Indices of Social Development

Working Paper
No. 2022-1

SURVIVING TOGETHER:

SOCIAL COHESION AND COVID-19 ACROSS THE WORLD

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September 2022

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ISSN 2213-6614

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Abstract

Studies on the determinants of the spread and mortality of COVID-19 indicate that the quality of health care systems and government type and capacity have a negligent role in explaining the variation of infection and death rates between countries. Studies therefore suggest a role for societal factors, in particular social capital and social cohesion as mitigating factors in control of epidemics. But the measures for these vary widely, which could include indicators that refer to politics, governance, or institutions. In this paper, we distinguish social cohesion from social capital and argue that, by its concern with the common good and relationships between social groups, the former captures the societal influence on the pandemic better than the latter. We test the hypotheses that countries with higher levels of social cohesion have lower levels of COVID-19 infection as well as death rates. We do this by analyzing the role of social cohesion in the spread and mortality of COVID-19 in a cross-country analysis with a comprehensive index and two sub-indices of social cohesion. The three indices used allow for a much larger group of countries (between 116 and 138, depending on the model variation) to be included than in previous studies by others. Moreover, they enable us to study the pathways through which social cohesion is likely to affect COVID-19 outcomes.

Contrary to the recent empirical literature we find robust relationships, specifically for the intergroup level of social cohesion. The results are particularly strong for medium-income countries. Our findings suggest that more cohesive societies, especially those with less divisiveness between social groups, may be better equipped to reduce the impact of a pandemic, irrespective of the quality of the health care system and government type and capacity. This implies that divisiveness has not only political costs but serious public health costs as well.

Keywords

Social cohesion; social capital; COVID-19; pandemic; divisiveness; cross-country analysis

SURVIVING TOGETHER [1]

SOCIAL COHESION AND COVID-19 ACROSS THE WORLD

1. Introduction

Studies have shown that the variation in the spread and fatality of COVID-19 outcomes between countries is related to population factors such as BMI and age (Popkin, Du, Green et al., 2020; Mallapaty, 2020). However, recent research show that the relationship with health care variables, such as the number of hospital beds or universal health coverage, are not meaningfully related to the impact of the virus (COVID-19 National Preparedness Collaborators, 2022). Moreover, the virus seems to affect populations in middle- and high-income countries much more than those in low-income countries (Mukherjee, 2021). These empirical findings suggest that there may be societal factors that may be relevant to explain the wide cross-country variation of the impact of the virus. A detailed cross-country study has indicated that the level of trust among individuals as well as in government institutions has a strong and statistically significant negative effect on COVID-19 infection rates (COVID-19 National Preparedness Collaborators, 2022). Various studies, often at the local level, have included measures of trust and other indicators of social capital. and many of them find statistically significant negative effects of social capital on COVID-19 infection rates and/or death rates.

Research suggests that social capital may be an important societal variable for understanding the spread and fatality of the virus. But studies use a wide variety of measures, often with a single indicator and sometimes indicators that refer not to social capital but to political participation (such as voter turn-out) or government institutions. This variation and inconsistency in

[1] This paper has benefitted from useful edits by Christina Sathyamala, useful feedback at a seminar of the Rotterdam Global Health Initiative at the ISS, The Hague (24-06-2022) and from comments at the ISD launch event of the 2020 data, also at the ISS, The Hague (13-04-2022).

measures used may be a reason for the mixed effects found, or at times a complete lack of correlation. Others have signaled such mixed effects earlier in studies on social capital and health outcomes in general (Bruhn, 2009; Kawachi and Berkman, 2014). Inconsistent findings may at least partially be due to the instrumental character of the concept of social capital, which does not fully capture the interpersonal level of connections and belonging and the extent of tolerance between different social groups. We think that the sociological concept of social cohesion is a more appropriate candidate for analyzing the impact of social relations on COVID-19 outcomes. This is because social cohesion refers to connectedness and belonging as well as to mutual respect between social groups, which involves interpersonal trust, prosocial norms, feeling safe, tolerance and willingness to cooperate with other groups (Durkheim, 1997; Manca, 2014).

In our cross-country analysis, we use a comprehensive multidimensional Social Cohesion Index consisting of a wide variety of measures of contextualized interpersonal trust, respect, tolerance and safety, from the online database Indices of Social Development (ISD). We have further detailed our analysis by distinguishing between the two dimensions of social cohesion that are generally recognized in the sociological literature (see, f.e., Manca, 2014): the degree of intolerance and conflict in the relationships *between groups* or factions in society (which we measure with the Intergroup Cohesion Index) and the extent of community and engagement *between individuals* at the local level as well as for strangers (which we measure with the Interpersonal Safety & Trust Index). The findings of our multivariate regression analysis using a wide variety of confounding variables show that social cohesion is negatively correlated with COVID-19 infection rates and death rates. The results for the Intergroup Cohesion Index are remarkably strong, suggesting that polarization of societies, through divisiveness between social groups, may allow a pandemic to be more devastating in them than in more tolerant societies.

2. Social Capital, Social Cohesion and COVID-19

2.1 Social capital, social cohesion, in studies on COVID-19

The empirical literature on societal determinants of COVID-19 refers more often to social capital than to social cohesion. We will briefly discuss the theoretical distinction between these two concepts in the next sub-paragraph and would like to discuss the recent empirical literature first. The quantitative empirical literature generally uses two types of dependent variables: behavioral indicators, for example, hand hygiene, the use of face masks or mobility, and COVID-19 infection and death rates.

Research on the behavioral dimensions shows much variation in societal variables used and in reported correlations. Sachat et al. (2021) find that a cooperative attitude supports the adherence to policy measures in China, while Müller and Rau (2021) show that social responsibility attitudes are positively correlated to compliance with policy measures in Germany. Zhu, Smetana and Chang (2021) find that in China, Japan and the US, pro-social norms are positively correlated to compliance with COVID-19 measures. Brodeur, Grigoryeva, and Kattan (2021) report that in high-trust counties in the US there is more compliance with the policy measures than in low-trust counties. In a sample of US counties and several European countries, Barrios et al. (2021) report a positive relationship between trust in institutions and trust in people, a composite measure they refer as civic capital, as well as behavioural aspects such as hand hygiene, social distancing and mask wearing. In a study carried out in Australia, Cardénas et al. (2021) show a positive correlation between social identification and responsible behavior, whereas a study by Makridis and Wu (2021) in the US finds that trust and relationships support the adherence to social distancing and hygienic practices.

However, other studies find mixed results or no effect at all in relation to their measures of social capital. For example, in a cross-country analysis of a survey including 34,000 individuals in 41 countries, Romano et al. (2021) find no effect of trust and cooperation on the support for policy measures. Some

studies use an opposite measure of social cohesion, namely individualism, as key explanatory variable. For example, Bian et al. (2021) report that in the US, counties with higher levels of individualism show less compliance with COVID-19 policy measures than counties with less individualism[1]. Interestingly, their study also indicates that the higher the COVID-infection rate in a county, the stronger the negative effect of individualism. In line with these results, Bazzi et al. (2020) point out that 'individualistic' counties tend to undermine the necessary collective action for limiting the effects of the virus. Borgonovi et al. (2021) distinguish between cognitive social capital (attitudes) and relational social capital (social relations) at the community level. They report a negative correlation between social capital in local communities and the COVID death rate in US counties while they find mixed effects in terms of political trust (measured as voter turn-out).

Several studies report nonlinear effects. In an experimental study in China, Sachat et al. (2021) show that cooperative behavior was high in the first stages of the pandemic but reduced over time. Bartscher et al. (2020) found that at the beginning of the pandemic, in seven European countries, social capital, measured as voter turn-out in elections, correlated with a higher infection rate, whereas after a year the correlation turned negative. In a study of 68 countries, Min (2020) finds a U-shaped relationship between trust radius and time till the virus infections peaked. In a study across 84 countries, Elgar et al. (2020) report that civic engagement is related to lower mortality rates of COVID-19, whereas group affiliation and social trust are related to higher mortality rates. In Japan, a study of Facebook connections among 60,000 individuals reports contradicting trends for two types of social capital (Fraser and Aldrich, 2021). However, in a similar study among counties in the US, both types of social capital showed negative correlations to death rates (Fraser et al., 2021).

Studies using measures that do not reflect social capital but refer to institutional trust or political participation, show even more mixed results. The earlier mentioned study on US counties using voter turn-out as a measure of social capital reports a clear nonlinear effect over a year (Borgonovi et al., 2021) The cross-country study in 41 countries finds no statistically significant

effects of institutional trust on behavioral changes (Romano et al., 2021), while studies on six Chinese cities (Liu et al., 2021) and on ten US states (Hao et al., 2021) find statistically significant effects for some but not for other institutional trust variables. A study on 106 Italian provinces shows a strong and positive effect of an institutional quality measure on the decline in reported new cases as compared to a negligent effect of social capital (measured as the share of nonprofit organizations per province)(Alfano and Ercolano, 2021).

The empirical literature using COVID-19 spread- and mortality rates as the dependent variable is more recent and therefore more limited than the body of literature on behavioral outcomes. In general, the literature on COVID-19 infection and mortality rates tends to find negative correlations with social capital and social cohesion measures, not only in case studies at the natimnal or sub-national level but also in cross-country studies, but again, not uniform . For example, Gelfand et al. (2021) use an index of loose versus tight cultures and in a study of 57 countries find that loose cultures have five times higher infection rates and 8.7 times higher death rates than tight cultures. However, their index includes variables for government control, which does not represent social capital or social cohesion. In his analysis of 62 countries, Kumar (2021) uses data from managers' surveys of social-cultural attitudes in countries and finds a negative correlation between community orientation and COVID-19 outcomes. Finally, a recent large cross-country study for more than 100 countries and sub-national locations finds that both trust between people and trust in government institutions are negatively related to COVID-19 infection rates but not to death rates (COVID-19 National Preparedness Collaborators, 2022).

What emerges from this review is that a wide variety of measures is used: (attitudes of) trust between individuals, (attitudes of) cooperation among individuals, (attitudes of) social responsibility of individuals, pro-social norms of individuals in communities, social identification by individuals, group affiliation, negative scores of localities on historical individualism (frontier mentality in US counties), social media connections, connections between

individuals in a local community or through social media, a tight cultures index, and managers assessments of community-orientation of societies.

In the next sub-section, we will briefly discuss the conceptual distinction between social capital and social cohesion as well as their measurement, as the basis for our own measures of social cohesion.

2.2 From Social Capital to Social Cohesion

Just like social capital, social cohesion has been analyzed in relation to health (Bruhn, 2009; Knowles and Owen, 2010; Mackenbach, 2014). John Bruhn (2009: 10) observes that "there is considerable evidence that suggests that community characteristics and community processes affect both health behaviours and health outcomes". But how is social cohesion to be distinguished from social capital in health research and does it matter?

The concept of social cohesion is much older than that of social capital, and dates to Émile Durkheim (1951; 1997) who considered it as the social quality of communities that provides belonging and mutual support. Many decades later, Mark Granovetter (1973) presented the idea of the strength of weak ties as compared to the sometimes suffocating strong ties in closed social groups. A decade later, other sociologists focused on the instrumental aspect of community ties, using the term social capital, for example for acquiring human capital (Bourdieu, 1986; Coleman, 1988). This, in turn, sparked the interest of economists, further narrowing down social capital to a resource in which one's investments would generate a pay-off in terms of income growth, business opportunities or poverty reduction (see, for example, Dasgupta and Serageldin, 1999; Grootaert and van Bastelaer, 2002). As a reaction to this gradual narrowing down of the concept of social cohesion, other economists have criticized the instrumental use of an inherently social concept (Fine, 2001; van Staveren and Knorringa, 2008; Davis and Christoforou, 2014). Today, the two are used side by side but often with overlapping though different understandings, which leads to a conceptual confusion and inconsistencies in measurement, which has also affected public health research (Carrasco and Bilal, 2016).

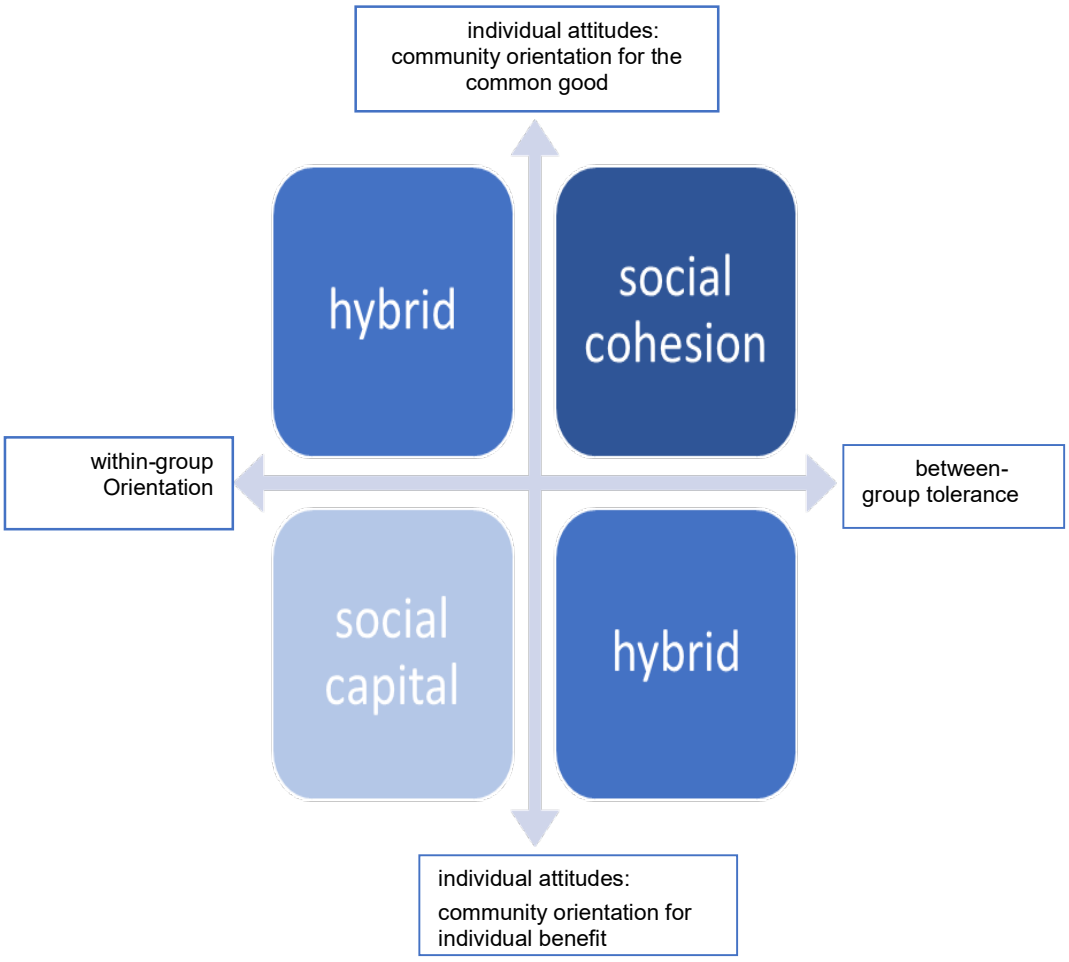
Today, the concept of social cohesion is often used deliberately in contrast to social capital, to emphasize its societal-level character, meso-level dynamics or orientation towards the common good (Bruhn, 2009; Kawachi and Berkman, 2014. As argued by Davis and Christoforou (2014), measures of social cohesion are concerned with relations between social groups, between strangers, as well as at the local level, and the extent, strength, duration, and underlying values of these social relations. In elaborating the distinction between the two concepts further, Carrasco and Bilal (2016) refer to Erich Fromm's use of the notions of having and being. They link the first to social capital (which tends to be considered as an individual resource) and the second to social cohesion (referring to relationships). The authors advise that researchers "should be aware of the difference between social capital and social cohesion when designing public health interventions, to ensure posing appropriate research questions and using the most conducive frameworks and approaches" (Carrasco and Bilal, 2016: 130). This is precisely what we have tried to do in our cross-country study.

In Figure 1, we clarify the distinction between the two key concepts with the help of two axes. The horizontal axis is concerned with social groups. To the left, social relations are inward-oriented (for example in some religious or political groups), which is also sometimes expressed by the concept of bonding social capital. However, this may result in us-them attitudes towards other groups. To the right, relations between social groups are characterized by tolerance or respect, rather than by divisiveness. The vertical axis refers to individual attitudes toward society. At the bottom, social relations are considered as social capital – social connections for individual benefit. At the top, social relations are considered as part of, as well as contributing to, the common good. The diagram's boxes indicate that *social capital* is concerned with within-group orientation and individual attitudes for individual benefit, whereas *social cohesion* refers to respectful relationship between-group relations and a community orientation for the common good by individuals. However, the distinction does not imply a clear separation or opposition between social capital and social cohesion. This is reflected in the two hybrid boxes, pointing out that there are

some overlaps in the understanding and measurement of social capital and social cohesion. For example, with various measures of trust or feelings of safety and community.

FIGURE 1

Differences and overlaps between social capital and social cohesion



Our research analyzes whether countries with higher levels of social cohesion show lower COVID-19 infection and mortality rates. In terms of the diagram, our explanatory variables are three social cohesion variables, located in the top right-hand corner of the diagram reflecting today's theoretical understanding of social cohesion as distinct from social capital (Manca, 2014;

Carrasco and Bilal, 2016). The next section will explain our measures in more detail. But first, we would like to elaborate our research question.

We expect a beneficial effect of social cohesion precisely because of the protective social features of social cohesion, irrespective of government policies and institutions, the level of democracy, and the quality of health care system. Earlier research on social cohesion and health impacts already provides some evidence for such protective pathways (Gärchter, Herrmann and Thöni, 2004; Bruhn, 2009; Prati et al. 2011; Kawachi and Berkman, 2014), while some of the studies reviewed above, using broader measures at the interpersonal level, also point at these pathways (for example, studies using measures of interpersonal trust and pro-social norms). We expect that social cohesion has beneficial effects on COVID-19 outcomes not through a single or one-dimensional societal variable but through the combined effect of positive intergroup relations and interpersonal bonds, uniting different groups in the fight against the pandemic and motivating individuals to prevent harm to others. This leads to two hypotheses:

H1: Countries with higher levels of social cohesion have lower levels of COVID-19 infection rates

H2: Countries with higher levels of social cohesion have lower levels of COVID-19 death rates

3. Method and data

3.1 Method

We will test the hypotheses with a large sample of countries for the period between the start of the data collection by WHO and November 2020, before the vaccination program initiated. We use multiple regression analysis (OLS) with several explanatory variables and confounders based on the empirical literature. However, cross-section regression analysis does not establish causality and may suffer from endogeneity. Moreover, given the difference in the moment of

measurement of the dependent variables and the key explanatory variables, reverse causality is not very likely in our study. The dependent variables refer to data on 1 November 2020, whereas the 2020 social cohesion indices, which are constructed every 5 years, were constructed using data from the years 2018, 2019 and, to a limited extent, 2020. The following equation describes the relationship between the COVID-19 outcomes and social cohesion.

$$Y_i = \beta_1 SC_i + \beta_2 GDP + \beta_3 G + \beta_4 H + \beta_5 Dem$$

In which Y_i refers to accumulated COVID-19 infections (Y_1) and accumulated COVID-19 deaths (Y_2). SC is the key explanatory variable, social cohesion, for which we use three different composite measures: Social Cohesion Index (SC_1), Intergroup Cohesion Index (SC_2) and Interpersonal Safety & Trust Index (SC_3). The other variables are confounders. The first one (GDP) is economic, referring to the level of economic development of a country, which is important because we include both developed and developing countries in our sample. The second is a group of variables, which refer to the general institutional capacity of the government. This concerns a matrix of government-related variables (G), which includes the quality of public services, governance performance and a corruption index. By including these three variables we try to capture the government capacity to confront shocks. As the shock in this case affects the health system, we also include variables to measure the health care capacity matrix (H), which includes a country's health expenditures as a percentage of GDP, the number of hospital beds and a general COVID-19 vulnerability indicator expressed by the percentage of the population over 65 years old. Finally, in order to account for differences in political systems across countries we control for the liberal democracy index (Dem).

We test two model variations, with and without a distinction between income categories of countries, which enables us to see which income category tends to be most responsive to the estimations, given the earlier established fact that the virus is most devastating in medium and high-income countries.

3.2 Variables and data

The two dependent variables are measured as the accumulated number of cases and deaths per ten thousand inhabitants. The data are obtained from the COVID-19 Data Repository of the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University. Due to the differences in the peak of the first wave of the pandemic we decided to use the total number of cases accumulated until November 2020, which is the last month before vaccination started worldwide.[2]

The Intergroup Cohesion Index refers to relations of tolerance and respect between social groups in society. The index consists of 10 indicators, including polarization, confidence in law-and-order authorities, the extent of grievances between groups and the extent of terrorism and internal conflict between groups. The Interpersonal Safety & Trust Index refers to the interpersonal norms and behaviors of trust, the extent to which people feel they can rely on others, and their feelings of safety. The index has 22 indicators, including measures of contextualized trust, community and crime rates. The Social Cohesion Index is constructed as the combination of the 32 variables. The two sub-indices are part of the open online database Indices of Social Development (ISD) of the International Institute of Social Studies, whereas the combined index was calculated using the same ranking method.[3] See Table 1 for the full list of indicators included in the three social cohesion indices.

The indices were constructed with the method of matching percentiles (see, for an explanation, Foe and Tanner, 2010). It is a bootstrapping method of 1000 iterations to generate a stable ranking of countries on a scale between 0 and 1, as long as a country has data for at least three indicators. The key advantage of this multidimensional ranking method is that it generates data for each index for a large number of countries, as compared to an index consisting of less indicators but where all countries need to have data with which an average can be calculated. The construction of the indices through bootstrapping generates a stable country ranking.

TABLE 1

Indicators included in the three social cohesion indices

	Social Cohesion Index	Number of countries	Intergroup Cohesion Index	Interpersonal Safety Trust Index
1	Societal polarization	177	X	
2	Confidence in law and order	134	X	
3	Group grievance	178	X	
4	Terrorist attacks	138	X	
5	Deaths in organized conflict (>25)	38	X	
6	Guerilla conflict instances	56	X	
7	Political risk	138	X	
8	Internal conflict	140	X	
9	Risk of terrorism	134	X	
10	Riots	133	X	
11	Felt unsafe at home	34		X
12	Trust family	73		X
13	Trust people meet for the first time	73		X
14	Trust people you know personally	73		X
15	Most people can be trusted	18		X
16	Had stuff stolen from home	34		X
17	Have not been attacked	34		X
18	Feel safe in their area at night	40		X
19	Preferred not to go out at night	42		X
20	Theft of a motorized land vehicle	60		X
21	Theft	74		X
22	Sexual exploitation	44		X
23	Crime victim	18		X
24	Frequency of alcohol consumed on streets	42		X
25	Frequency of drug sale in neighborhood	42		X
26	Frequency of robberies in neighbourhood	42		X
27	Victim of robbery in the neighbourhood	43		X
28	Victim of attempted murder	5		X
29	Kidnapping Rate	65		X
30	Homicide estimates by country	183		X
31	WHO homicide rate	183		X
32	Satisfied with freedom to choose in life	144		X

As an economic variable, we include GDP per capita at constant 2010 from the World Bank Development Indicators.[4] The data for health care expenditures as percentage of GDP, number of hospital beds per 1000 inhabitants and proportion of the population over 65 years old were all taken from the World Bank as well. The data on governance are from the Worldwide

Governance Indicators (also World Bank) and the data for the level of democracy are taken from the Varieties of Democracy database of the University of Gotherburg.[5] Table 2 shows the descriptive statistics for all these variables.

Our sample of countries consists of 219 countries: 184 developing countries and 35 developed countries. Except for 10, all others have been categorized into four income categories, as per the World Bank classification.[6] The various regressions contain less countries due to missing data for some of the variables.

TABLE 2

Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Intergroup Cohesion Index	168	47.64	0.97	45.41	50.14
Interpersonal Safety & Trust Index	160	49.46	1.03	47.27	52.25
Social Cohesion Index	187	48.47	0.84	46.73	50.53
COVID infections per 10,000	189	98.48	125.14	.03	753.71
COVID deaths per 10,000	174	2.07	3.17	0	26.4
GDP per capita USD	175	14293.51	19837.14	208.07	111062.3
Democracy Index	171	.41	.25	.01	.86
Corruption Index	171	.48	.29	.01	.97
Public services	175	5.05	2.67	.63	9.99
Health expenditure % GDP	190	6.5	2.75	1.99	16.94
Governance performance	203	-.02	1	-2.4	2.16
Universal health coverage	194	64.41	15.35	27.33	89.36
Hospital beds per 1,000	171	3.14	2.6	.1	15.13
Percentage over 65 years	193	8.36	5.88	.95	25.75
High income countries	74				
Upper middle-income countries	54				
Lower middle-income countries	55				
Low income countries	26				
Developed countries	35				
Developing countries	184				

4. Results

Tables 3 and 4 show the results for the accumulated COVID-19 infection rates. The first three models present the results without comparing income categories, while models 4, 5 and 6 include the four income categories, with low-income countries as the default.

4.1 Results for COVID-19 infection rates

The results presented in table 3 indicate that there are 33 less cases per ten thousand inhabitants when countries have a one point increase on the Social Cohesion Index (which equals a percentage point, since the scale is converted to 0 – 100, although the range is much narrower). This means that, for example, if the UK had the same level of social cohesion as Estonia, it would have had 33 less cases per ten thousand inhabitants than it actually had by November 2020. This is a difference of 218,000 infections, given its population size of 68.2 million inhabitants. The table also points out that the regression result for the Social Cohesion Index ($p<0.05$) seems to be driven by the Intergroup Cohesion Index ($p<0.01$) and not by the Interpersonal Safety & Trust Index. Hence, our first hypothesis is supported by our findings.

When we look at the confounding variables, we note that GDP per capita has a statistically significant positive albeit a small effect. An increase in per capita income of 1000 USD per year is correlated with 4 more COVID-19 cases, which confirms that the richer countries are more affected by the virus compared to the poorer counties. This result is in line with the results obtained by Deaton (2021) who presented evidence that richer countries show more deaths per capita. Also, this author indicates that precisely the higher death rates occurred in countries which also have better health care systems, higher incomes and more capable governments.

Our results show that for government capacity, only the quality of public services shows a statistically significant result. Again, the relationship is positive, which may be a sign of higher levels of diagnosis of the virus in countries with more effective public health services. We see a similarly positive and statistically significant relationship with public health care expenditures. Probably, countries that spend more on health have a higher capacity to test and identify COVID-19 cases. The universal health coverage does not present a significant effect on the number of cases.

TABLE 3

Social cohesion and the number of COVID-19 infections per ten thousand inhabitants

	(1)	(2)	(3)
Social cohesion	-33.309*		
	(-2.04)		
Intergroup cohesion		-31.070**	
		(-2.66)	
Interpersonal safety & trust			7.308
			(0.55)
GDP per capita	0.004***	0.004***	0.002+
	(4.01)	(4.01)	(1.78)
Democracy	31.471	46.626	49.952
	(0.58)	(0.86)	(0.87)
Corruption	39.309	38.126	27.550
	(0.86)	(0.84)	(0.56)
Government performance	3.257	4.440	-0.597
	(0.40)	(0.55)	(-0.07)
Public services	22.336**	20.566**	13.731++
	(2.80)	(2.81)	(1.54)
Health expenditure as %GDP	10.935**	11.745**	12.190**
	(2.91)	(3.09)	(2.99)
Universal health coverage	-0.077	-0.024	0.848
	(-0.07)	(-0.02)	(0.77)
Constant	1670.079*	1507.773*	-376.655
	(2.02)	(2.61)	(-0.53)
N	125	123	116
adj. R^2	0.448	0.459	0.384

Notes: *t* statistics in parentheses; ++ $p < 0.15$, + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In the three models presented in table 4, we observe that middle income countries show stronger correlations with the spread of the virus than either low- or high-income countries. In particular, many middle-income countries can be found in Latin America and Asia, and much less so in Africa, where the spread and mortality of the virus is much less. In fact, compared to African countries, the Americas and Europe show more COVID-19 infections.

TABLE 4

Social cohesion and the number of COVID-19 infections per ten thousand inhabitants per country group

	(1)	(2)	(3)	(4)	(5)	(6)
Social cohesion	-33.309*			-36.750*		
	(-2.04)			(-2.31)		
Intergroup cohesion		-31.070**			-33.930**	
		(-2.66)			(-2.96)	
Interpersonal safety & trust			7.308			3.909
			(0.55)			(0.28)
GDP per capita	0.004**	0.004**	0.000	0.005***	0.005***	0.003*
	(2.88)	(3.09)	(0.16)	(4.43)	(4.40)	(2.01)
Democracy	4.815	6.577	34.667	41.353	56.628	58.886
	(0.09)	(0.12)	(0.62)	(0.79)	(1.08)	(1.06)
Corruption	14.583	11.730	11.754	38.302	38.330	22.789
	(0.32)	(0.26)	(0.25)	(0.87)	(0.87)	(0.48)
Government performance	1.539	3.896	-3.813	-0.457	0.250	-5.796
	(0.19)	(0.49)	(-0.48)	(-0.06)	(0.03)	(-0.69)
Public services	19.571*	17.896*	7.681	22.987*	23.661**	16.778+
	(2.48)	(2.47)	(0.90)	(2.57)	(2.72)	(1.77)
Health exp. %GDP	12.743**	14.206***	11.542**	8.802*	9.466*	9.088*
	(3.13)	(3.46)	(2.77)	(2.28)	(2.44)	(2.17)
Universal health coverage	-1.647	-1.945++	-0.326	-1.694	-1.859++	-0.873
	(-1.37)	(-1.64)	(-0.27)	(-1.37)	(-1.51)	(-0.68)
High income	94.276+	108.721*	131.040*			
	(1.91)	(2.18)	(2.44)			
Upper mid-income	107.122**	121.778***	111.336**			
	(3.26)	(3.59)	(3.15)			
Lower mid-income	39.307	50.446+	18.481			
	(1.39)	(1.78)	(0.63)			
Asia				39.051+	32.035	28.993
				(1.69)	(1.38)	(1.10)
Europe				78.736**	67.926*	71.874*
				(2.62)	(2.28)	(2.23)
America				87.027**	92.419**	89.406**
				(3.05)	(3.25)	(2.99)
Constant	1670.079*	1507.773*	-376.655	1924.639*	1765.639**	-78.947
	(2.02)	(2.61)	(-0.53)	(2.39)	(3.03)	(-0.11)
N	125	123	116	125	123	116
adj. R^2	0.448	0.459	0.384	0.485	0.498	0.425

Notes: *t* statistics in parentheses; ++ $p < 0.15$, + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.2 Results for COVID-19 death rates

The results in table 4 indicate that there were 1.8 less cases per ten thousand inhabitants when countries score one point higher on the Social Cohesion Index. This, for instance, means that, if Brazil had the same level of social cohesion as Malaysia, it would have had 49,000 less deaths, given its population size of 213 million inhabitants.[7] The table also points out that the regression result for the Social Cohesion Index ($p<0.01$) is again driven more by the Intergroup Cohesion Index ($p<0.01$) than by the Interpersonal Safety & Trust Index. The findings confirm our second hypothesis.

When we look at the confounding variables, we note that GDP per capita has zero effect and is not statistically significant. This is contrary to the estimation for the infection rates. For the level of democracy, there is an unexpected weak positive association ($p<0.15$) although it may signal that autocracies might systematically underreport COVID-19 mortality. The government capacity variables do not seem to be much related. Interestingly, the results show hardly any statistically significant association with the number of hospital beds per thousand inhabitants, although the sign is negative, as expected. Finally, there is a positive correlation with the proportion of the population over 65 years old, but this relation is not significant.

TABLE 5

Social cohesion and the number of COVID-19 deaths per ten thousand inhabitants

	(1)	(2)	(3)
Social cohesion	-1.803**		
	(-3.23)		
Intergroup cohesion		-1.170**	
		(-2.78)	
Interpersonal safety & trust			-0.771
			(-1.44)
GDP per capita	-0.000	-0.000	-0.000
	(-0.03)	(-0.60)	(-0.65)
Democracy	2.446	3.081+	1.735
	(1.37)	(1.62)	(0.90)
Corruption	0.241	0.240	0.137
	(0.14)	(0.13)	(0.07)
Government performance	0.138	0.313	-0.128
	(0.20)	(0.42)	(-0.17)
Public services	0.138	0.313	-0.128
	(0.20)	(0.42)	(-0.17)
Health expenditure as %GDP	0.155	0.223+	0.200
	(1.06)	(1.51)	(1.24)
Hospital beds per 1,000	-0.162	-0.109	-0.214
	(-0.91)	(-0.59)	(-1.14)
Percentage over 65 years	0.078	0.035	0.115
	(0.81)	(0.34)	(1.11)
Constant	88.896**	56.384**	39.818
	(3.21)	(2.76)	(1.43)
N	138	133	131
adj. R^2	0.167	0.149	0.108

Notes: *t* statistics in parentheses; + $p < 0.15$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In the six models presented in table 6, we observe that once we divide the countries by income group or geographical region, the social cohesion decreases the number of COVID-19 deaths in up to 2.04 deaths per ten thousand inhabitants. For the number of deaths, we observe that the interpersonal safety & trust index has a weak but also negative relation with the number of deaths.

We observe again that (upper) middle-income countries show stronger correlations with the spread of the virus than either the low- or high-income countries. Also, that the Americas (which includes both North, Central and South America) and Europe present more deaths per ten thousand inhabitants than Africa.

TABLE 6

Social cohesion and the number of COVID-19 deaths per ten thousand inhabitants per country group

	(1)	(2)	(3)	(4)	(5)	(6)
Social cohesion	-1.601**			-2.045***		
	(-3.01)			(-3.95)		
Intergroup cohesion		-1.114**			-1.548***	
		(-2.80)			(-4.00)	
Interpersonal safety & trust			-0.606			-0.847+
			(-1.19)			(-1.64)
GDP per capita	0.000	-0.000	0.000	0.000	-0.000	-0.000
	(0.48)	(-0.06)	(0.12)	(0.34)	(-0.14)	(-0.02)
Democracy	1.678	1.076	1.996	2.750+	2.786+	3.399+
	(0.96)	(0.58)	(1.09)	(1.63)	(1.53)	(1.94)
Corruption	-0.768	-1.081	-0.912	0.035	0.172	0.496
	(-0.45)	(-0.58)	(-0.51)	(0.02)	(0.10)	(0.30)
Government performance	0.005	-0.424	0.101	0.313	-0.160	0.680
	(0.01)	(-0.56)	(0.14)	(0.49)	(-0.23)	(1.02)
Public services	0.134	0.042	-0.018	0.417+	0.321	0.272
	(0.52)	(0.14)	(-0.07)	(1.84)	(1.19)	(1.24)
Health exp. %GDP	0.265+	0.293+	0.308*	0.051	0.090	0.086
	(1.84)	(1.87)	(2.14)	(0.37)	(0.59)	(0.61)
Hospital beds per 1,000	-0.219	-0.276+	-0.185	-0.012	-0.036	0.084
	(-1.29)	(-1.53)	(-1.04)	(-0.07)	(-0.21)	(0.50)
Percentage > 65 years	0.064	0.099	0.034	-0.151	-0.086	-0.171
	(0.69)	(0.99)	(0.34)	(-1.38)	(-0.74)	(-1.50)
High income	2.740+	3.168+	3.120+			
	(1.65)	(1.75)	(1.80)			
Upper mid income	3.882***	4.289***	4.241***			
	(3.43)	(3.50)	(3.59)			
Lower mid income	1.582+	1.620+	1.666+			
	(1.57)	(1.51)	(1.61)			
Asia				0.927	1.578+	0.768
				(1.20)	(1.83)	(0.95)
Europe				4.079***	3.905**	3.651**
				(3.66)	(3.15)	(3.21)
America				4.032***	4.529***	4.508***
				(5.15)	(5.23)	(5.54)
Constant	75.358**	27.645	49.943*	100.221***	41.902+	73.598***
	(2.85)	(1.04)	(2.59)	(3.87)	(1.57)	(3.86)
N	138	131	133	138	131	133
adj. R^2	0.249	0.205	0.244	0.315	0.265	0.324

Notes: *t* statistics in parentheses; + $p < 0.15$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.3 Pathways

The complex character of social cohesion, with its two levels (Mekoa and Busari, 2018) makes it challenging to trace the pathways to COVID-19 outcomes. While the general Social Cohesion Index has a persistent negative relationship with the number of infections and deaths, it seems that the level of group relations is driving this relationship: the associations are larger and have a higher level of significance for the Intergroup Cohesion Index as compared to the Interpersonal Safety & Trust Index. This suggests that tolerance and respect between social groups are key to explain lower COVID-19 infections and deaths. This can be analyzed further. For the 10 indicators in the Intergroup Cohesion Index, we ran the same regressions as before. As can be observed in Table 7, four out of the 10 indicators have a negative and statistically significant ($p<0.05$) relation with the number of COVID-19 cases and deaths: grievances between groups, societal polarization, confidence in authorities being able to keep law and order, and riots by or between particular groups (shaded rows). This suggests that divisiveness between groups in society may be worse for the spread and mortality of the virus than distrust and a lack of safety and cooperation between individuals.

Although there is a crucial difference between political polarization and populist governments on the one hand, and societal polarization and divisiveness on the other hand, the two probably go hand-in-hand as the first relies on and magnifies ideological differences between groups in society. Various empirical studies in US, Europe and Bolivia have shown positive correlations between political polarization and populism on the one hand, and COVID-19 behavior and deaths on the other hand.(Bayerlein et al., 2021; Morris, 2021; Velasco-Guachalla et al., 2021; Charron et al., 2022; Aron and Meullbauer, 2022).

Our finding that it is particularly intergroup cohesion which drives the results, suggests a pathway through attitudes of respect, community-feeling or even solidarity across society, despite ideological, religious, ethnic or social-economic differences between groups. It may also imply a shared attitude

across groups that the virus is a common enemy, which can only be confronted jointly, aligning members of different groups to cooperate and follow restrictive policy measures even if they would not do so in normal times. This pathway implies that the increasing polarization in various countries is not only detrimental for democracy but also for public health.

TABLE 7

Intergroup Cohesion Index indicators and COVID-19 infections and deaths

	Infections per 10,000	Deaths per 10,000
Grievances between groups	-8.94 (-2.01)	-0.29 (-2.15)
Societal Polarization	-19.80 (-2.92)	-0.58 (-2.80)
Terrorist attacks	-0.01 (-0.27)	0.00 (0.00)
Terrorism	1.25 (0.27)	-0.10 (-0.68)
Political risk	-398.8 (-0.51)	-3-09 (-0.36)
Riots by groups	-0.61 (-1.75)	-0.01 (-1.25)
Guerrilla by groups	-0.011 (-0.22)	0.00 (0.00)
Law and order	-0.61 (-0.52)	-0.08 (-2.09)
Internal conflicts by groups	-5-3 (-0.54)	-0.18 (-0.58)
Deaths in conflicts by groups	-0.00 (-0.16)	-0.00 (-0.00)

Notes: *t* statistics in parentheses; shaded rows refer to statistically significant results ($p<0.10$).

4.4 Robustness test

In our main specifications (Table 3 and Table 5) we included the index of liberal democracy to indicate how the state of democracies could influence on the number of COVID-19 cases and deaths. However, the recent literature in political economy is increasingly concerned about populist democracies and their performance once they are elected in the management of crisis.

Using the classification made by Bayerlein et al. (2021), in the following table we include a variable that indicates if the country is populist or not. The results show that, as shown by Byerlein et al. (2021), populist countries present a positive, but not significant, relation with the number of COVID-19 cases. However, the impact of the social cohesion persists.

TABLE 8

Social cohesion and the number of COVID-19 cases and deaths per ten thousand inhabitants controlling for populist countries

	(1)	(2)
Social cohesion	-32.076^{+}	-1.572**
	(-1.92)	(-2.71)
GDP per capita	0.004***	-0.000
	(3.86)	(-0.35)
Populist	15.399	0.949
	(0.47)	(0.91)
Corruption	32.670	-0.663
	(0.76)	(-0.43)
Government performance	5.944	0.363
	(0.92)	(0.54)
Public services	22.444**	0.398^{+}
	(2.82)	(1.75)
Health exp. %GDP	11.369**	0.203
	(3.09)	(1.42)
Universal health coverage	-0.176	
	(-0.16)	
Hospital beds per 1,000		-0.276^{+}
		(-1.53)
Percentage over 65 yrs		0.104
		(1.09)
Constant	1621.918^{+}	78.859**
	(1.93)	(2.73)
N	125	138
adj. R^2	0.448	0.160

Notes: *t* statistics in parentheses; $^{+}$ $p < 0.15$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Further, if we consider not only the wealth of the population of each country but its inequality, we observe that the negative effect of the social cohesion over the number of COVID-19 deaths persists. In table 9 the results show that the more inequality, measured by the Gini index, the more deaths per thousand inhabitants. The results for the number of cases persist in magnitude but the significance of the relation with the social cohesion decreases.

TABLE 9

Social cohesion and the number of COVID-19 cases and deaths per ten thousand inhabitants controlling for Gini index

	(1)	(2)
Social cohesion	-33.666	-2.478**
	(-1.33)	(-3.16)
Gini Index	0.010	0.101+
	(0.01)	(1.55)
Democracy	12.921	3.833
	(0.18)	(1.34)
Corruption	-2.363	-1.153
	(-0.04)	(-0.50)
Government performance	14.780	0.186
	(1.40)	(0.19)
Public services	16.928	0.497
	(1.42)	(1.33)
Health exp. %GDP	13.719**	0.088
	(2.97)	(0.44)
Universal health coverage	1.683	
	(1.14)	
Hospital beds per 1,000		-0.033
		(-0.14)
Percentage over 65 years		0.074
		(0.55)
Constant	1527.082	117.982**
	(1.19)	(2.99)
N	80	92
adj. R^2	0.419	0.181

Notes: *t* statistics in parentheses; + $p < 0.15$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To identify the effects of social cohesion on the spread and mortality of the virus, we also explored the impact only in developing countries, excluding China. Once we restrict the sample, we observe, as shown in table 10, that the relationships with social cohesion persist both for the number of infections and for the number of deaths, but with slightly lower parameter sizes and levels of statistical significance. For example, if Paraguay had the same level of social cohesion as its neighbor Uruguay, it would have had 31.5 less infections and 1.7 less deaths per 10,000 inhabitants. Given the population size of Paraguay of 7.13 million, that would have meant 20,000 less infections and 1,200 less deaths.

We also did the estimations with a proxy variable for international mobility (in- and outbound tourism), but this variable appeared to be statistically insignificant and reduced the overall strength of the correlations (the table can be obtained from the authors).

TABLE 10

Social cohesion and COVID-19 infections and deaths for developing countries

	(1)	(2)
Social cohesion	-31.574^{+}	-1.799**
	(-1.92)	(-3.20)
GDP per capita	0.004***	-0.000
	(3.92)	(-0.04)
Democracy	20.743	2.408
	(0.37)	(1.30)
Corruption	36.364	0.226
	(0.79)	(0.13)
Government performance	3.984	0.140
	(0.49)	(0.20)
Public services	21.084*	0.492*
	(2.60)	(2.11)
Health exp. %GDP	10.811**	0.155
	(2.87)	(1.06)
Universal health coverage	0.147	
	(0.13)	
Hospital beds per 1,000		-0.163
		(-0.91)
Percentage over 65 yrs		0.079
		(0.81)
Constant	1571.440^{+}	88.733**
	(1.88)	(3.19)
N	124	137
adj. R^2	0.449	0.163

Notes: *t* statistics in parentheses; $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Please note that the sample excludes China.

Finally, the number of cases and deaths could have been reduced by the lockdowns and policies instituted by the governments. We use the stringency index calculated by the Oxford COVID-19 Government Response Tracker (Hale et al. 2021) to control by the strictness of the lockdowns. This index indicates the containment and closure policies that restricted people's behavior. We are aware that the stringency of the measures could have decreased the number of COVID-19 cases, however, also the number of cases

could have influence on the stringency of the measures. To control for this double causality, we control for the stringency measured six months before November. In other words, we included the stringency at the end of June assuming this stringency could have affected the COVID-19 cases in November. For the number of deaths, we use the stringency of the measures two more months before, i.e. the end of April. The limit of this index is that it does not account for the effectiveness of this measures. In that sense, we interacted the stringency index with the corruption index as a proxy of straightness of the government and society to follow rules. Table 11 shows that the interaction of the stringency of the measures and the corruption index, have a negative but not significant effect in the number of cases and deaths. However, the impact of the Social Cohesion persists for the number of cases and deaths per thousand inhabitants.

TABLE 11

Social cohesion and COVID-19 infections and deaths

	(1)	(2)
Social cohesion	-24.759^{+}	-1.167*
	(-1.68)	(-2.09)
GDP per capita	0.005***	0.000
	(4.63)	(0.31)
Democracy	61.020	2.515
	(1.26)	(1.42)
Government performance	-1.216	0.360
	(-0.17)	(0.54)
Public services	21.611**	-0.524^{+}
	(2.94)	(-1.72)
Health exp. %GDP	9.180**	0.121
	(2.66)	(0.85)
Universal health coverage	-0.359	0.165***
	(-0.36)	(4.37)
Hospital beds per 1,000		0.050
		(0.29)
Percentage over 65 years		0.003
		(0.03)
Stringency Index * Corruption	-2.392^{+}	-0.084
	(-1.62)	(-1.44)
Constant	1130.160^{+}	35.896
	(1.51)	(1.22)
N	120	132
adj. R^2	0.515	0.289

Notes: *t* statistics in parentheses; $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5. Discussion

The results of the multiple regression analyses with various confounding variables show consistent negative relationships between social cohesion on the one hand and the spread and mortality of COVID-19 on the other hand. Our results are in line with those obtained in other cross-country studies using much less indicators and smaller sample sizes, such as Barrios et al. (2021), Gelfand et al. (2021), Kumar (2021) and COVID-19 National Preparedness Collaborators (2022) and show robust results for both infection rates and death rates. Moreover, just like the last-mentioned study, we find that the effect of health care system variables and government capacity are either small or absent.

The results for the two sub-indices are relevant for the pathways through which social cohesion is likely to affect pandemic outcomes. The relationships tend to be larger and more significant for the Intergroup Cohesion Index as compared to the Interpersonal Safety & Trust Index, indicating that tolerance and respect or even solidarity and cooperation between different groups in society may be more important for the adherence to policy measures and behavioral adaptations in public than community attitudes between individuals. Qualitative research in countries with low levels of social cohesion seem to support this finding. For instance, in India, rampant islamophobia leading to the relentless persecution of the Muslim communities for spreading the virus was widely evident during the crisis. Social media viral hashtags such as #Coronajihad and #Talibanicrime blamed a Muslim congregation of 8000 devotees for "super spreading" the virus[8] even while millions of Hindu pilgrims gathered freely on the banks of river Ganges[9]. What followed was scaremongering and vicious scapegoating which not only exacerbated religious fault lines in the country, deepening the social divisions even further, but as has been noted subsequently, the stigmatization impeded gathering of accurate information about the spread of the disease, information which is crucial to arrest and combat the effects of a rapidly evolving pandemic (Kumar and Ray 2020, Biswas et al 2021). As WHO cautioned in response to the developments in India, racial, religious or ethnic profiling of any kind is "not useful" as it

leads to concealment of cases and delays in action (Down to Earth 2020). Similarly, in the case of the United States, a very visible aspect of public shaming was evident in the way in which the virus was being named as "Chinese virus", "Honk Kong flu", fueling racist and xenophobic violence against the Asian ethnic community (Human Rights Watch 2020). At the same time, ideological polarization across political and cultural lines was most evident during the crisis and manifested in the form of various conspiracy theories around the origin and spread of COVID 19. From reducing the virus to a "hoax", "nothing more than a flu" to insistence that masks were not efficient in controlling the contagion, this "infodemic" severely hampered the response efforts, leading people to ignore public health advice and instead choose unproved treatments and "cures" (Lewis 2020).

6. Conclusions

Most of the empirical literature on the societal factors behind the impact of the virus uses social capital variables, while some refer to social cohesion. All studies measure these concepts with a single indicator or a very small number of indicators. The findings in the literature are mixed. In line with Carrasco and Bilal (2016) we think it is important to clearly distinguish social cohesion from social capital. We have chosen to go back to the original two-level understanding of social cohesion as a combination of tolerance and respect between different social groups as well as trust, community and safety feelings between individuals irrespective of their membership of social groups. We therefore have used a multiscalar (intergroup level and interpersonal level) and multidimensional (32 indicators) index to measure social cohesion.

The results of our large cross-country sample provide three insights. First, the general index of social cohesion shows strong and statistically significant correlations with both infections and the death rate. Second, intergroup cohesion shows larger and stronger results than interpersonal relationships, suggesting that divisiveness in societies can have a devastating public health effect. If different groups do not perceive the virus as a common enemy but

are divided over its existence, spread and impact, as well as over the need to follow policy measures, such divisions may affect public opinion, behavior, and support for policies. Third, our findings indicate that the effect of social cohesion is stronger and more significant than the effects of the health care system, government capacity, and, for COVID-19 death rates, a country's level of economic development.

We recognize that our analysis has several weaknesses. First, the measures of social cohesion that we have used try to capture the complexity and layers of the concept, but they are not perfect. The matching percentiles method of the indices enables a large number of countries to be included in the sample. But the indicators included imply choices and may involve biases. A second limitation concerns biases in the registration of COVID-19 infections and deaths. Some studies have therefore used excess mortality rates, but that measure has its own shortcomings, while it does not solve the registration problem for the infection rate. A third possible weakness is that a cross-country study is cross-sectional and therefore may involve problems of the direction of causality, although in our case this may be a minor issue due to the fact that most of our social cohesion indicators were collected before November 2020.

In conclusion, we think that our study provides a novel perspective on the societal factors that have influenced the spread and mortality of COVID-19 across the world by pointing at social cohesion, and in particular the negative role of divisiveness in societies, for effectively controlling a pandemic.

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Notes

[1] Individualism at the county level in the US was measured as the expected average extent of frontier-mentality of citizens, based on the length of time counties were at the Western-shifting frontier of development in the history of the US. Counties which were a longer period of time at this frontier are expected to have higher average levels of individualism among their citizens, because at the frontier there was no government protection at all, so that people were left to themselves.

[2] We acknowledge that the quality of the COVID-19 registrations of cases and deaths may differ between countries. For example, in the case of India, new research points out that it has been massively undercounting COVID-19 deaths (Rukmini, 2022).

[3] For the combined index, please contact the authors. For the database, see: https://isd.iss.nl

[4] https://databank.worldbank.org/source/world-development-indicators

[5] https://www.v-dem.net/

[6]https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2021-2022

[7] By November 2020, Brazil had over 165,000 COVID-19 deaths.

[8] https://www.codastory.com/disinformation/exclusive-islamophobic-disinformation-and-hate-speech-has-swamped-social-media-during-the-coronavirus-pandemic/
https://www.aljazeera.com/opinions/2020/4/18/how-the-coronavirus-outbreak-in-india-was-blamed-on-muslims

[9] https://edition.cnn.com/travel/article/india-ganges-pilgrimage-festival-intl-hnk-scli/index.html
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592171/