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COVID-19 pandemic and prosociality: An experiment with healthcare professionals☆

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ABSTRACT

We study the extent to which exposure to COVID-19 relates to healthcare professionals' prosociality. Drawing on empirical evidence from an incentivized experiment and a companion survey of healthcare professionals (HCPs) at a large Italian hospital ($N = 194$), we find that different forms of exposure to COVID-19 predict their altruistic motivation in heterogeneous ways. HCPs who worked in COVID-19 wards or had a close relative or friend severely affected by the virus are more than 5 percentage points more likely to prioritize patient welfare over personal gain, with the association for professional exposure being mostly driven by female HCPs, especially nurses. Conversely, personally contracting COVID-19 is associated with a 6 percentage point decline in prosociality. Our results highlight that different experiences of need shape prosocial behavior in hospital settings.

1. Introduction

The COVID−19 pandemic has provided important lessons about how societies prepare for and respond to public health emergencies. It has also reshaped individual behaviors, influencing both patients' attitudes toward healthcare and the decision-making and moral engagement of healthcare providers. Healthcare professionals (HCPs) were confronted with an unprecedented public health emergency that imposed extraordinary physical, emotional, and psychological demands on them.[1] However, we know little about the role of prosociality in explaining how HCPs responded to the pandemic. From the seminal work of Arrow (1963), the healthcare profession is thought to be characterized by prosocial and altruistic motivations, driving individuals to act in the interest of others' well-being. Yet, does this hold true under extreme conditions? Does proximity to COVID−19 matter? And what about personal exposure to the virus?

Understanding whether HCPs' prosocial behavior is associated with exposure to the strain of the COVID−19 emergency is essential for designing effective health policies and maintaining a resilient and ethically grounded healthcare workforce. A natural setting in which one may examine this question is Northern Italy. Northern Italy was the first European area severely affected by COVID−19; the healthcare system at

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[1] The intense workload, high infection risk, and moral dilemmas associated with triage and patient care during the pandemic exacerbated stress and burnout among HCPs (Greenberg et al., 2020; Shanafelt et al., 2020).

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the time was under extreme pressure, and Italian HCPs were exposed to unexpectedly high mortality rates and prolonged ethical strain. Studies conducted in Italian hospitals have revealed elevated levels of anxiety, compassion fatigue, and moral distress among healthcare personnel (Barello et al., 2020).

This paper studies how different forms of exposure to COVID−19 predict the prosocial behaviors of medical doctors and nurses towards their patients in Italy three years after the outbreak of the pandemic. In an experimental framework, we test how different forms of exposure—namely, having worked in a COVID−19 ward, having had a friend or close relative who experienced severe symptoms, or having personally contracted the disease – are related to HCPs' choices between therapies that lead to different payoffs for patients and HCPs. Using rich data from a sample of 194 doctors and nurses employed at a large Italian hospital in Turin, we study whether these shocks are associated with any differences in the propensity to maximize patients' well-being rather than their own monetary benefits.

First, we show that having worked in a COVID−19 ward is associated with an increase of roughly 5 percentage points in the propensity to prioritize patients' benefits over monetary gains. A similar increase in altruistic choices is also observed among HCPs exposed to COVID−19 through a friend or relative who experienced a severe infection. In contrast, HCPs who were personally infected with COVID−19 exhibit a sizable reduction in altruistic behavior, especially in the case of a serious infection requiring hospitalization. However, while the positive association in the first case is heterogeneous across subgroups and is mainly driven by female HCPs, especially nurses, the estimated associations for the latter two exposures are more homogeneous across subgroups.

Our empirical evidence is consistent with *identity theory*, which posits that social and professional identities may shape preferences and behaviors beyond individual traits, fostering effort and cooperation (e.g., Akerlof and Kranton, 2000; Akerlof and Kranton, 2005; Chen and Li, 2009; Charness and Chen, 2020). The outbreak of the COVID−19 crisis reinforced the salience of healthcare workers' professional mission (i.e., identity), thereby heightening the symbolic value and purpose of their work. During the COVID−19 pandemic, the medical profession was widely recognized as embodying collective resilience and civic duty, which in turn might have strengthened HCPs' professional identity as a key source of intrinsic motivation and moral satisfaction (Pellegrini et al., 2022). Our findings suggest that this enhanced sense of purpose may not have been merely transient. The positive association between altruism and having worked in a COVID−19 ward is observed well beyond the initial phase of public celebration, when HCPs were portrayed as "heroes". That is, HCPs' direct involvement in high-intensity care environments may reinforce patient-oriented altruistic motivations through mechanisms of professional identification and internalized social value (e.g., Oswald and Powdthavee, 2008; Deaton, 2012).

In contrast, we document a negative association between *personal* COVID−19 infection and altruistic behavior among HCPs, which is consistent with the literature in behavioral science that links adverse shocks to self-protective behavioral shifts. Experiencing illness firsthand often redirects cognitive and emotional resources toward recovery, security, and self-preservation, thereby temporarily diminishing other-regarding preferences (Fiske and Taylor, 2007; Loewenstein, 2000). That is, the personal burden of disease may crowd out prosocial tendencies by prioritizing self-care over altruistic engagement, par-ticularly when individuals face lasting psychological or physiological consequences of infection. This is consistent with existing work on inequality preferences (e.g., Asaria et al., 2023) and with the so-called "unhealthy self-interest" channel, which suggests that exposure to adverse personal health shocks reduces support for equitable health policies (Antonini and Costa-Font, 2025).

More broadly, consistent with the literature on *background risk* (Gollier and Pratt, 1996), our findings suggest that exposure to large, uninsurable risks can heterogeneously shape individuals' responses to salient *foreground* trade-offs in decision-making. In this context, the COVID−19 pandemic may be interpreted as a background health risk whose lasting effects on prosocial behavior depend critically on the degree to which individuals experience the risk directly and personally (Harrison et al., 2022).

We make three main contributions to the literature. First, we contribute to the literature on the persistence of *state-dependent* preferences and attitudes (Andersen et al., 2008), examining in a cross-sectional setting whether and to what extent individual behaviors remain associated with exposure to large-scale shocks beyond their initial occurrence, thereby speaking to recent evidence that shock-induced effects on preferences and attitudes may fade over time (Shachat et al., 2021a; Shachat et al., 2021b; Abel and Brown, 2022; Gambetta and Morisi, 2022).[2] In contrast to our results, Poole et al. (2025) show that Danish general practitioners' motivations remained relatively stable before, during, and after the outbreak of the COVID−19 pandemic. However, the differences between their findings and our main results can be explained by differences in sample composition, outcome measurement, and institutional context. While Poole et al. (2025) focus specifically on general practitioners, our sample consists of a broader group of hospital-based HCPs. Indeed, our heterogeneity analysis suggests that the positive association between altruism and professional exposure to COVID−19 wards is mainly driven by female HCPs and nurses, while we find no statistically significant association among doctors. Moreover, Poole et al. (2025) rely on self-reported motivations, whereas our conclusions are based on choices elicited in the context of an incentivized experiment with real-world consequences. Finally, it is worth noting that Northern Italy was severely hit by the outbreak of COVID−19, especially in terms of hospital pressure, ICU saturation, and mortality, while Denmark experienced a more contained first-wave shock.

Second, we contribute to the literature on HCPs' altruism and, more broadly, on the determinants of their attitudes and behaviors (Li et al., 2017; Li, 2018; Li et al., 2022; Attema et al., 2023; for a recent survey, see Galizzi et al., 2023). This strand of research has grown substantially in recent years, also thanks to the increasing use of experimental methods in health economics (Cox et al., 2016; Galizzi and Wiesen, 2017). Experiments are meaningful to study healthcare providers' behavior in controlled and incentive-compatible decision environments as they allow researchers to make an altruistic concern salient (Arrow, 1963) while avoiding adverse consequences for patients in this high-stakes environment. Behavioral experiments on provider behavior analyze a broad range of topics, from financial incentives (Hennig-Schmidt et al., 2011; Brosig-Koch et al., 2017b; Di Guida et al., 2019; Brosig-Koch et al., 2024), non-monetary incentives (Huesmann et al., 2026), professional norms (Kesternich et al., 2015), and referral patterns (Waibel and Wiesen, 2021; Brosig-Koch et al., 2022) to the effects of liability (Finocchiaro Castro et al., 2019) and competition (Brosig-Koch et al., 2017a; Byambadalai et al., 2023).[3] Furthermore, Casalino et al. (2024) document that physicians' altruism leads to better health outcomes for patients and a more efficient allocation of resources. Conversely, profit motivation is associated with worse quality of care, higher costs, provision of potentially harmful overtreatment, and prescription of more expensive branded drugs (Gertler and Kwan, 2024; Huang et al., 2025).

Finally, the paper contributes to the literature on the effect of personal health shocks on HCPs' prosocial behaviors. So far, there is evidence of a negative effect of COVID−19 on the prosocial behavior of young adolescents from low-socioeconomic-status backgrounds (Terrier et al., 2021), especially those who experienced a strong mental health

[2] Note that we do not interpret our empirical results as evidence on the stability of *unconditional* or *structural* preferences. Rather, we study the persistence of preferences conditional on exposure to the COVID−19 pandemic.

[3] For a first comprehensive review of economic experiments on health service provision, see Finocchiaro Castro et al. (2024).

burden (Lohmann et al., 2023). Moreover, Angrisani et al. (2024) document that personality traits were largely negatively impacted for workers in highly exposed professions (e.g., traders). More specifically, we speak to the large body of research that investigates the impact of COVID−19 on individual attitudes, which yields mixed results (see Umer, 2023 for a review). Several studies show that medical students volunteering in COVID−19 wards exhibit better communication skills, a greater propensity for teamwork, and increased altruism (Ali et al., 2021), often reinforcing traits that are intergenerationally transmitted (Guo et al., 2024). On the other hand, Cartwright et al. (2023) document that HCPs more exposed to the physical and psychological burden of the pandemic became significantly less likely to encourage relatives and friends to pursue a medical career, an effect that is primarily explained by decreased altruism and higher risk aversion. This paper shows how these different, and apparently divergent, effects on altruism arise through distinct channels of exposure to COVID−19. We differentiate between exposure through professional contact with patients in COVID−19 wards, through close friends or relatives who experienced severe illness, and through personal infection. While many studies have investigated the impact of health shocks on preferences and behaviors, little attention has been devoted so far to their effects on HCPs, despite the important implications for patient care and health system efficiency.

Taken together, our study contributes to the above literature by documenting how large unexpected shocks may persistently shape behaviors and attitudes among exposed groups, especially in terms of prosociality (e.g., Beatton and Torgler, 2018; Fumagalli et al., 2023). On the one hand, we highlight the importance of HCPs' traits in shaping patients' outcomes, suggesting that screening and hiring procedures should consider both technical competencies and prosocial attitudes. In line with *identity theory*, reinforcing HCPs' professional and social identity may enhance their altruism, thereby improving the quality of care provided. On the other hand, the negative impact of personal COVID−19 infections indicates that support mechanisms addressing the needs of HCPs (e.g., medical assistance, safety protocols, organizational measures meant to reduce stress and burnout; see Reiff et al., 2022) may help effectively sustain altruism and, in turn, improve patient outcomes.

The paper proceeds as follows. Section 2 provides background on our setting. In Section 3, we lay out our study design and describe our sample. Section 4 provides a descriptive analysis and outlines our econometric approach. Section 5 shows our estimation results and discusses underlying mechanisms. Section 6 concludes.

2. Background and study setting

2.1. COVID−19 and healthcare in Italy

Following the outbreak of COVID−19 in China in late 2019, Italy was among the first European countries to be severely affected by the spread of the disease, especially in its northern regions. After the first COVID−19 cases were reported in Lombardy in February 2020, Italy experienced an extremely rapid surge in the number of COVID-related hospitalizations and fatalities. This placed the Italian healthcare system under strain, with hospitals facing serious shortages of beds and equipment, particularly in intensive care units (ICUs) in northern regions (Armocida et al., 2020; Boccia et al., 2020; Angelici et al., 2023).

When the Italian government imposed a nationwide lockdown in March 2020 to limit the contagion and reduce pressure on the healthcare system, hospital facilities were already facing a shortage of available beds. Thus, the regional authorities in charge of the supply of healthcare services promoted a rapid expansion of capacity. While Italy had approximately 5200 intensive care beds (about 8.8 beds per 100,000 inhabitants) at the beginning of 2020, this figure exceeded 8500 within a few months, although with large regional disparities and persistent shortages in highly affected areas (Gitto et al., 2021).

Several hospitals in areas exposed to a higher incidence of COVID−19 converted existing wards into temporary intensive care units or constructed new modular wards in adjacent areas. There was also a massive reallocation of medical and protective equipment toward regions and hospitals exposed to a higher incidence of severe COVID−19 cases in Northern Italy. Several additional hospital workers were either reassigned to COVID−19 wards or newly recruited, even among medical students, retired doctors and nurses, and volunteers. To strengthen the healthcare system and support these measures aimed at expanding ICU capacity, the Italian government allocated more than 3.5 billion euros in additional emergency funds (OECD - European Observatory on Health Systems and Policies, 2021).[4]

Despite substantial efforts, the rapid spread of the virus – especially in northern Italian regions – led to the saturation of intensive care units. During the first wave of the pandemic, shortages of beds and medical equipment forced HCPs to make difficult decisions regarding patients' access to life-saving treatments. As a result of the excess demand for healthcare driven by the pandemic, HCPs faced a substantially increased workload, often working several consecutive extended shifts. Medical doctors and nurses employed in COVID−19 wards therefore experienced a serious physical and emotional toll, not only due to the difficult health decisions to be made, but also because of the support to be provided to patients who could not receive visits due to the severe restrictions. Moreover, the limited availability of personal protective equipment exposed HCPs to a high risk of contagion. Thus, to avoid infecting their close relatives at home, doctors and nurses often lived in isolation from their families for prolonged periods of time, with further negative effects on their levels of distress, anxiety, and burnout.

Finally, the outbreak of COVID−19 disrupted routine healthcare services, leading to delays and cancellations of outpatient visits, diagnostic procedures, and routine non-urgent surgeries. These disruptions had serious implications not only for the timely diagnosis and treatment of new conditions but also for the continuity of care for chronic illnesses. As a result, several patients experienced a deterioration in their health status, with long-term consequences for healthcare system backlogs that extended beyond the acute phase of the pandemic (Gualano et al., 2021; Franzoni et al., 2025).

2.2. Our study setting

To examine the association between exposure to COVID−19 and HCPs' attitudes, this study focuses on a major northern Italian hospital located in Turin, the regional capital of Piedmont, where several COVID−19 wards were opened during the first wave of the pandemic in spring 2020 (Bo et al., 2020). Piedmont was, in fact, one of the regions most severely affected during this first wave. For example, in April 2020, it recorded the highest incidence of confirmed cases in Italy, reaching 3.6 cases per 1000 inhabitants (Italian Department of Civil Protection, 2025).

The hospital where we collected data is one of the largest public healthcare facilities operating within the Regional Healthcare System in Piedmont. It is equipped with specialized departments that deliver both primary care and advanced medical services. The four main departments are Surgical, Medical, Diagnostics and Services, and Emergency and

[4] Note that these additional resources, initially introduced as emergency funds during the pandemic, were subsequently incorporated on a permanent basis into the Italian *National Health Fund*.

Acute Care. Each department encompasses multiple units, ensuring a comprehensive and diversified range of healthcare provision.[5] This hospital has approximately 480 beds, 90% of which are inpatient beds, while the remaining beds are designated for outpatient day care[6]. Overall, the hospital employs approximately 1480 staff members, encompassing a wide range of professional roles that reflect its diversified organizational structure. These employees can be classified as HCPs or support staff in social-care roles, with the former representing over 80% of the total workforce. Nurses and medical doctors account for approximately 52% and 27% of the workforce, respectively. The remaining 20% is split between technicians (e.g., radiology and laboratory staff) and other specialized profiles (e.g., midwives, physiotherapists, and psychologists).

After the outbreak of the COVID−19 pandemic in March 2020, the hospital underwent a substantial reorganization. Starting on March 1, following a specific mandate from the regional healthcare authority, the hospital temporarily suspended all scheduled elective inpatient admissions and all outpatient specialist treatments. Until the end of May, the general surgery unit remained closed, with all eight operating rooms converted into COVID−19 wards.[7] During the second quarter of 2020, the intensive care treatments provided by the hospital were almost exclusively dedicated to COVID−19 patients. Considering the full capacity of the hospital, the general directorate estimated that, during the first wave of the pandemic, between 50% and 60% of all available beds (i.e., approximately 240–290 beds) were allocated to COVID−19 patients. Among the remaining beds, capacity was reduced by more than one-third – generally by decreasing the number of beds per room from three to two – to ensure the minimum required distancing measures aimed at preventing the spread of the virus.

To cope with the emergency and manage the increasing number of COVID−19 infections, the departments of the hospital rapidly reallocated human resources, while also revising their clinical protocols. Moreover, to address the limited availability of personnel, the regional health authorities of Piedmont launched a recruitment campaign that covered all its major hospitals. In March 2020, two public calls were opened to hire both fixed-term nursing staff and social healthcare workers, requiring full availability for 24-hour shifts. A further special procedure was launched to urgently recruit medical doctors, including graduates still completing their specialization. The recruitment focused on key specialties relevant to the pandemic response, such as epidemiology, respiratory diseases, anesthesiology and intensive care, virology, and microbiology. The hospital further introduced a dedicated psychological support service for its employees, aimed at addressing the heightened stress, uncertainty, and emotional strain experienced during the health emergency.

[5] The Surgical Department includes units such as general surgery, cardiac surgery, vascular surgery, thoracic (pulmonary) surgery, oncological surgery, anesthesiology, obstetrics and gynecology, ophtalmology, and urology. The Medical Department covers cardiology, internal medicine, oncology, neurology, nephrology, pulmonology, pediatrics, and endocrinology, among others. The Diagnostics and Services Department comprises laboratory medicine, radiology, pathology, pharmacy, and nuclear medicine. Finally, the Emergency and Acute Care Department is responsible for managing urgent admissions and providing critical interventions for acute medical conditions.

[6] Note that, since our experiment was conducted in 2023, this was the most up-to-date information available at the time, reflecting the situation as of December 31, 2022.

[7] After a gradual reopening of the surgical unit beginning in June 2020, all activities were again suspended on November 1, due to the onset of the second wave of COVID−19 infections.

3. Study design

3.1. Ethics and recruitment

This study is based on a survey and experiment administered to the HCPs of a major public hospital. The structure of the questionnaire and the data collection process were planned with the hospital's General Management, ensuring that no patients were involved and that no clinical experimentation was conducted.[8] This experimental research project is registered at the Center for Open Science (OSF) under the title "COVID−19, prosocial preferences, and inequality aversion" (OSF Registration).

All hospital employees involved in both direct and indirect healthcare assistance were deemed eligible and thus invited to take part in our study. They were invited through an official communication sent by the hospital's General Director on December 6, 2023. The invitation explained that the survey was jointly designed by researchers affiliated with the London School of Economics, the Università Cattolica del Sacro Cuore, and the University of Cologne, explicitly mentioning that its objective was to investigate prosocial preferences and risk attitudes after the outbreak of the COVID−19 pandemic.

Participation was voluntary and respondents were assured of the anonymity and confidentiality of their answers. Participants received a link to access the survey via *Qualtrics* and, as a first task, they were prompted to create an anonymous identification code. They were also informed that the estimated completion time for the survey was approximately 10 minutes.

3.2. Survey and experimental design

Our analysis of the correlation between exposure to COVID−19 and altruism is based on an incentivized experiment and survey administered between mid-December 2023 and February 2024 to HCPs.

To measure HCPs' altruism, we use a short version of Attema et al.'s (2023) experimental paradigm. In this medically framed setup, subjects are asked to make a series of six binary choices, each involving a trade-off between their own profits and patient benefits. Five decision situations involve no Pareto-dominated choice, while one does. Both HCPs' profits and patients' benefits are expressed in monetary terms. Table 1 summarizes the combinations of payoffs in each task.

While all subjects make decisions as HCPs for stylized patients, their choices have real-world consequences. They are informed that, at the end of the experiment, one of the six tasks is randomly selected to determine each individual's payoff. In particular, HCPs' earnings are

Table 1
Choice scenarios in the experiment.

Choice scenario	1	2	3	4	5	6
Therapy A	(3;15)	(3;15)	(9;9)	(6;12)	(3;15)	(3;3)
Therapy B	(15;3)	(9;9)	(15;3)	(15;3)	(12;6)	(15;3)

Notes. This table reports the combinations of payoffs for each choice scenario of the experiment. The order in which the scenarios appeared on subjects' screens was randomized. In each pair, the first payoff refers to the monetary profit for the healthcare professional, while the second payoff reflects the gain for the patient.

[8] Prior to implementation in the hospital, the study protocol received ethical approval from both the Ethics Committee of the hospital itself and the London School of Economics and Political Science Research Ethics Committee (Protocol Ref. 72257).

converted into equivalent probabilities to win an Apple iPad (10.9", 64 GB).[9] Patients' benefits are instead translated into donations to *Telethon*, a well-known non-profit foundation advancing medical research in rare genetic diseases.[10] Upon the conclusion of our study, the Apple iPad was awarded to the participant who maximized monetary profits in the randomly selected task of the experiment, and a donation of 1000 euros – corresponding to the payoffs generated for patients during the experiment – was made to *Telethon*. This incentive mechanism follows the structure of previous experiments on provider behavior (e.g., Hennig-Schmidt et al., 2011; Hennig-Schmidt and Wiesen, 2014; Kesternich et al., 2015). The Online Appendix A reports the exact experimental instructions.

To identify HCPs' exposure to COVID−19, respondents were asked to indicate *(i)* whether they were employed in a COVID−19 ward during the first wave of the pandemic in 2020, and, for those who did work in such wards, whether their assignment was based on specific medical expertise; *(ii)* whether they had a friend or close relative who experienced COVID−19 with different severity, ranging from mild symptoms to hospitalization and ICU admission; and *(iii)* whether they experienced a COVID−19 infection themselves, again distinguishing between different degrees of severity.

Our survey also measured attitudes toward inequality, following the approach proposed by Costa-Font and Cowell (2025). First, respondents had to state whether, on a scale from 1 (strongly disagree) to 10 (strongly agree), they believed that reducing income inequality should be a government priority. Second, they had to report the extent to which they agreed with the statement that the reduction of income inequality should be prioritized over the overall increase of income. This question was rated between 1 (maximum support for economic growth) and 10 (maximum support for income equality). Analogously, respondents had to state their preference for reducing health inequalities rather than improving overall life expectancy, again on a 1–10 scale, with higher values indicating stronger support for equity in health outcomes.

To further assess their prosocial attitudes, subjects were asked whether they were regular blood donors or made regular donations to non-profit organizations. Additionally, our survey investigates patience, with participants rating on a scale from 1 to 10 their willingness to sacrifice some present welfare to obtain greater benefits in the future, and risk aversion, with participants rating on a scale from 1 to 10 their propensity for taking risks. Our dataset also includes information on personal characteristics such as gender, age, region of origin, acquired qualifications, and family background (i.e., whether parents or grandparents were active in the same profession). Table A.1 in the Online Appendix A lists all survey questions, along with the corresponding answer options (see also Falk et al., 2018).

3.3. Sample description

The 194 HCPs in our sample are on average 48 years old, 60% are female, and 40% are nurses rather than doctors. Table 2 compares these characteristics with those of the healthcare staff in the hospital under analysis, and more generally with employees in Italian hospital facilities (Italian Ministry of Health, 2022). Columns (2) and (3) show that, although smaller in overall employment size, the hospital staff closely resembles that of other Italian public hospitals, particularly in terms of gender composition and share of nurses. As far as our sample is concerned (Column 1), although the average age is relatively similar between samples, nurses tend to be somewhat under-represented. This also explains a lower share of female respondents in our sample. Sections 5 and 6 discuss how this under-representation does not threaten our main conclusions, inducing, if anything, an attenuation bias in our estimates.

Table 2
Comparison between our sample and universe of healthcare employees in Italian hospitals.

	(1) Our sample of respondents	(2) Our hospital in Turin	(3) Average Italian public hospital
Female	60%	71%	70.9%
Age	47.86	46.31	48.16
Nurse	40%	60%	61.2%
N	194	1029	1952

Notes. This table compares the demographic characteristics of our sample with those of the HCPs employed at the hospital in Turin under analysis and, more generally, at Italian hospital facilities (Italian Ministry of Health, 2022). The last row displays the number of observations included in our sample (Column 1), the number of HCPs employed at the hospital in Turin under analysis (Column 2), and the average number of HCPs in Italian public hospitals (Column 3). Technical and administrative staff is excluded from the total number of employees.

Table 3 shows descriptive statistics for the 194 HCPs in our sample. These respondents represent approximately 19% of the HCPs employed by the hospital, all of whom were invited to take part in the experiment. The table summarizes key variables regarding these respondents' demographic and job characteristics, attitudes and preferences, and exposure to COVID−19.

In addition to the demographic variables described above, 26% of participants are originally from regions other than Piedmont and 14% of them have at least one parent who also worked in the healthcare sector. With regard to health status, 30% of respondents report being in very good condition.

Focusing on attitudes and preferences, the individuals in our sample exhibit a relatively high degree of aversion to inequality, with an average score of 8.22 on a scale ranging from 1 to 10. However, when evaluating their preferences for prioritizing income or health equality over the improvement of general income or health levels in the population, participants express a more moderate view, with average scores of, respectively, 4.83 and 4.38. We observe an intermediate degree of risk propensity in our sample of doctors and nurses, with an average score of 4.94 on our 10-point Likert scale, while their level of patience –

Table 3
Summary statistics.

	Mean	SD	Min	Max	*N*
A. Demographic and job characteristics					
Female	0.60	0.49	0	1	194
Age	47.86	10.32	25	66	194
From other region or abroad	0.26	0.44	0	1	194
Parents with same job	0.14	0.35	0	1	194
Doctor	0.60	0.49	0	1	194
Nurse	0.40	0.49	0	1	194
Very good self-reported health	0.30	0.46	0	1	194
B. Attitudes and preferences					
Inequality aversion	8.22	2.10	1	10	194
Income equality over total income	4.83	2.49	1	10	194
Health equality over health level	4.38	2.75	1	10	190
Risk propensity	4.94	2.22	0	10	194
Patience	7.47	1.59	2	10	194
Regular blood donor	0.10	0.30	0	1	194
Regular charity donations	0.38	0.49	0	1	194
C. Exposure to COVID−19					
COVID−19 ward	0.66	0.47	0	1	194
COVID−19 ward due to medical expertise	0.26	0.44	0	1	194
Friend with severe COVID−19	0.29	0.45	0	1	194
COVID−19 infection	0.31	0.47	0	1	194

Notes. This table presents descriptive statistics for the main variables concerning respondents' demographic characteristics (Panel A), attitudes and preferences (Panel B), and exposure to COVID−19 (Panel C).

[9] For instance, based on the monetary value of the iPad (about 425 EUR), for each participant the winning probability associated with a payoff of 15 in the experiment corresponds to about 4%.

[10] For more details on the Telethon foundation, see https://www.fondazionetelethon.it.

defined as the willingness to give up something today to obtain a future benefit – is much higher, with a mean of 7.47. Moreover, 10% of respondents are regular blood donors, while 38% of them are regular donors to non-profit charitable organizations.

Two-thirds (66%) of respondents in our sample report having worked in a COVID−19 ward during the first wave of the pandemic in spring 2020,[11] with 26% assigned there specifically due to their medical expertise. Exposure to the pandemic was not limited to professional experience: about one-third (29%) of respondents in our sample of HCPs report having a close friend or relative who suffered from a severe COVID−19 infection, and a similar share of them (31%) personally contracted COVID−19.

Finally, before investigating the association between these forms of COVID−19 exposure and HCPs' altruism, we describe the overall pattern of therapy choices observed in the experimental task. Across the five scenarios involving a trade-off between HCPs' own monetary payoff and patients' benefits (see Table 1), respondents maximize patients' payoffs in 79.17% of cases, with shares ranging from 53.6% in Task 2 to 90.2% in Task 3. This share of patient-regarding altruistic choices is higher than that reported by Attema et al. (2023) among medical students (from 46% among clinical students to 66% among freshmen). This difference, however, is not unexpected, since our respondents are practicing doctors and nurses, who display on average stronger altruism than medical students (Li et al., 2022). Moreover, the variation in the share of altruistic choices across our tasks suggests that respondents did not mechanically select the patient-regarding option throughout the experiment, mitigating the concern that altruism was systematically over-reported.

4. Descriptive analysis and empirical approach

4.1. Descriptive statistics

Fig. 1 displays the association between different exposures to COVID−19 and HCPs' altruism toward patients. Focusing on the five tasks of the experiment in which respondents face a trade-off between therapies that maximize either HCPs' monetary payoffs or patients' benefits, the figure displays cumulative distribution functions of altruistic choices, comparing respondents based on their type of COVID−19 exposure.

The distributions shown in panels (a) and (b) indicate that individuals who worked in a COVID−19 ward or had a close friend or relative experiencing a severe infection exhibit a higher number of altruistic decisions. In both cases, the cumulative distribution functions of exposed HCPs lie below those of their unexposed counterparts, suggesting first-order stochastic dominance. In contrast, HCPs who were themselves infected with COVID−19 exhibit the opposite pattern, with a cumulative distribution function lying above that of the non-exposed group, indicating fewer altruistic choices (panel c).

Table 4 reports descriptive statistics on the number of altruistic choices made by the respondents over the first five tasks of the experiment. In each panel of Table 4, we compare the number of altruistic choices for HCPs who did or did not experience the three different types of exposure to COVID−19. Working in a COVID−19 ward or having a close friend or relative who suffered from a severe COVID−19 infection are both associated with a higher propensity to make altruistic choices. In contrast, Panel C indicates that the opposite effect materializes for infected subjects. Figure B.1 in the Online Appendix B provides further support by comparing the share of respondents choosing the profit-maximizing option over the altruistic one in each task of the experiment.

4.2. Empirical approach

To investigate the association between different types of COVID−19 exposure and HCPs' altruism, we estimate a linear probability model predicting the likelihood of choosing the therapy that maximizes the patient's payoff across our set of hypothetical clinical scenarios. Our baseline model specification is as follows:

$$Y_{is} = \alpha + \beta \cdot \text{EXPOSURE}_i + \gamma \mathbf{X}_i + \rho \mathbf{A}_i + \delta_s + \varepsilon_{is} \quad (1)$$

where Y_{is} is a binary indicator equal to 1 if respondent i chooses the therapy that maximizes the patient's payoff in scenario s and 0 otherwise.[12]

The variable EXPOSURE_i is a dummy equal to one if respondent i was exposed to COVID−19 during the first wave of the pandemic in spring 2020, based on one of the following alternative definitions: (*i*) the respondent worked in a COVID−19 ward; (*ii*) the respondent had a friend or close relative who experienced a severe COVID−19 infection; or (*iii*) the respondent personally contracted COVID−19.

The vector of individual-level controls $\mathbf{X}_i$ includes dummy variables for gender, for age groups (25–39, 40–49, 50–59, 60 +), for being born outside Piedmont, for having completed education in another region, for parental employment in the healthcare sector, and for health status. Vector $\mathbf{A}_i$ includes a set of variables that account for individual attitudes and preferences. Specifically, we include dummy variables for being a regular donor to charitable organizations, a regular blood donor, having high risk propensity (i.e., a score $\geq$ 6/10 on the Likert scale), high patience (i.e., a score $\geq$ 8/10 on the Likert scale), and high aversion to income inequality, measured as preference for income equality over total income (i.e., a score $\geq$ 6/10 on the Likert scale).[13] For each form of exposure to COVID−19, we also control for the other two potential simultaneous types of exposure. The model always includes scenario fixed effects (δ_s), which account for differences in the structure of payoffs in each trade-off *s*. ε_{is} is the error term. We use White robust standard errors in all specifications.

While we rely on the linear probability model in Eq. (1) as our baseline specification to ease the interpretation of the coefficients, we also estimate a logit model to account for the binary nature of the outcome variable. Among robustness checks, we show that the coefficients obtained from the linear probability model are closely in line with the average marginal effects from the logit model, both in magnitude and statistical significance.

5. Results

5.1. Main estimates

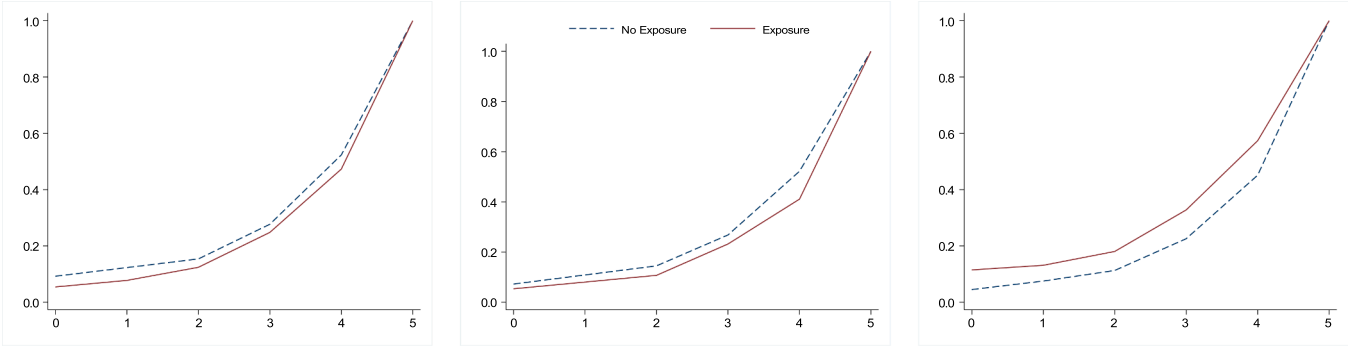
Table 5 displays how different types of exposure to COVID−19 predict HCPs' altruism toward patients. The estimates reported in the table are obtained from the linear probability model in Eq. (1) and are consistent with the average marginal effects obtained from the corresponding logit specification presented in the robustness checks.

Panel A shows that having worked in a COVID−19 ward during the

[11] Note that the share of respondents exposed to COVID−19 wards in our sample is extremely close to that documented by Epifanio et al. (2023), who find that 66.5% of their surveyed Italian physicians and nurses worked in COVID−19 wards during the first wave of the pandemic. Additionally, our evidence that COVID−19 wards involved a broad mix of healthcare professionals – rather than only narrowly specialized intensive-care personnel – is consistent with official guidelines on the reorganization of hospital services around dedicated COVID−19 areas (Italian Ministry of Health, 2020).

[12] In the case of two therapies that yield the same payoff for the patient, the choice scenario (Task 6) is dropped.

[13] Note that cutoffs are chosen based on the distribution of each variable over the 1–10 Likert scale. While we use a score of 6/10 for risk propensity and aversion to income inequality, whose average values are 4.94 and 4.83, respectively, we select a stricter cutoff of 8/10 for patience, which has an average value of 7.47 and a distribution more concentrated at high values (see Table 3).



(a) Worked in COVID-19 ward (b) Friend with COVID-19 (c) Own COVID-19 infection

Fig. 1. Cumulative distribution of the number of altruistic choices by COVID−19 exposure. *Notes.* This figure compares the cumulative distribution functions of the number of altruistic choices made by HCPs exposed to COVID−19. Panel 1a focuses on differences between HCPs who did ($N = 129$) or did not ($N = 65$) work in a COVID−19 ward during the first wave of the pandemic in spring 2020. Panel 1b compares the choices of HCPs who did ($N = 56$) or did not ($N = 138$) have a friend or close relative experiencing a severe COVID−19 infection. Panel 1c contrasts HCPs who did ($N = 61$) or did not ($N = 133$) experience a COVID−19 infection.

Table 4
Number of altruistic choices by COVID−19 exposure.

Exposure	Mean	SD	Min	Max	*N*
A. Working in COVID−19 ward					
Yes	4.02	1.39	0	5	129
No	3.83	1.58	0	5	65
B. Friend or relative with severe COVID−19					
Yes	4.14	1.34	0	5	56
No	3.88	1.49	0	5	138
C. COVID-19 infection					
Yes	3.67	1.64	0	5	61
No	4.09	1.34	0	5	133

Notes. This table presents descriptive statistics comparing the number of altruistic choices made by doctors and nurses depending on the type of exposure to COVID−19.

Table 5
Healthcare professionals' probability of maximizing patients' payoffs.

	(1)	(2)	(3)
A. Work in COVID−19 ward			
COVID−19 ward	0.048*	0.052*	0.055*
	(0.028)	(0.029)	(0.029)
Regular charity donations	0.051**	0.051**	0.051**
	(0.025)	(0.026)	(0.025)
Regular blood donor	0.110***	0.121***	0.114***
	(0.034)	(0.036)	(0.037)
B. Friend or relative with severe COVID−19			
Friend with severe COVID−19	0.057**	0.056**	0.060**
	(0.028)	(0.028)	(0.027)
Regular charity donations	0.056**	0.059**	0.051**
	(0.025)	(0.026)	(0.025)
Regular blood donor	0.107***	0.117***	0.114***
	(0.035)	(0.037)	(0.037)
C. COVID−19 infection			
COVID−19 infection	−0.058**	−0.051*	−0.065**
	(0.029)	(0.028)	(0.028)
Regular charity donations	0.048* (0.025)	0.051**	0.051**
		(0.025)	(0.025)
Regular blood donor	0.099***	0.109***	0.114***
	(0.034)	(0.036)	(0.037)
Scenario Fixed Effects	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes
Individual preferences	No	Yes	Yes
Other COVID−19 Exposures	No	No	Yes
N	970	970	970

Notes. This table reports the estimates from a linear probability model for the association between different types of exposure to COVID−19 and HCPs' likelihood of choosing a therapy that maximizes patients' payoffs. Panel A examines the effect of having worked in a COVID−19 ward during the first wave of the pandemic in spring 2020. Panel B examines the effect of having had a friend or close relative who experienced a severe COVID−19 infection. Panel C examines the effect of having been personally infected with COVID−19. All specifications include fixed effects for each trade-off and a set of demographic controls listed in Table 3 (Section A). Column (2) adds dummy variables for high risk propensity, high patience, and high aversion to income inequality (see Table 3, Section B). Column (3) controls for other potential exposures to COVID−19 (Table 3, Section C). Among the six trade-offs faced by each respondent, the sixth task is excluded because the choice is between two therapies that give the same payoff to the patient. *,**,*** represent the 10%, 5%, 1% significance levels.

first wave of the pandemic is associated with a higher level of altruism in the choice of therapies, corresponding to an increase of more than 5 percentage points. Similarly, Panel B documents a positive association for respondents with a friend or relative who experienced a severe COVID−19 infection, with an estimated increase exceeding 6 percentage points, although this coefficient is not statistically different from the one reported in Panel A for HCPs having worked in COVID−19 wards. Conversely, Panel C indicates that being infected with COVID−19 has a sizable negative relationship – up to 6.5 percentage points – with HCPs' altruism. This negative association becomes even larger when restricting attention to severe COVID−19 infections requiring hospitalization (see Table C.1 in the Online Appendix C).[14] The estimated relationship between the different types of exposure to the COVID−19 shock and our incentivized measure of altruism remains robust when controlling for personality traits (Column 2), including self-reported indicators of prosocial engagement such as regular blood donation and charitable giving, both of which are positively associated with HCPs' probability of maximizing patients' payoffs. Moreover, Column (3) shows that the coefficients for each type of exposure remain unchanged when the other two potential simultaneous exposures are included in the specification.

To rule out the potential concern that this specification might be affected by multicollinearity, we also compute the *variance inflation factors* (VIFs) for the explanatory variables included in Column (3). Reassuringly, the average VIF for the specification is 1.36, while the VIFs for the three exposure measures range between 1.11 and 1.19, well below conventional thresholds of concern.

[14] Note that HCPs exposed to a COVID−19 infection with severe symptoms account for a relatively small share of our sample (slightly over 8%).

5.2. Heterogeneity and mechanisms

Fig. 2 shows the heterogeneity in the association between exposure to COVID−19 wards and HCPs' altruism toward patients, obtained by estimating model (1) separately for several subsamples of respondents. Although these coefficients should be interpreted with caution due to the limited size of some subsamples, they uncover some interesting patterns. According to this analysis, the overall positive association documented in the full sample appears mainly concentrated among females, older respondents aged 50 +, and nurses. For regular blood donors, the point estimate is also positive, even if imprecisely estimated due to the limited sample size.

Figure B.2 in the Online Appendix B reports analogous heterogeneity analyses for exposure through a close friend or relative who experienced severe COVID−19 symptoms and for exposure due to personal infection. In the former case, the estimated coefficient is positive for most respondent groups, although the estimates vary in magnitude and precision across subsamples. In the latter case, the estimated coefficient is generally negative across groups, while it becomes closer to zero for males, relatively younger respondents aged 25–49, and blood donors.

To shed light on the mechanisms behind the association between exposure to COVID−19 wards and HCPs' altruism, we then distinguish HCPs according to the reason why they worked in COVID−19 wards. Specifically, we separate HCPs whose assignment was motivated by specific medical expertise from those whose assignment was not, and who are therefore more likely to have volunteered. Table C.2 in the Online Appendix C shows that regular charity donations and blood donation predict the probability of working in a COVID−19 ward only among HCPs without specific medical expertise. By contrast, these proxies for baseline prosociality are not significantly associated with working in COVID−19 wards among HCPs assigned because of their medical expertise.[15]

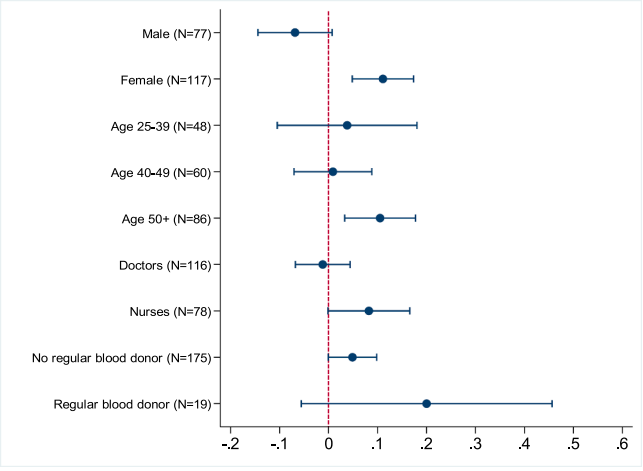


Fig. 2. Heterogeneous effects of doctors' and nurses' exposure to COVID−19 wards. *Notes.* This figure shows the estimates from a linear probability model for the association between exposure to COVID−19 wards and HCPs' likelihood of choosing a therapy that maximizes patients' payoffs, with confidence intervals at the 10% significance level. The figure reports the estimate of β from Eq. (1) separately for different subsamples. Subgroup labels report the number of respondents in each estimation sample. All specifications include fixed effects for the trade-offs under analysis, the demographic controls listed in Table 3 (Section A), the dummy variables for high risk propensity, high patience, and high aversion to income inequality (Table 3, Section B), as well as the controls for other potential exposures to COVID−19 (Table 3, Section C).

Building on this evidence, in Table C.3 in the Online Appendix C we estimate Eq. (1) distinguishing HCPs based on the reason why they worked in COVID−19 wards. Specifically, we replace the binary indicator for having worked in a COVID−19 ward with two mutually exclusive indicators, one for HCPs who worked in COVID−19 wards because of their specific expertise, and the other for HCPs whose assignment was not motivated by specific expertise, whom we interpret as more likely to have volunteered.[16] Thus, the omitted category is represented by HCPs who did not work in COVID−19 wards. For both groups of HCPs who worked in COVID−19 wards, the coefficients are positive and broadly in line with the baseline estimates reported in Panel A of Table 5. Although the point estimate tends to be larger for HCPs whose assignment was not motivated by specific expertise, a formal test does not allow us to reject equality between the two coefficients. We therefore interpret this evidence as suggestive of a somewhat stronger association of exposure to COVID−19 wards with altruism among HCPs more likely to have volunteered.

5.3. Robustness checks

Tables C.4, C.5, and C.6 in the Online Appendix C show how the main coefficients of interest evolve as control variables are progressively added to the model. These specifications further document that higher risk propensity is associated with a sizable reduction in altruism, whereas greater patience has the opposite effect.[17]

As a further robustness check, Table C.8 in the Online Appendix C reports the marginal effects from a logit model estimating how the probability of maximizing patients' payoffs is affected by having worked in a COVID−19 ward (Panel A), having a close friend or relative who experienced a severe COVID−19 infection (Panel B), or having personally contracted the disease (Panel C). The estimated coefficients are largely aligned with those obtained from our baseline linear probability model (Table 5).

To further strengthen our interpretation that estimates are specific to altruistic choices involving a meaningful trade-off between HCPs' own payoff and patients' well-being, we exploit Task 6 to perform a placebo test. In Task 6 of our experimental setting, respondents choose between two therapies that yield the same payoff to the patient but different payoffs to the HCP – i.e., one Pareto-dominated and one Pareto-dominant option, with no natural implications in terms of patient-regarding altruism. Figure B.3 in the Online Appendix B shows that the estimated coefficients for having worked in a COVID−19 ward, having a close friend or relative who experienced a severe COVID−19 infection, and having personally contracted COVID−19 are all close to zero and statistically insignificant. This placebo test therefore rules out the concern that our main results might be driven by general response patterns, unobserved differences in experimental behavior, or a tendency to choose dominated options, rather than by altruism itself.

Table C.9 in the Online Appendix C shows the correlation between altruism and exposure to COVID−19, focusing on respondents who

[15] This pattern is consistent with potential self-selection into COVID−19 wards *only* among HCPs whose assignment was *not* expertise-based.

[16] This interpretation is consistent with employment rates. HCPs who worked in COVID−19 wards due to their specific expertise report an average employment rate in these wards of 75%. In contrast, doctors and nurses whose activity in COVID−19 wards was not motivated by their specific expertise report an average employment rate in these wards of 46%.

[17] Table C.7 in the Online Appendix C shows that patience and aversion to income inequality are themselves negatively associated with exposure to COVID−19 wards.

experienced only one type of exposure.[18] In both cases, the positive estimates corroborate the results presented in Table 5. The magnitude of these coefficients appears even larger, although this might reflect the relatively small sample size resulting from the applied restrictions.

One remaining concern is that our self-reported measures of COVID−19 exposure might be affected by recall bias. To address this concern, Tables C.10 and C.11 in the Online Appendix C examine the correlations among our three exposure measures. The results show that personal COVID−19 infection is positively correlated with having worked in a COVID−19 ward, especially among HCPs whose assignment to the ward was related to their specific medical expertise. Personal infection is also positively correlated with having had a friend or close relative with severe COVID−19, although this association becomes less precisely estimated once additional control variables are included. By contrast, having worked in a COVID−19 ward is essentially uncorrelated with having had a friend or close relative with severe COVID−19. This pattern is reassuring, as it suggests that the exposure variables do not simply capture a common reporting tendency or a generalized ex-post narrative about COVID−19 exposure.

6. Conclusions

This paper provides novel empirical evidence on how large-scale societal shocks – such as the COVID−19 pandemic – are associated with persistent differences in HCPs' prosociality, moral attitudes, and behavioral choices. While much of the existing literature has examined the pandemic's short-term psychological and economic consequences, this study investigates its longer-term effects on prosocial motivation among HCPs, a group uniquely situated at the intersection of personal risk and social responsibility. Examining the relationship between different forms of COVID−19 exposure and HCPs' altruistic choices elicited in an experimental setting, we show that large shocks and health emergencies such as the COVID−19 pandemic are associated with heterogeneous differences in HCPs' prosocial behavior even after several years. First, we find that working in a COVID−19 ward is associated with a significantly higher propensity to maximize patients' well-being, especially among nurses. This pattern is consistent with psychological and behavioral theories positing that episodes of large crises and shared adversity can amplify cooperative norms and moral commitments within professional groups (Bauer et al., 2020; Han et al., 2022). In line with these results, we also find a large positive association between altruism and exposure through a close friend or relative who experienced a severe COVID−19 infection. Conversely, being personally infected with COVID−19 is associated with a decrease in prosociality, potentially reflecting the psychological burden associated with contagion and severe illness.

A careful interpretation of our results should acknowledge some *limitations* and *caveats*. First, our experiment was conducted in a single hospital in Turin, which may raise concerns about the external validity of our findings. Accordingly, our findings should be interpreted as most directly informative for high-intensity hospital settings during the first wave of the pandemic, while extrapolation to contexts characterized by lower COVID−19 pressure, different institutional arrangements, or different professional cultures should be made with caution. Moreover, although the hospital under study is slightly smaller in scale than the average Italian public hospital, its healthcare staff composition is closely aligned with national benchmarks (Table 2). While some categories of workers (e.g., women and nurses) tend to be under-represented in our sample, this is unlikely to threaten the reliability of the estimates, since these groups are those associated with stronger effects. This implies that, if anything, our estimates should be interpreted as lower-bound estimates of the associations between COVID−19 exposure and altruism. Second, we are interpreting the therapy choices made in our incentivized experimental setting as a reliable proxy of altruism and prosociality. However, this is a relatively strong assumption, as doctors' and nurses' behaviors inevitably depend on their characteristics and interactions in a much more complex real-world environment.

Although this is primarily a study in *positive* economics, as it investigates how an unexpected large-scale shock may persistently shape individual preferences, our findings also carry some health policy implications. In particular, our results shed light on the relationship between HCPs' attitudes and patients' outcomes, suggesting that preferences should be taken into account in screening and hiring procedures alongside technical competencies. The negative association between personal COVID−19 infection and altruism indicates that hospital workers – and, more generally, all individuals exposed to potential health shocks – should be the focus of measures designed to reduce risks, stress, and burnout. Such efforts may also help improve patient outcomes. In this perspective, future research should explore how institutional support can reinforce HCPs' prosocial behavior, assessing the long-term impact of such attitudinal shifts on the quality of patient care.

[18] Note that in our sample it is not possible to estimate the effect of having personally experienced a COVID−19 infection without also having been exposed to either a COVID−19 ward or a severely infected friend, due to the near absence of observations meeting this condition.

CRediT authorship contribution statement

Joan Costa-Font: Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Nicolò Gatti:** Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Gilberto Turati:** Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Daniel Wiesen:** Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ehb.2026.101629.

Data availability

The microdata are subject to a proprietary agreement with the participating hospital and cannot be publicly shared; a replication package, including code and documentation, will be made available.

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