries, we employed a novel instrumental variable strategy leveraging variations in national BCG vaccination schedules to establish causal evidence.

Our findings consistently support the 'unhealthy self-interest hypothesis', namely that individuals in poorer (better) health exhibit reduced (increased) support for healthcare access and financing fairness. A one-point improvement in self-reported health increases support for fair access by 11 % and the willingness to support fair financing by 8 %. That is, the evidence shows a stronger effect of health status on normative judgments compared to specific behavioral intentions involving personal financial sacrifice (e.g., paying more taxes), suggesting that health status has a more pronounced impact when no personal financial sacrifice is required. This pattern indicates that while healthier individuals express greater support for fairness principles, this support somewhat weakens when it involves an actual financial contribution. Our findings on willingness to support fair financing are particularly interesting, as our measure of willingness to support fair financing can be interpreted as a proxy for progressive financing. Notably, we find that such support is not just a reflection of their individuals' needs, challenging simplistic views of self-interest in healthcare preferences.

Overall, these results provide a behavioural explanation for prior empirical evidence showing that unequal societies often face poorer health outcomes, including lower life expectancy, higher obesity rates, increased drug abuse, and poorer mental health (Napier and Jost, 2008; Pickett and Wilkinson, 2015). That is, when individual's face ill-health, such adversity weakens their support for health care system fairness, and hence one would expect that interventions to increase fairness would be on the margin less likely to be launched. Importantly, these effects persist across diverse healthcare systems, though with varying magnitudes, suggesting the relationship between health and preferences for financing fairness transcends institutional arrangements while being moderated by them.

The mechanisms driving these effects operate primarily through economic pathways (income and employment), with healthcare trust and political attitudes playing contributing roles. This helps explain why healthier individuals, who typically have better economic outcomes, exhinit too a stronger preference for healthcare financing and access fairness.

These findings align with Ivlevs (2024), who found that better health correlates with more positive attitudes toward immigration, suggesting health's influence on preferences for financing fairness extends beyond healthcare domains. Our results also offer new insights into the relationship between health status, risk aversion, and inequality aversion. While existing literature shows that poor health typically increases risk aversion (Cen et al., 2021; Rice and Robone, 2022), which usually correlates negatively with inequality aversion (Carlsson et al., 2005; Chambers, 2012), our results reveal that, in the healthcare domain, this relationship may be affected by other confonders. Future research should investigate in greater detail the causal links among these three distinct individual traits.

Our study has several limitations that should be acknowledged. First, our cross-sectional data structure limits our ability to observe how health status changes over time. Second, we lack data on potentially important confounders including individual traits (optimism, risk attitudes, time preferences) and experiences (prior health shocks), all of which could influence preferences for healthcare financing, although our IV strategy should be robust to omitted variable bias. Future research should incorporate longitudinal designs and collect data on these psychological and experiential factors to test whether our findings remain robust. Third, our measures of preferences for financing fairness are based on single survey items, which may not capture the full complexity of these constructs. Fourth, while our sample includes 22 countries with diverse healthcare systems, the institutional heterogeneity across these nations introduces challenges in generalizing findings to specific contexts. Despite these limitations, the consistency of our results across multiple specifications and robustness checks provides confidence in our main conclusions. Lastly, the second wave of data collection (2021) took place in the middle of the COVID-19 pandemic. Accordingly, we cannot rule out that the health crisis differentially affected individual attitudes towards health care. Future research using post-pandemic data will be important for confirming the generalisability of these findings to non-crisis periods.

This study has significant policy implications. More specifically, the causal link between improved health and increased support for health care financing fairness points to a potential virtuous cycle: as health systems become more effective at improving population health, political support for equitable healthcare financing may naturally increase. This could explain the existence of a Kuznets curve for health inequalities (Costa-Font et al., 2018) and provides additional justification for health improvement investments as foundational for building more equitable systems. Consequently, health systems should consider incorporating fairness weights in resource allocation decisions, with particular attention to neglected populations whose needs may gain increased recognition as overall population health improves.

Beyond healthcare, our findings suggest that successful redistributive policies in the health domain may influence their own political sustainability, by shaping the preferences that support them. This challenges models that treat social preferences as exogenous and suggests that policy evaluation should account for preference-shaping effects alongside direct welfare impacts. That is, improvements in individual health status might in turn shape and consolidate the support for health system fairness. Understanding these feedback loops between policy outcomes and preference formation may be crucial for designing durable social institutions.

Data availability statement

Data can be accessed through the International Social Survey Programme website.

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Declaration of competing interest

The authors have no conflict of interest to report.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2025.107337.

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