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The impact of national culture on the increase of COVID-19: A cross-country analysis of European countries

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ABSTRACT

In recent years, countries have been fighting with increasing momentum against outbreaks. This struggle requires the effective implementation of several measures that are required in medical science. However, the cultural characteristics of each society prevent these measures from being applied in the same way globally. One area in which social scientists have not applied much effort is observing the impact of countries' cultural characteristics in the fight against outbreaks. Therefore, this study aims to determine whether cultural differences among countries have an impact on their fight against outbreaks. This study uses the COVID-19 pandemic's total cases and selected European countries' cultural dimension scores as data. Due to the differences in the measurement units of cultural and outbreak variables, a stepwise multiple logarithmic regression analysis is preferred to select the proper regression model. The results have shown that power distance has a significant and negative effect on the increase rate of the total COVID-19 cases per million (IRTCCPM). In addition, the results have demonstrated that both individualism and indulgence have significant and positive effects on IRTCCPM, at the 95 % confidence level. However, the hypotheses concerning the impacts of masculinity, uncertainty avoidance, and long-term orientation on the IRTCCPM are rejected at the $\alpha = 0.05$ level. In light of the findings of this study, it can be asserted that countries act in harmony with their cultural characteristics in the formal or informal practices of their fight against outbreaks. The contributions of the study can be discussed in academic and practical fields.

Introduction

Human history has witnessed outbreaks and the fight against them. There is no need to look far back in history: we can observe the early 2000s. The acute respiratory syndrome coronavirus (SARS-CoV) first emerged in China's southern provinces in late 2002 and early 2003 (Yau, Leung, Cheung, & Chow, 2007) and quickly spread to 37 countries, infecting more than 8422 people, and killing 916 people (Chen, Lee, Lin, & Chen, 2018). The first case of the Middle East respiratory syndrome coronavirus (MERS-CoV) was reported in September 2012 in Saudi Arabia (World Health Organization- WHO, 2019). However, retrospective studies found that the first known MERS-CoV cases emerged in April 2012 in Jordan (WHO, 2013). Between 2012 and January 2020, 2519 cases of MERS-CoV infections and 866 MERS-CoV-associated deaths were reported (WHO, 2020b), and the number of countries in which cases were seen was

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recorded as 27 in 2019. On December 31, 2019, WHO's Chinese office was informed about pneumonia cases with an unknown etiology in the city of Wuhan in China's Hubei province (WHO, 2020c). The virus, defined as a novel coronavirus on January 7, 2020 and referred to as coronavirus disease 2019 (COVID-19) in the WHO's 23rd situation report on February 12, 2020 (WHO, 2020a), is now on the agenda of all countries. By May 20, 2020, the total number of cases surpassed 5 million, and the number of deaths surpassed 320, 000.

Hand washing was reported to help reduce the spread of SARS-CoV (Fung & Cairncross, 2006). In addition, wearing masks in public venues and disinfecting living quarters were found to be significant protective factors against SARS-CoV (Lau, Tsui, Lau, & Yang, 2004). The Korean government suggested the use of facial masks and hand washing as preventive measures against MERS-CoV (Jang et al., 2019). Today, the same applications, such as washing hands, reducing face-touching, wearing masks in public, and physical distancing (Van Bavel et al., 2020), are also included among the most basic measures for preventing the spread of COVID-19. Health organizations and governments are taking similar measures against outbreaks; they endeavor to prevent a faster and further spread of the disease by sharing their experiences. Calls which are made to combat at the individual level emphasize the importance of the populations' cooperation for ending the outbreaks. Statistics are published regarding the effectiveness of individual practices in reducing the disease infection rate, but the interesting point is that similar practices do not yield similar outcomes. During these outbreaks that are experienced on a global scale, the question of why some countries are more successful than others in the fight against outbreaks arises. Although most countries apply similar measures among their citizens to reduce the infection rate, the results obtained can differ between countries. The main reason for this difference can be the variability of the behaviors towards these measures by people with different cultures. Here, a basic factor that requires attention is human behavior. How humans react to the spread of the virus is important for whether governments and international bodies, such as WHO, can tackle its effects (Tagat & Kapoor, 2020). It is widely known that culture has the broadest and most significant impact on many dimensions of human behavior (Soares, Farhangmehr, & Shoham, 2007). Cultural differences among societies lead people to exhibit different behaviors in the face of events because culture is *the collective programming of the mind that distinguishes the members of one group or category of people from others*; in other words, culture is the *operating system* of humans (Hofstede, Hofstede, & Minkov, 2010, p. 6). The human response to COVID-19 is likely to be driven by national culture, and it will determine how (and when) it is overcome. Therefore, it is expected that measures that are desired to be implemented against outbreaks and behaviors emerging in relation to these implementations will differ among societies.

In this context, Mason, Roy, Spillane, and Singh (2016) propose that considering the social and cultural dimensions affecting tuberculosis provides new approaches for us to reduce identification delay, improve powerful health systems, and abate the transmission of tuberculosis. Fairhead (2016) claims, in his study on Ebola in the Forest Region of the Republic of Guinea, that ignoring cultural aspects in the beginning of an outbreak causes inefficient and troubled public health measures. Ngwa et al. (2017) express that cultural factors play an important role in the exposure and transmission of cholera in the Republic of Cameroon. Now, in studies on COVID-19, it is seen that culture has started to become more important. For example, Pogrebna and Kharlamov (2020) show that the hand washing culture alone is an important factor, which allows us to understand much about the currently observed heterogeneity in the pandemic. Muurlink and Taylor-Robinson (2020) argue that cultural factors may affect the gender balance of the reported COVID-19 infection prevalence in systematic ways. Bruns, Kraguljac, and Bruns (2020) highlight the importance of culturally appropriate methods of education, prevention, and treatment in public health efforts to ensure the successful management of the outbreak and the effective screening and treatment of COVID-19. Messner (2020) emphasizes the need for public policy-makers to pay close attention to cultural contexts in their countries when instigating measures aimed at constricting COVID-19's growth.

To the best of our knowledge, there is no fine-grained published study on the association between cultural dimensions and COVID-19 cases to date. Increasing the number of studies that can eliminate this deficiency will enable the development of specific policies regarding each country's own struggle. In this way, it can help in increasing the effectiveness of the global struggle. The authors of this study believe that understanding the causality between national cultures and outbreaks is critical. Unleashing this causality may lead to effective political solutions not only for the COVID-19 pandemic but also all different kinds of outbreaks. This study also helps to identify the factors that influence people's intentions to comply with the measures.

This article proposes that heterogeneity in the commitment of individuals to the regulation and governance of COVID-19 between different societies stems from the fundamental cross-cultural differences between countries. This situation causes different outcomes in the fight against outbreaks. Therefore, the purpose of the study is to determine whether cultural differences among countries have an impact on their fight against outbreaks. To this end, the impact of national cultural dimensions on the increase rate of the total COVID-19 cases per million (IRTCCPM) was investigated by using explanatory modeling, as proposed by Shmueli (2010). Hypotheses were tested for 31 very high developed (VHD) European countries that were specified according to their Human Development Index (HDI). Such an understanding can provide important information to assist countries in their efforts to adjust their operations in order to build more effective health policies against outbreaks in line with their national cultures.

Hypotheses

Cultural differences between societies manifest themselves in individual behaviors, beliefs, values, and norms. Comparisons between societies in different parts of the world can clearly show how culture can affect human behavior (Chiang, 2005). However, in some societies, culture reflects the individuals' expression of their own preferences (Licht, Goldschmidt, & Schwartz, 2007). In our study, we focus on Hofstede's cultural diversity model, which is one of the major frameworks for understanding culture in the last four decades (Moon & Franke, 2000). This typology provides a rationale for cross-cultural differences in several areas, such as economic development, foreign direct investment, ethics, consumer behavior, and corruption. Hofstede demonstrates that the culturally

influenced attributes of a nation do exist and that they are manifested in different values and behaviors (Chiang, 2005). Hofstede's model analyzes national culture in six dimensions. While constructing hypotheses in terms of cultural dimensions, we considered the possible reactions of individuals to government measurements against outbreaks as culture is known to motivate and justify the actions of individuals.

The first dimension is power distance (PD). It ranges in value from zero, for a culture with a low PD, to 100, for a culture with a high PD. This dimension is the extent to which the less powerful members of societies accept and expect that power is distributed unequally (Hofstede & McCrae, 2004). A high PD indicates that social hierarchy is established and executed clearly and without reason. If the PD is low, people question the authority and attempt to distribute power. Therefore, in societies with a high PD, it is expected that people obey the measures taken for preventing an outbreak more strictly; government declarations for preventing an outbreak are strictly implemented, and the outbreak is quickly controlled. In low PD cultures, people are less willing to accept directions from superiors, with potentially detrimental effects on controlling an outbreak (Messner, 2020). Therefore, countries that score relatively high on PD are expected to be more efficient in implementing COVID-19 measures.

Hypothesis 1. *(H_1):* PD has a significant and negative effect on IRTCCPM.

The second dimension is individualism (IND) versus collectivism. This dimension ranges from zero, indicating a highly collectivistic culture, to 100, indicating a highly individualistic culture. This dimension refers to the degree to which individuals are integrated into groups. In individualistic cultures, there is a social environment in which individuals are only expected to assume responsibility for themselves and their close families, while in collectivism, people become integrated into large families with strong bonds, and they protect them with firm loyalty (Hofstede & McCrae, 2004). In collectivistic cultures, individuals make greater distinctions between in-groups and out-groups, whereas in individualistic cultures, individuals make fewer distinctions between in-groups and out-groups. There is less social interaction in collectivistic cultures (Gelfand, Bhawuk, Nishii, & Bechtold, 2004). This attitude can serve as an effective antipathogen defense function by reducing contact with novel outbreaks in collectivistic cultures (Fincher, Thornhill, Murray, & Schaller, 2008). It is possible to say that the importance of personal benefits increases as individualism increases. In individualistic cultures, individual identity is at the forefront. The expectation that the individual in collectivistic cultures considers their benefits less important than the group's complies with the expectation that collectivist cultures will support government policies that restrict individual rights in favor of collective rights (DeBode, Haggard, & Haggard, 2020). In addition, the priority given to obligations and duties in collectivistic cultures may motivate individuals to remain committed to government policies despite personal desires (Kitayama et al., 2018). Therefore, highly collectivistic cultures are more likely to relinquish their individual rights for the sake of protecting public health, and any implementation against the outbreak is acceptable for collectivists if it benefits the in-group. Citizens appreciate the preventive measures taken by the government to restrict the spread of the disease and demonstrate compliance accordingly. Therefore, countries that score relatively high on IND are expected to be less efficient in implementing COVID-19 measures.

Hypothesis 2. *(H_2):* IND has a significant and positive effect on IRTCCPM.

The third dimension is masculinity (MAS) versus femininity. The masculinity index ranges from zero, for feminine cultures, to 100, for masculine cultures. Societies with high masculinity are characterized by intense competition, self-confidence, materialism, high ambition, and a need for power (Kąkol, Kisilowski, Kunikowski, & Uklańska, 2018). Meanwhile, societies with high femininity prefer cooperation, modesty, caring for weak and powerless people, and life quality. Feminine cultures are more consensus-oriented (Hofstede, n.d.). Considering that COVID-19 has a larger impact on the elderly, it is expected that people in societies with high femininity display more cooperative behavior regarding the measures taken for preventing outbreaks. Thus, countries that score relatively high on MAS are expected to be less efficient in implementing COVID-19 measures.

Hypothesis 3. *(H_3):* MAS has a significant and positive effect on IRTCCPM.

The fourth dimension is uncertainty avoidance (UA). UA is scored from zero, indicating a culture with a weak UA, to 100, indicating a culture with a strong UA. In this dimension, the emphasis is on the extent to which a culture feels threatened or is concerned about ambiguity (Mahlich, Dilokthornsakul, Sruamsiri, & Chaiyakunapruk, 2018). Societies that display a strong UA adopt and implement strict laws, rules, and security and safety measures to minimize the probability of the rise of situations that are unknown and different than normal. These societies are intolerant of unorthodox behaviors and ideas (Hofstede & McCrae, 2004; Hofstede, n.d.). In the initial stage, an outbreak involves uncertain probabilities and consequences of infection. Individuals in a high-UA culture would hesitate to engage in the gambling process, which means that they would assign high utility to any given health state (Mahlich et al., 2018). Therefore, to prevent an outbreak, it is expected that orthodox behaviors are implemented in these cultures to a greater extent and that individual oppositions are raised to those who do not comply with these behaviors. Thus, countries that score relatively high on UA are expected to be more efficient in implementing COVID-19 measures.

Hypothesis 4. *(H_4):* UA has a significant and negative effect on IRTCCPM.

The fifth dimension is long-term orientation (LTO) versus short-term orientation (STO). The LTO index ranges from zero, for short-term-oriented cultures, to 100, for long-term-oriented cultures. This dimension defines the connection of the past with current and future actions or challenges (Hofstede et al., 2010). In a society, STO indicates that their traditions are strong, maintained, and valued. Societies characterized by LTO try to solve problems in an adaptable, circumstantial, and pragmatic manner. A society with an STO would assign less value to health states, whereas societies with an LTO would be more willing to gain an additional year of life (Mahlich et al., 2018). Therefore, it is expected that individuals in an LTO culture would be willing to follow the rules in favor of their health. In

addition, for outbreaks, a high degree of LTO ensures that permanent measures are taken to prevent outbreaks resurfacing. In such societies, a measure is adopted, and a permanent solution is generated. Therefore, countries that score relatively high on LTO are expected to be more efficient in implementing COVID-19 measures.

Hypothesis 5. *(H_5):* LTO has a significant and negative effect on IRTCCPM.

Indulgence (INDUL) versus restraint is Hofstede's last cultural dimension. The INDUL index ranges from zero, for cultures with restraint, to 100, for cultures that are indulgent. Societies characterized by indulgence allow basic and natural human drives related to enjoying life to be satisfied in a relatively free manner, while in restrained societies, the satisfaction of needs is suppressed and regulated by means of strict social norms (Hofstede, n.d.). Put differently, highly restrained societies usually establish strict social norms to govern and control the behaviors of their citizens (DeBode et al., 2020). Therefore, it is expected that people in such cultures more easily accept the imposed restrictions for preventing outbreaks. Furthermore, it can be assumed that the countries with a high INDUL score would prioritize enjoyment and the satisfaction of needs over these restrictions (Messner, 2020). Last, cultures accustomed to higher indulgence may also have more difficulty coordinating themselves in the face of an outbreak (Van Bavel et al., 2020). Thus, countries that score relatively high on INDUL are expected to be less efficient in implementing COVID-19 measures.

Hypothesis 6. *(H_6):* INDUL has a significant and positive effect on IRTCCPM.

Data and methods

In this study, to check the hypotheses, VHD European countries have been selected as the data sources. The development categorization of the countries is specified according to their HDI, which is published annually by the official website of United Nations Development Programme (UNDP, 2018). Owing to the lack of data on the national culture dimensions of some VHD European countries (such as Liechtenstein, Andorra, and Montenegro), the intersection of valid data regarding 31 countries (Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom) has been collected from different online databases.

First, since the initial growth of an outbreak is exponential (Anderson & May, 1991; Chowell, Nishiura, & Bettencourt, 2007; Wallinga & Lipsitch, 2007; Viboud, Simonsen, & Chowell, 2016), in order to calculate the IRTCCPM of the ith country, its increase rate (k) is estimated by using a simple exponential growth function. As the duration of the outbreak affects the rate of spread, we recommend the same period (60 days) for each country to compute *k* by using a simple exponential growth function in order to capture the initial rate of increase in the cases. Thus, the data of the IRTCCPM (including the term between the date of reaching the 100th total case and the date of the 60th day) of each VHD European country has been gathered from the Our World in Data formal website (Fig. 1), which classifies daily COVID-19 data from WHO situation reports (OWD, 2020).

The data of the dimensions of national culture concerning each country has been collected from The Geert Hofstede Centre's formal website (THC, n.d.), which analyzed a vast database of employee value scores gathered by IBM and comprised more than 70 countries. The descriptive statistics and correlations of the data set are illustrated in Table 1.

Upon analyzing the correlation results, while there is a positive correlation between the IRTCCPM and IND and between the

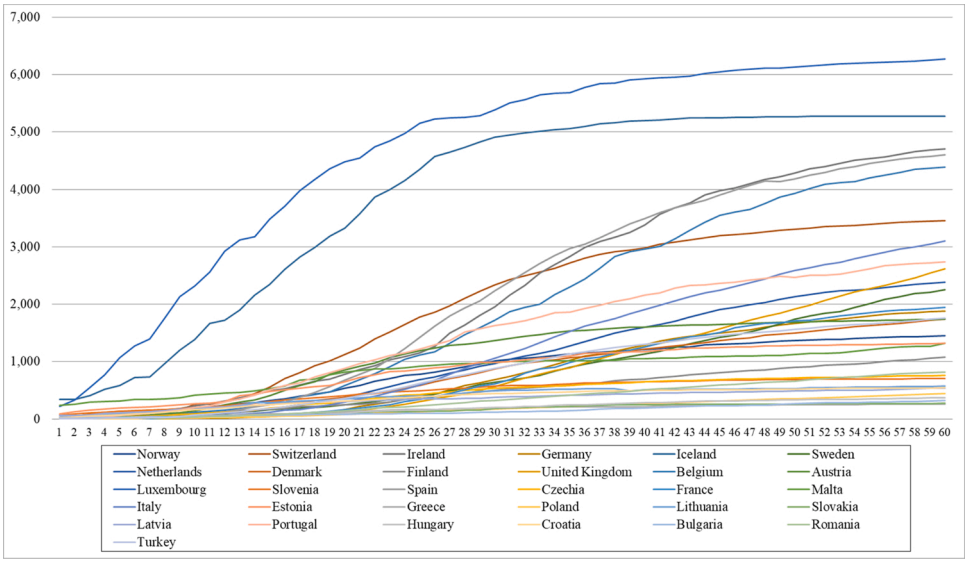

Fig. 1. Total COVID-19 cases per million of VHD European countries.
Note. The x-axis demonstrates the interval between the date of reaching the 100th total case and the date of the 60th day

IRTCCPM and INDUL, there is a negative correlation between the IRTCCPM and PD and the IRTCCPM and UA. In terms of the correlation among the cultural dimensions, there is a positive correlation between PD and UA and between IND and INDUL. However, there is a negative correlation between PD and IND; PD and INDUL; IND and UA; UA and INDUL, and between LTO and INDUL.

In our study, to measure IRTCCPM, we use a simple exponential growth function, as stated below (Eq. 1):

$$TCCPM_{it} = TCCPM_{it_0} \times e^{k_i t} \quad (1)$$

$TCCPM_{it}$: Total COVID-19 cases per million of the ith country on the date of the 60th day

$TCCPM_{it0}$: Total COVID-19 cases per million of the ith country on the date of reaching the 100th cumulative case

k_i: The increase rate of the total COVID-19 cases per million related to the ith country.

In this study, to test our causal hypotheses, we attempt to discover the impact of national culture dimensions (PD, IND, MAS, UA, LTO, and INDUL) on the IRTCCPM by designing explanatory modeling. Since the dependent and independent variables in the model have different measurement units, a multiple logarithmic regression model is suggested, as stated in Eq. (2).

$$lnIRTCCPM_i = \beta_0 + \beta_1 lnPD_i + \beta_2 lnIND_i + \beta_3 lnMAS_i + \beta_4 lnUA_i + \beta_5 lnLTO_i + \beta_6 lnINDUL_i + \varepsilon_i \quad (2)$$

$lnIRTCCPM_i$	: The natural logarithm of the IRTCCPM of the i^{th} country,
$lnPD_i$	: The natural logarithm of the PD score of the i^{th} country,
$lnIND_i$	: The natural logarithm of the IND score of the i^{th} country,
$lnMAS_i$	: The natural logarithm of the MAS score of the i^{th} country,
$lnUA_i$	: The natural logarithm of the UA score of the i^{th} country,
$lnLTO_i$	: The natural logarithm of the LTO score of the i^{th} country,
$lnINDUL_i$	: The natural logarithm of the INDUL score of the i^{th} country,
ε_i	: The error (residual) term in the regression model.

Results of analysis

For testing the hypotheses pertaining to this research, a multiple logarithmic regression analysis is employed for each model, as specified below. To remove the non-significant explanatory variables, we conduct stepwise multiple regression analysis. The summary of the stepwise multiple regression analysis is illustrated in Table 2.

By analyzing the results in Table 2, it can be seen that the regression models (1st, 2nd, and 3rd) are significant at the $\alpha = 0.05$ level, and it can be easily detected that the optimal model is the 3rd model, according to its adjusted R^2 score. The coefficients of PD, IND, and INDUL in the 3rd regression model are significant at the 95 % confidence interval. The results in the 3rd regression model promote the assumptions that three national culture dimensions, PD, IND, and INDUL, have an impact on the IRTCCPM. The other coefficients are not statistically significant at the 95 % confidence interval.

To extensively test the directions of the impacts of the national cultural variables on IRTCCPM, the signs of the coefficients of the independent variables must be checked. According to the results obtained from Table 2, the signs of the PD, IND, and INDUL coefficients are in line with the hypotheses of the study. The coefficients of the other dimensions (MAS, UA, and LTO) do not match our expectations as their coefficients are not statistically significant at the $\alpha = 0.05$ level. The adjusted R^2 of the multiple regression model (3rd model) is 0.687, denoting that the 68.70 % variance for the dependent variable (IRTCCPM) is explained by the independent variables (PD, IND, and INDUL).

Consequently, the signs of coefficients of PD, IND, and INDUL comply with the theory of the study, which depended on the literature, as argued below. The regression model (3rd model) also ensures basic assumptions (normality, multicollinearity, heteroscedasticity, etc.) of regression, so these results support the statistical validity of the analysis and encourage us to use them in discussions. Considering the findings above, the results of the hypotheses are given in Table 3.

Table 1
Descriptive statistics and correlations of data set.

Variables	Descriptive Statistics				Correlations						
	Min.	Max.	Mean	SD	IRTCCPM	PD	IND	MAS	UA	LTO	INDUL
IRTCCPM	0.02	0.12	0.06	0.02	1.000						
PD	11.00	100.00	50.00	20.50	−0.707**	1.000					
IND	27.00	89.00	58.61	17.26	0.554**	−0.581**	1.000				
MAS	5.00	100.00	44.35	25.12	−0.197	0.233	0.085	1.000			
UA	23.00	100.00	69.32	21.40	−0.597**	0.622**	−0.577**	0.206	1.000		
LTO	24.00	83.00	56.00	17.25	−0.109	0.165	0.161	0.239	0.086	1.000	
INDUL	13.00	78.00	45.48	19.30	0.765**	−0.537**	0.381*	−0.107	−0.437*	−0.402*	1.000

IRTCCPM: Increase Rate of Total COVID-19 Cases per Million, PD: Power Distance, IND: Individualism, MAS: Masculinity, UA: Uncertainty Avoidance, LTO: Long-Term Orientation, INDUL: Indulgence.
(**): Correlation is significant at the 0.01 level (2-tailed); (*): Correlation is significant at the 0.05 level (2-tailed).

Table 2
Summary of Stepwise Multiple Regression Analysis[a,d,e].

Model ID	R^2	Adj. R^2	SE	F	p	Coeff.	Unstand. Coeff.		Stand. Coeff.	t	p	Collinearity Statistics	
							b_i	SE				Tol.	VIF
1	0.507	0.490	0.127	29.777	0.000[b]	(Constant)	−3.734	0.168		−22.251	0.000[b]		
						lnINDUL	0.245	0.045	0.712	5.457	0.000[b]	1.000[c]	1.000[c]
2	0.662	0.638	0.107	27.381	0.000[b]	(Constant)	−4.421	0.238		−18.544	0.000[b]		
						lnINDUL	0.201	0.040	0.585	5.065	0.000[b]	0.906[c]	1.104[c]
						lnIND	.211	0.059	0.414	3.582	0.001[b]	0.906[c]	1.104[c]
3	0.719	0.687	0.099	22.995	0.000[b]	(Constant)	−3.616	0.409		−8.834	0.000[b]		
						lnINDUL	0.167	0.040	0.487	4.230	0.000[b]	0.786[c]	1.272[c]
						lnIND	0.149	0.061	0.292	2.449	0.021[b]	0.733[c]	1.364[c]
						lnPD	−0.113	0.048	−0.298	−2.340	0.027[b]	0.642[c]	1.557[c]

(a): Dependent Variable: lnIRTCCPM.
(b): The regression models and coefficients are significant at the $\alpha = 0.05$ level.
(c): As neither the Tolerance nor the VIF values are higher than the cutoff threshold (Tolerance [0.1] and VIF [10]), there is no multicollinearity in the model (Hair, Black, Babin, & Anderson, 2014).
(d): To test the normality assumption, the Jarque-Bera Normality Test (The null hypothesis [H_0]: The data of the variable is distributed normality) is conducted. As the test values of the data of all the variables are higher than the $\alpha = 0.05$ level, the null hypothesis (H_0) is supported.
(e): To check the heteroscedasticity assumption, the White Homoscedasticity Test (H_0: There is no heteroscedasticity in the model) is performed. Owing to all the test values being greater than the $\alpha = 0.05$ level, it can be concluded that there is no heteroscedasticity in the models.

Table 3
Research hypotheses and results.

Hypotheses		Results	Statement
H_1	*PD has significant and negative effect on IRTC*	Accepted	
H_2	*IND has significant and positive effect on IRTC*	Accepted	
H_3	*MAS has significant and positive effect on IRTC*	Rejected	Not significant
H_4	*UA has significant and negative effect on IRTC*	Rejected	Not significant
H_5	*LTO has significant and negative effect on IRTC*	Rejected	Not significant
H_6	*INDUL has significant and positive effect on IRTC*	Accepted	

Conclusion and discussion

Since the purpose of this study is to determine whether cultural differences among societies have an impact on their fight against the COVID-19 pandemic, we investigated the impact of national cultural dimensions on IRTCCPM. The results have shown that PD has a significant and negative effect on IRTCCPM. In addition, the results have demonstrated that both IND and INDUL have significant and positive effects on IRTCCPM. However, the hypotheses concerning the impacts of MAS, UA, and LTO on the IRTCCPM have been rejected as their coefficients in the regression models are not statistically significant at the 95 % confidence interval. While potentially controversial, an association between cultural differences and COVID-19 cases should not be surprising since the implementation of countermeasures is ultimately affected by human beings (Messner, 2020).

According to the findings, it is possible to consider that societies with a high degree of PD are at an advantage in reducing the spread of the outbreak because these societies are more sensitive to the measures implemented by the government authorities, and they do not display resistance to these measures. An "authorities know best" attitude in countries scoring high for PD may ensure that even non-compulsory recommendations are considered by the societies.

However, the findings have revealed that individualistic societies could have a characteristic that accelerates the spread of the outbreak as these societies do not support the practices that restrain individual interests in favor of collective interests. Therefore, it is more difficult for measures aimed at controlling the spread of the outbreak to receive support in these societies than in collectivist ones. Regarding the COVID-19 pandemic, individualistic societies are less likely to endure sacrifices, such as staying at home and avoiding gathering activities, because of their preference for personal freedom. Additionally, they are also more reluctant to support mandatory measures, such as quarantine and isolation, than collectivistic societies are (Jiang, Wei, & Zhang, 2020). Our results support previous findings in some aspects. Biddlestone, Green, and Douglas (2020) findings suggest that promoting collectivism may be a way to increase engagement in the efforts to reduce the spread of COVID-19. Gelfand et al. (2020) found that the nations with high levels of cultural tightness (considered more collectivist) have slower growth rates of COVID-19. Overall, it could be argued that collectivists, rather than individualists, are more likely to display adaptive responses during times of crisis (Biddlestone, Green, & Douglas, 2020). Unlike the findings mentioned above, Messner's unpublished article claims that individualistic societies have lower COVID-19 growth rates. This inconsistency may result from a coefficient deviation caused by Messner not including all the cultural dimensions of the theory in the analysis.

According to the findings, it could be suggested that, in more indulgent societies, it is more difficult to restrain individuals' satisfying activities by means of social norms. Thus, it will be more difficult for restrictive measures that are implemented against the spread of the outbreak to be accepted in societies with a high INDUL.

The contributions of this study can be discussed in academic and practical fields. From an academic perspective, this study is significant as it is among the first examples to investigate the relationship between culture and the COVID-19 pandemic. In addition, it points to a new area of study as a less-visible aspect of the strategy of fighting against outbreaks. When considered in terms of practicality, the study points out that policy-makers should not only focus on technical measures but also develop these measures by reinforcing them with cultural elements; they should consider the cultural factors that are specific to their country when making policy choices. Thus, societies will conflict with their own selves to a lesser degree in the face of measures recommended and/or implemented by the authorities. Additionally, a communication system that considers the culture can be a fruitful endeavor in encouraging people to comply with the measures. For example, "maintaining physical distancing can protect you and your family from infection" may be a more effective communication strategy in collectivistic cultures, whereas "maintaining physical distancing can protect you from infection" may be more effective in individualistic cultures. In low PD cultures, messages may include the emphasis that measures are part of the solution to a global problem not an imposition of authority. In countries scoring high on INDUL, the messages may focus on the need to make some sacrifices, like obeying the measures today to enjoy life in the future. Ultimately, COVID-19 communication and messaging should correspond with the culture to increase the likelihood of individuals complying with the measures.

In this study, an analysis was carried out during an ongoing phase of the outbreak. Re-analysis of the data when the outbreak comes to an absolute end will consolidate the conclusions of the study. The study was conducted on a limited number of developed countries. Similar studies that are carried out on developing countries will make it possible to compare the two groups and to determine whether the same dimensions also lead to similar outcomes. On the other hand, we propose the research question of "What have different European societies with different cultures done differently in order to counter the pandemic, and how has this resulted in different rates of growth in the infection rates?" for further research.

Finally, in light of the findings of this study, it can be asserted that societies should act in harmony with their cultural characteristics in the formal or informal practices of their fight against outbreaks.

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