REVIEW ARTICLE

The influence of COVID attitudes on environmental concern: a cross-national perspective

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Abstract

Past research on the influence of crisis on environmental attitudes shows an ambiguous picture. On the one hand, there is evidence of a short-term negative effect of economic factors on environmental attitudes, which is supported by the theory of affluence and the theory of postmaterialism. On the other hand, national studies on the impact of the COVID-19 pandemic show a positive influence in terms of an increase in collective values and thus also environmental attitudes. This paper aims to investigate if this proposed positive effect of the pandemic found in some countries can be supported, since this has not been analyzed systematically through a cross-national point of view. For this purpose, the Values in Crisis dataset is used, which was collected in 18 countries at the beginning of the pandemic. The results indicate that influences of COVID attitudes affect environmental concerns differently across countries. There is support for a positive impact on environmental concerns across nations, but this cannot be concluded overall. The results are discussed in the context of their limitations and should provide the foundation for further research.

Keywords Environmental concern · Environmental attitudes · Climate crisis · COVID-19 · Pandemic · Economic crisis · Cross-national comparison

Introduction

Recent global events give the impression that we have arrived in an age of crises. Whether it is increasing refugee movements, economic hardships, the COVID-19 pandemic, the Ukraine war, or the climate crisis, they all have a lasting impact on societal life. In spite of scientists' warnings for many years about the negative effects of global warming and the establishment of international political agreements (e.g., Kyoto Protocol, Paris Agreement), the achievement of positive changes within the environment remains a slow process. One reason for this is that the impacts of

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climate change are mainly acknowledged as "slow onset events", such as global warming, rising sea levels, and loss of biodiversity. This makes it challenging to prioritize climate-oriented policy-making especially when multiple societal problems compete for policy-makers' attention (Tosun & Howlett, 2021). The latest report of the Intergovernmental Panel on Climate Change (IPCC) made it clear once again that an increase in global warming of 1.5 degrees should not be exceeded and pleads for a reduction of greenhouse gas emissions within the upcoming decades to avoid overshoot (IPCC, 2023). Given these findings and the culmination of the *Fridays-For-Future* (FFF) movement in 2019, it seemed more urgent than ever to take up the fight against climate change. Moreover, research on the FFF movement showed a positive effect on environmental and political attitudes in general. With fighting climate change being at the center of public discourse, it improved the public's perception of climate change and its risks, especially among the younger generation (Deisenrieder et al., 2020; Lorenzini et al., 2021; Noth & Tonzer, 2022).

When the COVID-19 virus swept across the world in early 2020, there was a global shutdown in the form of lockdowns, restrictions of various forms of public life, and measurements of social distancing. These social changes, although short-lived, were very profound and led to a shift in attention, driven in part by ongoing media coverage of the pandemic and its consequences, e.g., health risks and economic risks. The topic of climate change was overshadowed by the pandemic during this time, and received more prominence, when the world could see short positive ecological improvements due to the global deceleration of life, with scientists warning of these changes being short-sighted and not sustainable (Bar, 2021; Girdhar et al., 2021; Zambrano-Monserate et al., 2020). When the pandemic caused a temporary collapse of the public discourse on climate change, the question arose as to whether such a state of crisis can have a negative impact on environmental attitudes. Research on the influence of crises on environmental attitudes does not show a clear picture. Whereas in times of economic crises, such as the 2008 financial crisis, there was a decline in environmental attitudes (Kahn & Kotchen, 2011; Brulle et al., 2012; Scruggs & Benegal, 2012; Shum, 2012; Kenny, 2020; Duijndam & van Beukering, 2021), research on the influence of the COVID-19 pandemic shows that this crisis promoted values of togetherness and this also benefited environmental attitudes (Da et al., 2021; Milfont et al., 2022; Shrum et al., 2021) and in some case indirectly even environmental consumption (Peluso et al., 2021). The suggestion of an overall positive effect of the pandemic on environmental attitudes is limited to individual countries and has not been analyzed systematically through a cross-national point of view. The lack of data makes such comparisons difficult, resulting in little research in this area. Notable contributions loosely tied to environmental attitudes include Farzanegan and Hoffmann (2022), who examine the relationship between political trust and excess mortality rates, Ozkan et al. (2021), who examine the role of climate risk and mortality rates, and Awuh et al. (2021), who demonstrate within five countries that environmental attitudes remain stable at the onset of the pandemic and that the pandemic does not necessarily increase the need for a sustainable future.

Driven by a lack of research within this field, this paper aims to investigate if this supposed positive effect of the pandemic can be observed across countries. This is achieved by an exploratory analysis with the Values in Crisis data, an international

dataset collected in 18 countries during the first year of the pandemic (World Value Survey Association, 2020; AUSSDA, 2022). The main reason for using this dataset is, on the one hand, its date of collection. Most of the data was collected in the months of April to June 2020. Thus, a majority of the countries were surveyed during or after the first COVID wave. On the other hand, the dataset includes one environment-related question and questions on the COVID-19 pandemic. The article starts with an overview of prior research to link the topics of crisis and environmental attitudes and present the research question. In the next step, data and methods are presented. Then, the main parts of the analysis are shown starting with a descriptive overview and correlations between environmental concern, COVID attitudes, and macro-indicators for the pandemic. The article concludes with a short explorative multilevel model and a conclusion and discussion of the paper's limitations.

Prior research

Environmental attitudes and economic crisis

Literature on the effects of previous crises on environmental attitudes suggests that economic crises have a negative effect on environmental attitudes in general (see among others Kahn & Kotchen, 2011; Brulle et al., 2012; Scruggs & Benegal, 2012; Shum, 2012; Kenny, 2020; Diujndam & van Beukering, 2021). One major finding suggests a negative effect of the unemployment rate on the prioritization of environmental problems during times of economic crisis (e.g., the Great Recession in 2008). This negative influence should not be interpreted as a direct effect, but rather as a shift in priorities in times of crisis. When material prosperity and personal security (e.g., employment) are at risk, issues such as climate protection might not be as important anymore, no matter how environmentally conscious a person is. These findings go along with theories of affluence (Dalton, 2005; Dunlap & York, 2008) and, most prominent, the postmaterialist theory from Inglehart (1981, 1983, 2008). Theories surrounding affluence propose that within more affluent countries, where individuals have less to worry about basic existential issues, topics such as environmental protection and climate change are on the rise, as well as an increased emergence of green parties and environmental movements. Following Inglehart's (1981, 1983, 2008) thesis on postmaterialism and shifting values, a negative impact of the economic crisis on environmentalism can be expected because material preferences tend to decline in times of economic stability. On the other hand, recessions can lead to a short-term upturn of materialistic values. This is in line with research that points to environmental protection as a "luxury good" that can only be afforded in times of economic stability. Therefore, a temporary collapse of environmental attitudes can be expected in times of economic crisis (Abou-Chadi & Kayser, 2017). This negative effect has been demonstrated in the past both in the American and in the European context (Scruggs & Benegal, 2012). Kenny (2020) also identifies the unemployment rate as a reliable predictor for declining environmental attitudes, as it is an easy-to-interpret and important metric for the population in assessing the economic situation of their country. Moreover, in addition to individual shifts in priorities, changes also

occur at the societal level in terms of public opinion. The media presence on the climate issue is relevant for the formation of public opinion on climate protection as a global problem. This could be observed in the *Fridays-For-Future* movement before the beginning of the COVID-19 pandemic. The emergence of a crisis shifts the attention in reporting, which Carmichael and Brulle (2017) identify as an additional reason why environmental concern declines in times of economic crisis. Furthermore, there is evidence of a decline in environmental attitudes during the first year of the pandemic in some European countries (Beiser-McGrath, 2022; Klösch et al., 2021; Wardana et al., 2022).

Environmental attitudes and the COVID-19 pandemic

While there is substantial evidence for a negative impact of economic crisis on environmental attitudes, research focused on the COVID-19 pandemic shows a slightly different picture. The COVID-19 pandemic was considered an immediate threat to human health with further consequences on many other societal levels. Collective action in the form of social distancing and restriction of public life is necessary to prevent the spread of the virus. These actions can lead to other consequences like economic hardship or negative effects on psychological well-being. Shrum et al. (2021) identified a connection between pro-environmental attitudes, altruism, and COVID-19 risk management behavior. People with strong environmental attitudes also feel a higher moral obligation to protect others from getting infected by the virus and, therefore, are more willing to accept policies of social distancing. Da et al. (2021) also found results of a positive relationship between a country's ability to prevent and fight against diseases and pro-environmental behaviors of its individuals. This relationship was mediated through environmental concern on a societal level and empathy on the individual level. Furthermore, Milfont et al. (2022) showed that after successful lockdowns the socio-political efficacy of an individual increased which also had a positive effect on environmental attitudes and climate change beliefs. These findings suggest relations on the country and individual level. Values like universalism (Schwartz, 2012), collectivism, and altruism (Batson et al., 2002; Stern & Dietz, 1994), which are highly associated with environmental attitudes, could partially shape an individual's attitude towards COVID-19. Also, macro-level indicators like policy measurements to decrease infection rates could potentially affect environmental attitudes through other mediators.

These recent results are limited to single countries. This makes a systematic comparison across countries necessary to investigate whether this positive relationship between environmental attitudes and the pandemic is only limited to some countries or if there is evidence of an overall positive relationship. This paper wants to make a contribution by offering a first international outlook during the first wave of the pandemic in 18 countries and analyze if there is evidence that supports the thesis of a positive effect of the pandemic on environmental attitudes.

Data and methods

The data is part of the "Values in Crisis" (VIC) project, an international cooperation initiated by members of the World Values Survey (WVS) group. The project aims to measure values and attitudes in times of crisis and was collected in the spring of 2020 within a time frame of a year in a total of 18 countries.[1] Due to the special circumstances of the pandemic, the sampling of each country is an online panel considering a fixed quota.[2] Most of the countries were surveyed during or after its first COVID wave. The period of data collection reflects a time, which was particularly characterized by uncertainty. There was limited information about the virus itself, no vaccination, and different political responses to the pandemic, ranging from strict curfews to various relaxed approaches. The participating countries depict a small representation of European, Asian, and South American countries: Austria, Brazil, Chile, China, Colombia, Georgia, Germany, Greece, Hong Kong, Italy, Japan, Kazakhstan, Maldives, Russia, Poland, South Korea, Sweden, and the UK (AUSSDA, 2022; World Values Survey Association, 2020; Seymer et al., 2021). To somewhat contextualize the countries in terms of their environmental attitudes, past data from the World Value Survey (2010–2014) was used. Comparing the means of environmental concern for those countries that appear in both samples shows that the countries in the VIC sample are, on average, countries with very high concern for the environment. This suggests that the countries participating in the VIC project show less variation regarding environmental concern on the aggregated level. In the following, the main variables and country-level variables are presented.

Dependent variable

The main variable used in this paper is the question "He/She/They strongly believe/s that people should care for nature. Looking after the environment is important to her/him/them." Respondents had to give their answer on a 6-point scale from "very much like me" to "not like me at all". This variable is referred to as environmental concern in the following because it asks about the importance and concern for the environment. It is also part of Schwartz's Theory of Values (1999, 2012, 2017) and isassociated with the scale for universalism. Respondents with a high score on universalism tend to have a higher regard for nature and the environment. For this reason, universalism, as well as other social-altruistic and biospheric values, is often highly correlated with general environmental attitudes (Schultz & Zelezny, 1999; Weaver, 2002).

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[1] Aschauer, W., Seymer, A., Bodi-Fernandez, O., Herzog, M., Hadler, M., Höllinger, F., Bacher, J., Welzel, C., Boehnke, K., Delhey, J., Deutsch, F., Eichhorn, J., Kühnen, U., Moraes, D., Kemer, T., Gonzalez, R., Salvatierra, V., Fuentes, A., Chang, Y. -T., ... & Stier, J. (2021). *Values in Crisis International (SUF edition)* (V2). AUSSDA. https://doi.org/10.11587/LIHK1L

[2] The original goal of the project was to build a panel data set with a total of three waves for the duration of the pandemic. Since each country had to seek funding individually, the data collection period for the first wave was delayed. In addition, there was no guarantee that each country would participate in subsequent waves. As of today, one international wave is published.

By reducing the main variable to a single item, the interpretation of relationships can be delivered more precisely and there has been past research using this variable as a single dependent main variable within their models (Givens & Jorgenson, 2011; Šimac et al., 2021). Furthermore, as the variable is part of Schwartz' Theory of Values, it has been validated in various cross-cultural studies. Limitations regarding the use of a singular variable should be addressed at this point. Environmental concerns cannot simply be reduced to a single item. Research on environmental concern and environmental attitudes in general point to several different ways of measurements which provided lots of insightful descriptions and explanations within the field of environmental sociology and psychology (Catton & Dunlap, 1978; Gifford & Sussman, 2012; Maloney & Ward, 1973; Stern & Dietz, 1994). At the same time, cross-national research on environmental attitudes sometimes shows high differences in variance of these dimensions, especially when comparing vastly different cultural contexts (Marquart-Pyatt, 2012; Chaisty & Whitefield, 2015; Mayerl & Best, 2019).

Individual variables

Attitudes regarding the pandemic were measured with two questions, one regarding the fear of getting sick ("How afraid are you that you or your loved ones get sick and suffer severely from the coronavirus?") and the other one asking about the fear of economic hardship ("How afraid are you that you or your loved ones will suffer from an economic recession following the corona crisis?'). These fears were measured on a 5-point scale from "no fear" to "a lot of fear."

Control variables at the individual level

As control variables, sex, age, education, household income, and political orientation were selected. These variables proved to be significant predictors for environmental attitudes and pro-environmental behaviors in past research (see among others Stern, 2000; Kollmuss & Agyeman, 2002; Barr, 2004; Hadler & Wohlkönig, 2012; Hadler & Haller, 2013; Hadler, 2016). The time of data collection was also considered as a control variable due to the 1-year survey period of the first wave. This meant that some participating countries had already experienced their first wave of COVID a while back. Therefore, a dummy variable was computed for the time of the survey to control for these differences.

Country-level variables

The spread of the pandemic differs from one country to another. For instance, various countries have experienced distinct waves of infection, leading to diverse policy measures to control the spread of the virus. Divergent COVID-19 experiences may affect the attitudes, opinions, and actions of individuals. As a result, a methodological approach has been adopted to tackle contextual differences. Multilevel modelling can help assess individual experiences in different contexts and identify the variations (Twisk, 2010; Bringé & Golaz, 2022). It should be noted that lower numbers of higher

units may cause issues when fitting the overall model, affecting the residual variance and the accuracy of the final predictions (Raudenbush, 2008). The literature includes various suggestions for the minimum quantity of higher-level units, but there isn't a definitive specification of a minimum number (Leyland & Groenewegen, 2020). To overcome these limitations in the available data for 18 countries, a robustness check is applied in the form of a cased bootstrapping (Van der Leeden et al., 2008). The country-level variables like the Human Development Index (HDI), the unemployment rate, the cumulative infection rate per million, and the Stringency Index are selected and presented in the following section.

Sumner et al. (2020) estimated severe economic consequences of the COVID-19 pandemic, especially for developing countries. The *Human Development Index* summarizes the key elements of human development: life expectancy, education, and the standard of living measured by the gross national income (GNI) per capita (United Nations Development Programme, 2022). Considering the research stated above, highly developed countries would be expected to perform better in a state of crisis by being able to secure and provide stability in times of financial or health risks. Necessities of life are potentially less threatened than in developing countries and therefore the pandemic could have a lesser negative effect on environmental attitudes (Awuh et al., 2021; Scruggs & Benegal, 2012). The majority of the participating countries have a HDI score above 0.8 with only three countries below. The underrepresentation of lesser developed countries has to be considered through the results.

The *unemployment rate* has been a significant predictor of the decline of environmental attitudes in past crises due to its everyday use and common knowledge for a nation's economic assessment (Kenny, 2020). Because of restrictions and measures to fight the spread of the virus, nations decided on different strategies with one of them being the (complete or partial) lockdown, a shutdown of most public places, and enforced social distancing, to diminish public activities. This was heavily enforced at the beginning of the pandemic and also led to a short-lived collapse of financial returns in the economy and subsequently to the dismissal of many workers. Being in line with past research on recessions, current research estimates that it will take years for the economy to overcome the impact of the pandemic (Ahmad et al., 2021; Petrosky-Nadeau & Valletta, 2020). Furthermore, the global economy has been under pressure because of the Ukraine war.

For this study, various measurements for the unemployment rate were considered. The aim was to capture the dynamic process of the pandemic and its economic impact, which is why not only the average unemployment rate at the time of the survey was collected for each country, but also comparative values to the year before to make the changes visible. In addition, the highest unemployment rate at the time of the survey was also selected. In the final model, the highest rate and the average change in unemployment within 1 year (2019–2020 to compare before and within the pandemic) were included.

Infection rates are important metrics for observing pandemic activities. As with unemployment, the dynamic structure of the pandemic was considered by selecting different infection rates, such as average infection rates, highest infection rates, or cumulative infection rates per million inhabitants. For the final model, the cumulative infection rate per million inhabitants was selected for each country, as it illustrates best how high the infection incidence was until the start of the survey.

The *Stringency Index* records the "strictness of 'lockdown style' policies that primarily restrict people's behavior" (Blavatnik School of Government, 2020) and is part of the Oxford COVID-19 Government Response Tracker Project (OxCGRT). It contains different dimensions of containment and closure like closings of schools and workplaces, other forms of public restrictions, and public information campaigns regarding health systems. It has a scale from 0 to 100; the higher the score of a country, the stricter the lockdown-style policies are (Hale et al., 2021). For the study, the stringency score of each country was determined at the time of data collection.

Descriptive overview

Table 1 shows an overview of the selected country-level variables. The original dataset contains 18 countries, with South Korea being represented with two samples.[3] For this analysis, only one of the two South Korean samples is used, and Maldives is excluded because of a lack of data at the macro-level.

Despite an overrepresentation of countries with higher affluence, the table highlights the differences in a country's pandemic management. While most of the countries only experienced a small change in unemployment of less than 2% on average when comparing mean percentages from before and after the pandemic started, the infection numbers and lockdown policies differed vastly. European and South American countries suffered from higher infection incidences although the lockdown policies were quite strong, with Sweden being an exception with their looser COVID policy and Colombia having relatively low numbers of cases. The Asian countries differ in the strictness of their COVID policy, but all had small numbers of infections at the time of data collection.

Results

Figure 1 shows the boxplots for environmental concerns for each country. It becomes evident that during the first wave of the pandemic the concern for the environment in general is high among the majority of the 17 countries. Countries like Colombia, Georgia, Greece, and Kazakhstan have very high concerns, with more than 50% of their population having values at the median (5) or higher on the 6-point scale. In comparison, the Asian countries have the lowest concerns. Japan's population has the lowest average concern for the environment within the sample, almost 60% percent are not as concerned for the environment (score of 3 or lower). The distribution of concern in South Korea is more evenly. Almost a third of the Korean Sample has a lower concern (score of 3 or lower).

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[3] In South Korea, the survey was conducted by two teams independently. Due to the different sample constellations, two datafiles were included in the final dataset.

Table 1 Overview of country-level variables and sample sizes

Country	N	Human Development Index[a]	Cumulative confirmed cases per million[b]	Stringency Index[c]	Mean unemployment rate 2020[d] (in %)	Mean difference in unemployment in %[e] (2019–2020)
Central Europe						
Austria	2018	0.922	1782.9	81.84	5.4	0.2
Germany	2009	0.947	1850	76.85	4.2	0.7
Greece	1540	0.888	275.9	84.26	16.4	–1.6
Italy[f]	1382	0.892	4211.5	93.52	9.3	0.3
Poland	1000	0.88	644.6	87.04	3.2	0
Sweden	2554	0.945	1497.5	64.81	8.3	0.9
UK	2033	0.932	2560.2	79.63	4.5	0.1
Eastern Europe/Central Asia						
Georgia	1059	0.812	185	100	12.1	0.5
Kazakhstan	1035	0.825	224	92.13	6.1	1.3
Russia	1527	0.824	3387.9	68.98	5.7	1.1
East Asia						
China	3200	0.761	57.9	81.94	5	0.4
Hongkong	3061	0.949	690.28	66.67	5.8	2.8
Japan	3000	0.919	127.7	47.22	2.8	0.2
South Korea	4000	0.916	219.7	82.41	4	–0.1
South America						
Brazil	3543	0.765	1201.4	81.02	13.7	0.1
Chile	2269	0.851	32,432.29	79.17	11.5	4.2
Colombia	1730	0.767	293.6	90.74	16.1	9.5

[a]United Nations Development Programme (2020)

[b]Mathieu et al. (2020)

[c]Our World in Data (n.d.), Hale et al. (2021)

[d]OECD Organisation for Economic Co-Operation and Development (2021), The World Bank (2022)

[e]OECD Organisation for Economic Co-Operation and Development (2021), The World Bank (2022)

[f]There were two surveys conducted in Italy. One mid-August 2020 and the other one in January 2021. This resulted in two independent samples. The means are from the merged samples. The cumulative infection rate was at 36,723.3 per million and the Stringency Index was at 58.33 for the second sample
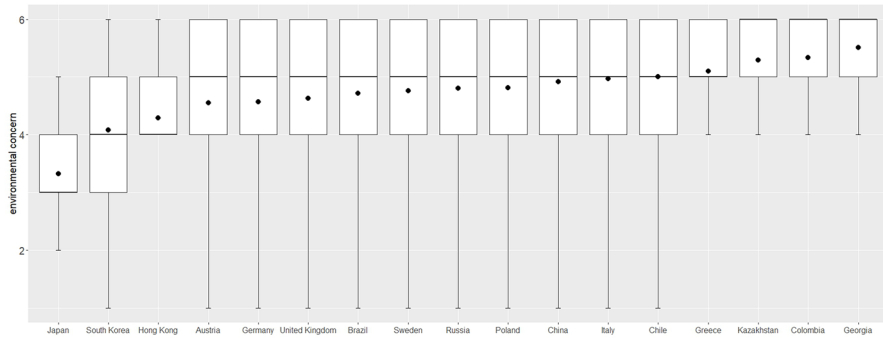
Fig. 1 Boxplots of environmental concern for each country, 6-point scale, low score = low concern, black dot = mean, data = Values in Crisis 2020, $N = 17$

Correlations between environmental concern, COVID attitudes, and country-level variables

Comparing the means of COVID attitudes with the mean concern for each country (Fig. 2), a negative relationship between the concern for the environment and the fear of getting sick ($r = -0.33**$) can be observed. Countries with less fear of infection tend to have higher environmental concerns. The relation between environmental concern and the fear of economic hardship shows no clear direction ($r = -0.02**$) although this relation turns negative when excluding outlier countries. Comparing means for both COVID attitudes within countries, it becomes evident that economic and health consequences are not always perceived with the same level of fear (e.g., Sweden having less average fear of economic
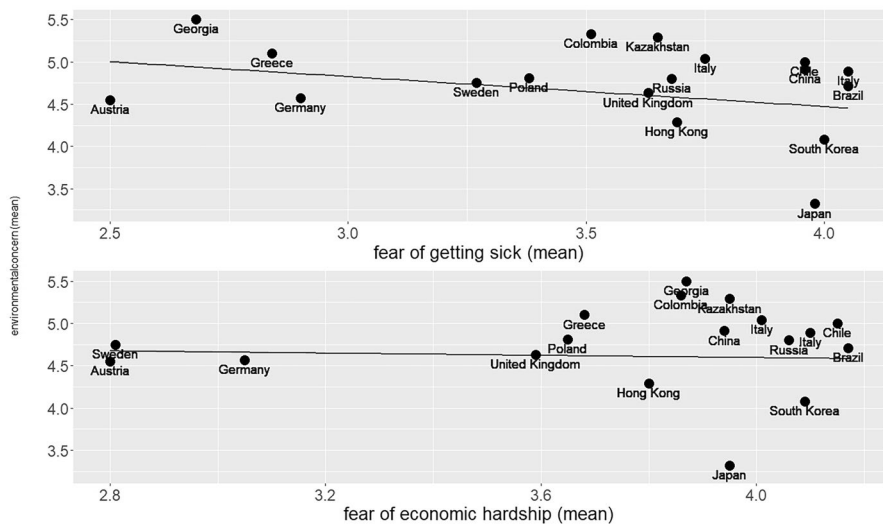

Fig. 2 Correlation between the mean environmental concern (y) and COVID-related attitudes (x, mean of fear of getting sick and mean of fear of economic hardship) across countries, data = Values in Crisis 2020, $N = 17$

consequences while having a higher average fear of infection). Within this sample, it becomes evident that the concern for the environment is generally high, but COVID attitudes differ across and within countries. These first correlations indicate a possible negative effect of the fear of infection on the aggregated level. Since the influence of COVID attitudes is of interest to this paper, these relationships will be further explored by adding control variables within multilevel modelling. Furthermore, since it is evident that the fears regarding economic consequences and health threats can differ within a country, it is also of interest to explore if their influence on environmental concerns differs across contexts.

Subsequently, the relationships between environmental concern and country-level variables are explored. Figure 3 shows the relationship between these variables. The top left chart shows the correlation between the average concern and the Human Development Index (HDI) for each country. Interestingly, there is a negative correlation between the two, meaning that countries with a higher HDI have lower environmental concerns. Although this finding goes against the proposed literature above that suggests higher environmental attitudes within affluent countries, this negative relationship with the HDI was already observed for additional countries within the last wave of the World Value Survey (2010–2014).

Another finding, which is unexpected, is the relationship between environmental concern and the unemployment rate (top and middle right chart). The plot shows a positive relationship across countries, meaning that countries with higher unemployment rates in 2020, or higher changes in their unemployment rate from 2019 to 2020, have higher environmental concerns. There is reason to believe that this positive relationship is caused by outliers, in this case, countries which experienced high changes of unemployment before and after the pandemic started. Excluding countries like Colombia, Chile, or Hong Kong from the sample changes the relationship into a negative one. This indicates that additional data from countries with higher changes in unemployment is needed to further investigate a possible positive relationship with environmental concern.
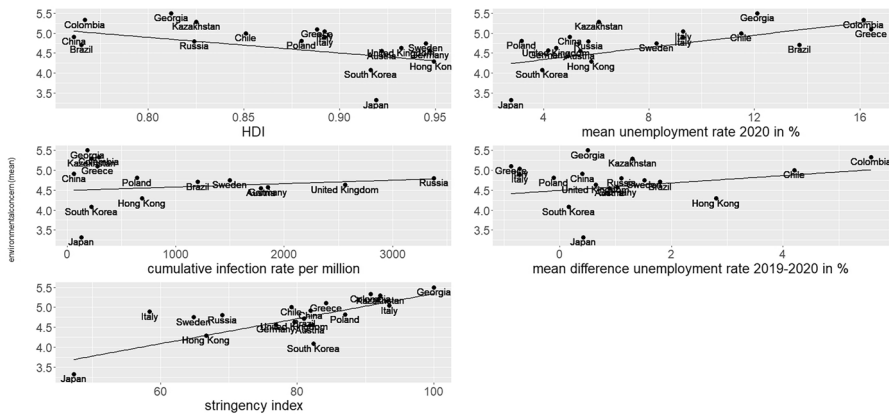

Fig. 3 Correlation between the mean environmental concern and country-level variables, $N=17$, data = Values in Crisis 2020

The relationship between environmental concern and the cumulative infection is shown on the middle-left chart and illustrates a small positive correlation. However, there are relatively fewer countries with very high cumulative infection rates within the sample, and excluding some of them turns the correlation around. There is more variance in infection rates within European countries compared to the rest, with Austria, Germany, Sweden, and the UK having the highest number of infections at the time of the survey. Finally, the last chart shows a positive correlation between environmental concern and the Stringency Index. Countries with stricter lockdown policies also have a higher average level of environmental concern.

To sum up, these supposed relations between environmental concern and country-level variables have to be interpreted with caution due to the limited number of participating countries within the sample. To account for these limitations within the data, a robustness check is included when adding the country-level variables into the model to check for the validity of the final results.

Multilevel analysis

Micro-level determinants of environmental concern

Table 2 shows the model with micro-level determinants on environmental concern. The effects shown here align with the findings of previous research on the effects of sociodemographic factors on environmental attitudes. Women tend to have higher environmental concerns than men (beta=0.11***), as well as people of 50 years and older in comparison to younger individuals (beta=0.12***), and a higher education also results in higher environmental concern (beta=0.16***). Interestingly, the control variable for the first wave has the strongest negative effect (beta: =−0.45*) which indicates that countries, which have already experienced the first wave of COVID, have lower environmental concerns in comparison to countries which did not. Both COVID attitudes have a small positive effect on environmental concern (beta=0.05***, beta=0.06***) indicating higher fears correlating with slightly higher environmental concern across countries when controlled for other sociodemographic variables. Overall, sociodemographics are still a more reliable predictor for environmental concern than COVID attitudes. Comparing the country-level variance (0.21) and residual variance (1.28), it becomes evident that there is less variation across means of environmental concern on the country level and higher variation within a country's population. Environmental concern depends largely on individual characteristics, while the country level only explains roughly 14% of the variance.

Additionally, random slopes for both fears were included in the model to see if differences in fears across contexts lead to different effects on environmental concerns. The analysis showed when controlled for sociodemographic variables the effect for both fears does vary across countries. While for most countries within the sample the effect of the COVID attitudes on environmental concern remains a positive one, there are some countries with a negative slope. For example, in Sweden, the fear of infection does have a negative effect on environmental concerns, while the fear of economic hardship does not. The same goes for Georgia and the UK. Economic fears have an

Table 2 Micro-level determinants, restricted maximum likelihood (REML), random intercept, fixed effects, dependent variable: environmental concern, data: Values in Crisis 2020. [a]Reference: no first wave experienced. [b]Reference: male. [c]Reference: under 35 years. [d]Reference: lower education (ISCED-level 1–3). [e]Reference: income quartile 1; *$p \leq 0.1$; **$p \leq 0.05$; ***$p \leq 0.01$

Predictors	Estimates [CI 95%]	Std. error	Std. beta
Intercept	4.58***		
Fear of getting sick (low = no fear)	0.05*** [0.04; 0.06]	0.01	0.05
Fear of economic hardship (low = no fear)	0.06*** [0.05; 0.08]	0.01	0.06
Control variables			
First wave[a]	−0.56* [−1.00; −0.12]	0.22	−0.45
Female[b]	0.13*** [0.11; 0.16]	0.01	0.11
35–49 years[c]	0.01 [−0.02; 0.04]	0.02	0.01
50 years and older[c]	0.15*** [0.12; 0.18]	0.02	0.12
Medium education (ISCED-level 3–4)[d]	0.11*** [0.07; 0.15]	0.02	0.09
High education (ISCED-level 5–8)[d]	0.20*** [0.16; 0.25]	0.02	0.16
Income quartile 2[e]	0.03 [−0.00; 0.07]	0.02	0.03
Income quartile 3[e]	0.03 [−0.00; 0.07]	0.02	0.03
Income quartile 4[e]	0.04* [0.00; 0.08]	0.02	0.03
Political orientation (low = left)	−0.05*** [−0.05; −0.04]	0.00	−0.07
Random effects			
Country (N)	17		
Total observations (N)	35,113		
Country-level variance	0.21		
Residual variance	1.28		
ICC	0.14		

overall positive influence on environmental concern, but the strength of the influence does vary across contexts (e.g., fears of economic hardships have a stronger effect on concern within the South American countries of the sample). These differences suggest that different perceptions of the pandemic can influence environmental concern in different ways across contexts and no general positive or negative effect of COVID attitudes on environmental concern could be observed.

Table 3 Macro-level variables (singly entered), restricted maximum likelihood (REML), random intercept, fixed effects, micro-level variables included but not shown, dependent variable: environmental concern, data: Values in Crisis 2020; *$p \leq 0.1$; **$p \leq 0.05$; ***$p \leq 0.01$

Micro-level (Table 2)+	Estimates [CI 95%]	Estimates of intervals through resampling	Country-level variance
+ Human Development Index	−3.10 [−6.48; +0.29]	[−7.92; −1.64]	0.18
+ Cumulative infection per million	0.00 [0.00; 0.00]	[$-1.61e^{-04}$; $+2.81e^{-05}$]	0.23
+ Unemployment rate 2020	0.05* [0.00; +0.1]	[+0.01; +0.13]	0.17
+ Difference unemployment rate 2019–2020	0.05 [−0.09; +0.19]	[−0.16; +0.22]	0.22
+ Stringency Index	0.01*** [0.00; +.01]	[0.003; 0.05]	0.17
Country (N)	17		

The influence of country-level variables

The next step is adding country-level variables singly to the model. As a result of a limited number of participating countries within the sample, changes in correlations on the aggregated level between environmental concern and the country-level variables could be observed. To account for these limitations, a robustness check, in the form of cased bootstrapping (Van der Leeden et al., 2008), was made. It is a form of resampling done only for the higher-level clusters to generate bootstrap samples. Therefore, each model is analyzed *n* times, each time with a different subsample (*m*) of countries originating from the total sample size (*N* = 18).

Table 3 shows the coefficients for the macro-level variables when added singly to the model of Table 2. As the 95% CI indicates, only two variables, the unemployment rate (*b* = 0.05; CI 95% [0.00; +0.1]) and the Stringency Index (*b* = 0.01; CI 95% [0.00; +0.01]), have a significant but rather small positive effect on environmental concern. The calculated estimate intervals from the bootstrap samples indicate that the effect of the unemployment rate and the Stringency Index remain positive, even when accounting for different combinations of countries. This indicates some form of robustness from these effects, despite the small number of countries in the dataset. Therefore, countries with a higher average of unemployment in 2020 and countries with stricter COVID-19 policies experienced a higher aggregated concern for the environment. Interestingly, the number of infections has no effect at all. It must be noted that the effects described in Table 3 must not be seen as a direct effect of macro-indicators on an individual's attitude, but rather mediated through individual characteristics as explained by the research above.

Conclusion, discussion, and limitations

This paper aims to investigate a cross-national comparison of environmental concerns during the first wave of the COVID-19 pandemic. It uses the Values in Crisis data of 18 countries which was collected through the first year of the global pandemic. The main question focuses on the influence of COVID attitudes on environmental concern by investigating relationships on the individual level across countries and contrasting them with macro-level indicators of the pandemic. Literature on how past crises affect environmental attitudes shows mixed results. On the one hand, research on the effect of past economic crises suggests a temporary decline in environmental attitudes in general. On the other hand, literature on the influence of the COVID-19 pandemic suggests an increase in values of community and togetherness, which then indirectly positively affects environmental attitudes. Therefore, this article aims to contribute by examining attitudes towards the COVID-19 pandemic and the environment and pointing out similarities and differences across countries.

The main finding from the analysis is that influences of COVID attitudes affect environmental concerns differently across countries, but the influences are rather small. When sociodemographic control variables were considered, fear of infection and fear of economic impact were found to have both positive and negative effects on environmental concerns. These disparate findings suggest that future research must address these differential influences across contexts. Moreover, it opens the question of which countries COVID attitudes have a more negative or positive effect on environmental attitudes. In addition, the analyses show that macro-variables of the crisis only have small influences on environmental concern, and individual characteristics provide a greater explanation. Tying these findings back to previous literature, some of the evidence could support an increase in values of togetherness due to the pandemic. This would be the case for countries where COVID attitudes have a positive effect on environmental concerns. But this is not the case for all countries observed. Further data from additional countries is needed to expand on these findings.

Finally, this brings me to the limitations of this research. The data used in this paper is only looking at one specific time point during the pandemic. To support the suggestion of rising collective values during this crisis and its positive effect on environmental attitudes, additional panel data is needed to further support this claim. The factor time was considered with a dummy variable since the data collection of the first wave took over a year to be completed but does not make up for the advantages of working with panel data. The Values in Crisis data was originally conceived as a panel design. It remains to be seen whether another international wave of the survey will be published in the future for these results to be followed up. To investigate the effect of the COVID-19 pandemic on environmental attitudes, it is therefore advisable to conduct systematic international comparative research on changes in collective values and attitudes towards COVID and the environment, especially considering the disparate findings. In

addition, other global events, e.g., the Ukraine war, the Middle East conflict, dependence on fossil fuels, increasing demand for renewable energy, and rising energy prices, will play a role in the near future, and will also influence the perception and prioritization of the environmental crisis.

Finally, the Values in Crisis data also contains a limited number of countries with some regions not being represented at all, e.g., Africa, North America, additional countries in South America, Central-East European countries, and South-East Asian countries. The represented countries in the VIC dataset are countries with an average high level of environmental concern. Future research can therefore focus on countries with lower environmental concerns to create additional results. Therefore, the findings in this paper must be considered within this limited context and not seen as a final result but rather as a starting point for future research.

Data availability Values in Crisis International Dataset (2020), online accessible through AUSSDA (https://data.aussda.at/).

Analysis SPSS and R, R-Script upon request available.

Declarations

Competing interests The author declares no competing interests.

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