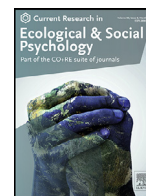


Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Current Research in Ecological and Social Psychology

journal homepage: www.elsevier.com/locate/cresp

Concern with COVID-19 pandemic threat and attitudes towards immigrants: The mediating effect of the desire for tightness

Silvana Mula^{a,*}, Daniela Di Santo^a, Elena Resta^a, Farin Bakhtiari^b, Conrad Baldner^a, Erica Molinaro^{bp}, Antonio Pierro^a, Michele J. Gelfand^{c,bn}, Emmy Denison^c, Maximilian Agostini^d, Jocelyn J. Bélanger^e, Ben Gützow^d, Jannis Kreienkamp^d, Georgios Abakoumkin^f, Jamilah Hanum Abdul Khaiyom^g, Vjollca Ahmedi^h, Handan Akkasⁱ, Carlos A. Almenara^j, Mohsin Atta^k, Sabahat Cigdem Bagci^l, Sima Basel^e, Edona Berisha Kida^h, Allan B.I. Bernardo^m, Nicholas R. Buttrickⁿ, Phatthanakit Chobthamkit^o, Hoon-Seok Choi^p, Mioara Cristea^q, Sára Csaba^r, Kaja Damnjanovic^s, Ivan Danyliuk^t, Arobindu Dash^u, Karen M. Douglas^v, Violeta Enea^w, Daiane Gracieli Faller^e, Gavan J. Fitzsimons^x, Alexandra Gheorghiu^w, Ángel Gómez^y, Ali Hamaidia^z, Qing Han^{aa}, Mai Helmy^{ab,bo}, Joevarian Hudiyana^{ac}, Bertus F. Jeronimus^d, Ding-Yu Jiang^{ad}, Veljko Jovanović^{ae}, Željka Kamenov^{af}, Anna Kende^r, Shian-Ling Keng^{ag}, Tra Thi Thanh Kieu^{ah}, Yasin Koc^d, Kamila Kovyazina^{ai}, Inna Kozytska^t, Joshua Krause^d, Arie W. Kruglanski^c, Anton Kurapov^t, Maja Kutlaca^{aj}, Nóra Anna Lantos^r, Edward P. Lemay Jr^c, Cokorda Bagus Jaya Lesmana^{ak}, Winnifred R. Louis^{al}, Adrian Lueders^{am}, Najma Iqbal Malik^k, Anton Martinez^{an}, Kira O. McCabe^{ao}, Jasmina Mehulić^{af}, Mirra Noor Milla^{ac}, Idris Mohammed^{ap}, Manuel Moyano^{aq}, Hayat Muhammad^{ar}, Hamdi Muluk^{ac}, Solomiia Myroniuk^d, Reza Najafi^{as}, Claudia F. Nisa^e, Boglárka Nyúl^r, Paul A. O’Keefe^{ag}, Jose Javier Olivas Osuna^{at}, Evgeny N. Osin^{au}, Joonha Park^{av}, Gennaro Pica^{aw}, Jonas H. Rees^{ax}, Anne Margit Reitsema^d, Marika Rullo^{ay}, Michelle K. Ryan^{d,az,d}, Adil Samekin^{ba}, Pekka Santtila^{bb}, Edyta Sasin^e, Birga Maren Schumpe^{bc}, Heyla A. Selim^{bd}, Michael Vicente Stanton^{be}, Wolfgang Stroebe^d, Samiah Sultana^d, Robbie M. Sutton^v, Eleftheria Tseliou^f, Akira Utsugi^{bf}, Jolien Anne van Breen^{bg}, Caspar J. van Lissa^{bh}, Kees Van Veen^d, Michelle R. vanDellen^{bi}, Alexandra Vázquez^y, Robin Wollast^{bq}, Victoria Wai-lan Yeung^{bj}, Somayeh Zand^{as1}, Iris Lav Žeželj^s, Bang Zheng^{bk}, Andreas Zick^{bl}, Claudia Zúñiga^{bm}, N. Pontus Leander^d

^a Sapienza University of Rome, Italy^b California State University, Fresno^c University of Maryland, College Park, USA^d University of Groningen^e New York University Abu Dhabi^f University of Thessaly^g International Islamic University Malaysia^h Pristine Universityⁱ Ankara Science University^j Universidad Peruana de Ciencias Aplicadas^k University of Sargodha^l Sabanci University^m De La Salle Universityⁿ University of Virginia^o Thammasat University^p Sungkyunkwan University^q Heriot Watt University

* Corresponding author.

E-mail address: silvana.mula@uniroma1.it (S. Mula).<https://doi.org/10.1016/j.cresp.2021.100028>

Received 8 July 2021; Received in revised form 2 December 2021; Accepted 7 December 2021

2666-6227/© 2021 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license

<http://creativecommons.org/licenses/by-nc-nd/4.0/>

^r ELTE Eötvös Loránd University
^s University of Belgrade
^t Taras Shevchenko National University of Kyiv
^u Leuphana University of Lüneburg
^v University of Kent
^w Alexandru Ioan Cuza University, Iasi
^x Duke University
^y Universidad Nacional de Educación a Distancia
^z Setif 2 University
^{aa} University of Bristol
^{ab} Menoufia University
^{ac} Universitas Indonesia
^{ad} National Chung-Cheng University
^{ae} University of Novi Sad
^{af} University of Zagreb
^{ag} Yale-NUS College
^{ah} HCMC University of Education
^{ai} Independent researcher, Kazakhstan
^{aj} Durham University
^{ak} Udayana University
^{al} University of Queensland
^{am} University of Limerick
^{an} University of Sheffield
^{ao} Carleton University
^{ap} Usmanu Danfodiyo University Sokoto
^{aq} University of Cordoba
^{ar} University of Peshawar
^{as} Islamic Azad University, Rasht Branch
^{as1} University of Milano-Bicocca
^{at} National Distance Education University (UNED)
^{au} National Research University Higher School of Economics
^{av} NUCB Business School
^{aw} University of Camerino (UNICAM)
^{ax} University of Bielefeld
^{ay} University of Siena
^{az} University of Exeter
^{ba} M. Narikbayev KAZGUU University
^{bb} New York University Shanghai
^{bc} University of Amsterdam
^{bd} King Saud University
^{be} California State University, East Bay
^{bf} Nagoya University
^{bg} Leiden University
^{bh} Utrecht University
^{bi} University of Georgia
^{bj} Lingnan University
^{bk} Imperial College London
^{bl} Bielefeld University
^{bm} Universidad de Chile
^{bn} Stanford Graduate School of Business
^{bo} Sultan Qaboos University
^{bp} Florida Gulf Coast University
^{bq} Université Clermont-Auvergne

ARTICLE INFO

Keywords:
 COVID-19
 Threat
 Desire for tightness
 Negative attitudes

ABSTRACT

Tightening social norms is thought to be adaptive for dealing with collective threat yet it may have negative consequences for increasing prejudice. The present research investigated the role of desire for cultural tightness, triggered by the COVID-19 pandemic, in increasing negative attitudes towards immigrants. We used participant-level data from 41 countries ($N = 55,015$) collected as part of the PsyCorona project, a cross-national longitudinal study on responses to COVID-19. Our predictions were tested through multilevel and SEM models, treating participants as nested within countries. Results showed that people's concern with COVID-19 threat was related to greater desire for tightness which, in turn, was linked to more negative attitudes towards immigrants. These findings were followed up with a longitudinal model ($N = 2,349$) which also showed that people's heightened concern with COVID-19 in an earlier stage of the pandemic was associated with an increase in their desire for tightness and negative attitudes towards immigrants later in time. Our findings offer insight into the trade-offs that tightening social norms under collective threat has for human groups.

1. Introduction

The 2019 Coronavirus disease (or COVID-19) outbreak has undermined people's certainties about the future, increasing fear and worry.

As the pandemic poses a destabilizing threat to entire societies worldwide, individuals are theorized to desire tighter norms (Gelfand et al., 2011; Jackson et al., 2019). In a pandemic, people may believe more strongly that their own country should have strict and clear rules that

must be complied with, especially in order to prevent and control the spread of the infection. Indeed, many countries around the world have strengthened preventive security measures to contain the transmission (e.g., social distancing, requirement to wear a mask and gloves, mandatory quarantine, closure of national borders). While strengthening social norms in response to threats serves as an adaptive mechanism that helps individuals coordinate to survive (Gelfand et al., 2011; Roos et al., 2015), it can also lead to intolerant attitudes towards outgroups (e.g., immigrants, homosexuals; Jackson et al., 2019; Inbar, et al., 2016; Sorokowski et al., 2020). For instance, previous research suggests that perceived threat is associated with greater intolerance and punitiveness towards outgroups (Feldman & Stenner, 1997; Jackson et al., 2019; Marcus et al., 1995), as well as higher ethnocentrism (Schaller & Neuberg, 2012). Emphasizing group boundaries can decrease empathy towards people who are perceived to be different (Cikara, Bruneau, & Saxe, 2011; Han, 2018) and heighten dehumanization and punishment (Han et al., 2020; Kteily, Hodson, & Bruneau, 2016).

Although not every disease threat (i.e., pandemic) raises negative attitudes towards outgroups (Cohn, 2012), it can nonetheless give rise to discrimination and violence against stigmatized groups. Since the beginning of the COVID-19 pandemic, there have been reports of increased aggression towards people from ethnic minority backgrounds, particularly against people from Asian communities (Aratani, 2020; Margolin, 2020). Recent evidence has also shown an increase in prejudice and negative attitudes towards specific outgroups, especially against those most affected during the initial stage of the pandemic (e.g., Sorokowski et al., 2020; Yamagata, Teraguchi, & Miura, 2020).

The purpose of this research is to examine if negative attitudes toward immigrants are on the rise globally, and to explain the possible threat-mechanisms pertaining to this phenomenon. We specifically examine whether the perceived threat of COVID-19 catalyzes negative attitudes toward immigrants over time through its effect on increasing desire for cultural tightness. Specifically, cultural tightness reflects “the strength of social norms, or how clear and pervasive norms are within societies, and the strength of sanctioning, or how much tolerance there is for deviance from norms within societies” (Gelfand et al., 2011, p.1226). Field, laboratory, and computational models have shown that groups that experience heightened collective threat (disasters, pathogen outbreaks, resource scarcity, invasions) develop stricter rules to help coordinate social action (Gelfand et al., 2011; Roos et al., 2015). Groups that have less threat and coordination needs, evolve to have more permissive norms. This threat → tightening relationship has been found both in modern nations and non-industrial groups (Jackson, Gelfand, & Ember, 2020).

Notably, as groups tighten to deal with coordination needs, they also experience a trade-off between *order* and *openness*. Tight cultures generally have more order—i.e., more monitoring and less crime (Gelfand et al., 2011), more uniformity (Gelfand, 2018), a preference for strong, independent leaders (Aktas, Gelfand, & Hanges, 2016), and higher self-regulation (Gelfand et al., 2011). By contrast, loose cultures have less order but more openness—i.e., less prejudice toward stigmatized groups (Jackson et al., 2019; Jackson et al., 2020), higher creativity (Chua, Roth, & Lemoine, 2015), higher openness to change (De, Nau, & Gelfand, 2017), and a preference for visionary team leaders (Aktas et al., 2016).

Here we examine whether desire for cultural tightness plays a pivotal role in fostering negative immigrant attitudes in the context of COVID-19. As noted, previous studies have underscored that when societies face societal threats, tight rules and punishments for people who deviate from norms may help them to coordinate to survive (Gelfand et al., 2011; Roos, et al., 2015). Yet tightening can have downsides. Correlational and experimental findings by Jackson and colleagues (2019) showed that perceived societal and ecological threats predicted people’s desire for greater tightness, which in turn, was associated with both implicit and explicit prejudiced attitudes towards perceived outgroups (e.g., opposition to having a person from a dif-

ferent religion, race, or sexual orientation as a neighbour, favourable attitudes towards heterosexuals over homosexuals, acceptability of violence towards people in other societies, feelings of cultural superiority) and xenophobic political preferences (i.e., intentions to vote for nationalist politicians). These outcomes are also consistent with other research which found that when people feel threatened, they show more negative attitudes towards out-groups (Faulkner, et al., 2004; Proulx, Inzlicht, & Harmon-jones, 2012) and have a higher sense of cultural superiority (Burke, Martens, & Faucher, 2010; Fritsche, Jonas, & Kessler, 2011; Navarrete & Fessler, 2006).

To date, it has not been possible to examine how countries around the world respond to the same collective threat happening simultaneously. As such, the COVID-19 pandemic provides a natural context to test whether an increased concern with COVID-19 threat would trigger greater desire for tight norms and increase negative attitudes towards immigrants. More specifically, in the context of COVID-19, more prejudiced attitudes may be heightened by native-born citizens’ desire for tightness, because individuals who are frequent targets of prejudice (e.g., immigrants) may be viewed as outsiders who threaten the collective health of the society with contagious diseases (Schaller & Neuberg, 2012; Parmet & Sinha, 2017; Person et al., 2004) and may be seen as social order breakers (Jackson et al., 2019).

1.1. The present research

We hypothesized that people’s concern with COVID-19 threat would be associated with their desire for tight rules (i.e., cultural tightness) and, consequently, with their negative attitudes towards immigrants, who may be perceived as disturbing the social order (see also Jackson et al., 2019). Accordingly, the current study aimed to investigate the effect of concern with COVID-19 on desire for tightness and attitudes towards immigrants. Indirect effects of concern with COVID-19 on negative attitudes towards immigrants via desire for tightness were also examined. Relationships between variables were examined using data reported by over 55,000 people. To investigate changes over time we used longitudinal data reported by a subset of over 2,000 participants in two subsequent follow-up assessments (see Table 1 for more details).

2. Method

2.1. Participants

We used participant-level data collected from the baseline, the fifth wave, and the seventh wave of PsyCorona, a cross-national longitudinal study on responses to COVID-19 (<https://psycorona.org/>). The research was approved by the Ethics Committee of the Psychology Department of the University of Groningen (PSY-1920-S-0390) and New York University Abu Dhabi (HRPP-2020-42). The codebook for the full PsyCorona survey can be found at <https://osf.io/qhyue/>. Data for the present study is available at <https://osf.io/kwf3r/>.

Participants were recruited using convenience and representative sampling strategies, and they completed the survey in one out of 30 possible languages. To date, several publications have been published or submitted which use data from this large-scale cross-national longitudinal project. So far, other projects have investigated effects on perceptions and attitudes towards immigrants (Han et al., 2020; Lemay et al., 2020) However, no project investigated the relationship between concern with COVID-19 and attitudes towards immigrants, nor has a project investigated desire for tightness. Other manuscripts from the PsyCorona project can be viewed here: <https://www.researchgate.net/project/PsyCorona-Project>.

The initial sample consisted of 63,675 participants across 115 countries who completed the initial survey starting March 19th, 2020. Eighty-four participants left the survey blank and were excluded from the analysis. Only participants with data for all the study’s main variables were

Table 1
Data collection for study variables

Variable	Baseline (March 19 th , 2020)	Wave 5 (May 2 nd , 2020)	Wave 7 (May 16 th , 2020)
Concern with COVID-19	x		
Desire for Tightness	x	x	
Attitudes towards Immigrants	x		x

selected. Furthermore, to ensure an average degree of reliability for a multilevel analysis (Kline, 2015), we only included countries with more than 100 participants.

Given the nature of the outcome variable under consideration, participants who considered themselves to be immigrants were also excluded. The final sample resulted in 55,015 participants from 41 countries. The sample included 61.1% women and 38.3% men (0.1% did not report gender and 0.4% reported a gender of “other”). Age was assessed in eight intervals, with 22.8% aged 18 to 24, 23.7% aged 25-34, 18.9% aged 35-44, 14.7% aged 45-54, 11.5% aged 55-64, 7.2% aged 65-75, 0.9% aged 76-85, and 0.1% older than 85 (0.2% did not report age). Regarding the educational level, 1.5% reported having a primary education, 13.4% had a general secondary education, 10% had a vocational education, and 24.1% possessed a higher education. Most participants (30.4%) had a bachelor’s degree, 15.7% had a master’s degree and 4.8% had a PhD degree (0.2% did not report their level of education).

After completing the initial survey, participants who provided their e-mail address received invitations to complete follow-up surveys, which were distributed starting March 27th, 2020 and then approximately every week for 13 follow-up assessments until June 13th, 2020. Starting June 2020, the invitation to fill in the survey was sent once a month. To examine change over time, we also used responses completed by a subset of participants during the fifth and the seventh follow-up assessments. We then excluded countries that had less than 100 participants to avoid unbalanced group sizes ($N = 2,349$ from 10 countries).

2.2. Measures

2.2.1. Concern with COVID-19 threat

Participants rated their personal concern about the COVID-19 pandemic through a single item measure (i.e., “How personally disturbing would you find the following possible consequences of the coronavirus? - Me contracting the virus”) that they responded on a five-point Likert scale ranging from ‘1’ (Not disturbing at all) to ‘5’ (Extremely disturbing). Concern with COVID-19 threat was collected at the baseline (March 19th – March 27th).

2.2.2. Desire for tightness

Participants rated their desire for cultural tightness through three items adapted from Gelfand et al. (2011). Participants were asked to indicate to what extent the country they currently live in *should* have loose versus tight characteristics (“Have flexible social norms” vs “Have rigid social norms”; “Be loose” vs “Be tight”; “Treat people who don’t conform to norms kindly” vs “Treat people who don’t conform to norms harshly”). Each item was responded to on a 9-point scale. The items were averaged to create a score indicating a desire for cultural tightness, where higher values reflect greater desire for tightness. The scale had satisfactory internal consistency (Cronbach’s $\alpha = .81$). Only two countries had a Cronbach’s α lower than .60 (China $\alpha = .50$, Vietnam $\alpha = .57$) and only one with α lower than .70 (Brazil $\alpha = .65$).

To further demonstrate that the latent structure of the construct and the factor loading of each item on the latent factor were similar across countries, we conducted a multigroup confirmatory factor analysis (MG-CFA) testing configural and metric measurement invariance (Davidov et al., 2014) across countries. We assessed model fit as recommended by Kline (2005). Results showed a satisfactory fit to the data for both configural ($\chi^2, 41 = 4.455.456$, $p < .001$, CFI = .927, RM-

SEA = .283, SRMR = .058) and metric invariance ($\chi^2, 121 = 6.102.250$, $p < .001$, CFI = .901, RMSEA = .192, SRMR = .100). As can be seen, the CFI indices for both models revealed a good fit, exceeding the suggested cutoff $\leq .90$. The SRMR index of the configural model revealed a good fit, while that of the metric one was slightly higher than the recommended cutoff $\leq .08$. However, a less stringent SRMR was also accepted (cutoff up $\leq .11$) (Beauducel & Wittmann, 2005; Stenzel et al., 2015). Regarding the RMSEA, a simulation study of 10-20 groups by Rutkowski and Svetina (2014) suggested that, as the number of groups increased, also the RMSEA increased. Given the 41 groups (countries) of our sample, we adopted a more liberal cut-off may be adopted (see also Jang et al., 2017 for more details). Additionally, in models with small degrees of freedom (df) (such as our measure with only three items), the RMSEA often falsely indicates a poor-fitting model (Kenny, Kaniskan, & McCoach, 2015). Kenny et al. even recommended avoiding computing the RMSEA in models with small df. In summary, we can reasonably consider our results as having adequate fit.

In any case, for all the subsequent analysis conducted, we run our models both with all countries and excluding the three countries with α lower than .70. Since results did not change, we decided to examine all the 41 countries. Results without these three countries (with and without covariates) are available in the Supplementary Materials.

Desire for tightness was measured at the baseline and at wave 5 (May 2nd – May 9th)

2.2.3. Attitudes towards immigrants

Participants were asked to rate how favorable and warm they feel towards immigrants using a 9-point feeling thermometer response scale (0°: “very cold or unfavorable feeling”; 100°: “very warm or favorable feeling”). Item scores were recoded so higher scores indicated negative attitudes.

Attitudes towards immigrants was measured at the baseline and at wave 7 (May 16th – May 23th).

2.2.4. Covariates

In all analyses, we controlled for participants’ gender, age, and educational level. Since the gender variable was coded in three categories (1 = female, 2 = male, 3 = other), we recoded it into two dummy variables (Gender 1: Female/Other = 0, Male = 1; Gender 2: Female/Male = 0, Other = 1). Age was assessed in eight intervals (1 = 18-24, 2 = 25-34, 3 = 35-44, 4 = 45-54, 5 = 55-64, 6 = 65-75, 7 = 76-85, 8 = 85+) and there were seven levels of education, from lowest to highest (1 = primary education, 2 = general secondary education, 3 = vocational education, 4 = higher education, 5 = bachelor’s degree, 6 = master’s degree, 7 = PhD degree).

In addition, we also controlled for the average number of COVID-19 cases and deaths during the baseline period (19th March – 27th March), retrieving the data from Our World in Data (<https://ourworldindata.org/coronavirus-data>). To avoid confusion between these COVID-19 data and countries’ population size, we downloaded data on cases and deaths per million citizens. Finally, to ensure normal distribution, we log-transformed cases and deaths.

2.3. Analysis strategy

To reduce the influence of cross-cultural response sets on our data, we used procedures outlined by Van de Vijver and Leung (1997), previously used in other research (see Gelfand et al., 2011). Response sets

vary across nations, such that individuals in some nations are more likely to provide extreme responses to survey items than in others (Gelfand, Raver, & Ehrhart, 2008; Gelfand et al., 2011; Van De Vijver & Leung, 1997). Thus, we applied a within-subject standardization procedure that adjusts the scores for each individual participant using the mean for that single individual across all variables (Hofstede, 1980; Van De Vijver & Leung, 1997). To do so, a grand mean was first calculated. We then standardized all items by subtracting each item from this grand mean to obtain the standardized item scores.

Predictions were tested using multilevel and SEM models that treated participants as nested within countries. We used group-centered predictors to examine between-person variation within countries (Enders & Tofighi, 2007). First, we estimated mixed models to examine the main effect of concern with COVID-19 on desire for tightness and on attitudes towards immigrants. We examined both cross-sectional (using only baseline data) and longitudinal effects. These mixed models accounted for differences across countries using random intercepts and were run using maximum likelihood (ML) estimation. Desire for tightness was measured during the baseline assessment and the 5th wave, six weeks later. Attitudes towards immigrants were measured during both baseline and the 7th wave, eight weeks later.

We then performed SEM models to test the mediational role of desire for tightness using *Mplus* version 8.2 (Muthen & Muthen, 1998–2017). Data were clustered by participants' country. We tested two mediational models, one with all variables at the baseline and another longitudinal one with the predictor at the baseline, mediator at wave 5 and outcome at wave 7. Full information maximum likelihood (FIML) was used to address missing data associated with covariates (Enders, 2010). To examine the indirect effects, we used the default method in *Mplus* (i.e., delta method standard errors for the indirect effects).

3. Results

3.1. Cross-sectional effects

Descriptive statistics for study variables (concern with COVID-19 threat, desire for tightness, and negative attitudes towards immigrants) and mean differences between them for each country are presented in Table 2.

We found a significant positive main effect of individuals' concern with COVID-19 on desire for tightness ($\beta = .03$, $SE = .003$, $t = 7.21$, $p < .001$, [95% CI = .019 .034]) and a significant positive main effect on attitudes towards immigrants ($\beta = .05$, $SE = .003$, $t = 15.16$, $p < .001$, [95% CI = .046.060]). Thus, greater concern with COVID-19 was significantly associated with greater desire for tightness and with more negative attitudes towards immigrants. All effects were obtained by controlling for covariates.

Next, we tested the direct and indirect effects of concern with COVID-19 on attitudes towards immigrants, through desire for tightness, and controlling for participants' age, gender, and education, as well as COVID-19 cases and deaths. The results of the path model revealed an appropriate fit to the data ($\chi^2 = 9.261$, $df = 5$, $p < .001$, CFI = .973, RMSEA = .004 [90% CI = .000, .009], SRMR = .021). The results (see Figure 1) showed that higher concern with COVID-19 was significantly related to greater desire for tightness ($\beta = .04$, $SE = .011$, $p < .001$) and greater desire for tightness was significantly associated with negative attitudes towards immigrants ($\beta = .12$, $SE = .024$, $p < .001$). Most importantly, there was a significant indirect effect of concern with COVID-19 on attitudes towards immigrants through desire for tightness (Indirect effect = .010, $SE = .002$, $p = .008$). A significant direct effect of concern with COVID on attitudes towards immigrants was also found ($\beta = .06$, $SE = .009$, $p < .001$), indicating that the desire for tightness partially mediated the relationship between concern with COVID-19 and attitudes towards immigrants.

Results of the models without covariates are available in the Supplementary Materials.

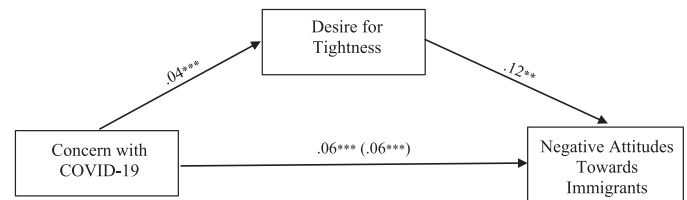


Fig. 1. Effects of concern with COVID-19 threat (baseline) on negative attitudes towards immigrants (baseline) via desire for tightness (baseline).

Note. Data were clustered by participants' countries. All coefficients are standardized. Total effect is in brackets. * $p < .05$; ** $p < .01$; *** $p < .001$.

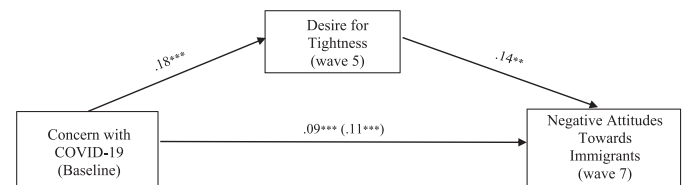


Fig. 2. Longitudinal model of concern with COVID-19 (baseline) on attitudes towards immigrants (wave 7) via desire for tightness (wave 5).

Note. Data were clustered by participants' countries. All coefficients are standardized. * $p < .05$; ** $p < .01$; *** $p < .001$.

3.2. Longitudinal model

Descriptive statistics for study variables and mean differences between variables for each country are presented in Table 3.

The next set of mixed models examined predictive effects of concern with COVID-19 measured during the baseline assessment on desire for tightness measured six weeks later at wave 5 and attitudes towards immigrants measured eight weeks later at wave 7.

Tables 4 and 5 summarize the results obtained in the mixed models. We found a significant positive main effect of individuals' concern with COVID-19 on desire for tightness at wave 5 ($\beta = .11$, $SE = .017$, $p < .001$), and a significant positive effect on attitudes towards immigrants at wave 7 ($\beta = .03$, $SE = .011$, $p = .006$). Thus, higher concern with COVID-19 in an earlier stage of the pandemic directly predicted both greater desire for tightness and negative attitudes towards immigrants later in time. The effects were obtained by controlling for age, gender, and education, as well as number of COVID-19 cases and deaths. Furthermore, since prior levels of mediator and outcome could be confounding variables (Cole & Maxwell, 2003; Gollob & Reichardt, 1991), we also controlled for both variables measured at the baseline.

Afterwards, we examined direct and indirect effects of the predictor (concern with COVID-19) measured at baseline on mediator (desire for tightness) measured at wave 5 and outcome (attitudes towards immigrants) measured at wave 7, controlling for covariates. The results of the path model revealed an appropriate fit to the data ($\chi^2 = 15.826$, $df = 5$, $p < .001$, CFI = .917, RMSEA = .043 [90% CI = .024, .064], SRMR = .019). The results (see Figure 2) showed that greater desire for tightness was significantly predicted by previous greater concern with COVID-19 ($\beta = .18$, $SE = .031$, $p < .001$), and negative attitudes towards immigrants were significantly predicted by previous greater desire for tightness ($\beta = .14$, $SE = .038$, $p < .001$). Importantly, there was a significant indirect effect of concern with COVID-19 on attitudes towards immigrants through the desire for tightness (Indirect effect = .03, $SE = .010$, $p = .012$). We also found a significant direct effect of concern with COVID-19 threat on attitudes towards immigrants ($\beta = .09$, $SE = .019$, $p < .001$), meaning that desired tightness partially mediated the relationship between concern with COVID-19 and attitudes towards immigrants.

Results of the longitudinal models without covariates are available in the Supplementary Materials.

Table 2
Descriptive statistics for study variables (Baseline).

Country	N	Concern with COVID-19 M(SD)	Desire for Tightness M(SD)	(Negative) Attitudes Towards Immigrants M(SD)
Algeria	170	4.11 (1.22)	5.17 (2.61)	5.05 (1.91)
Argentina	1259	3.92 (1.18)	6.61 (2.07)	4.07 (2.06)
Australia	950	3.76 (1.18)	5.58 (2.01)	4.03 (2.19)
Bangladesh	125	4.28 (1.04)	6.18 (2.34)	4.61 (1.76)
Brazil	1308	4.35 (.97)	5.59 (1.95)	3.80 (2.04)
Canada	1180	3.93 (1.13)	6.00 (2.03)	3.62 (2.21)
Chile	320	3.98 (1.06)	6.26 (2.05)	2.95 (1.64)
China	1439	2.88 (1.71)	4.78 (1.58)	5.69 (1.69)
Croatia	340	3.44 (1.14)	6.20 (1.78)	4.28 (1.88)
Egypt	979	4.02 (1.21)	4.70 (2.12)	4.29 (1.86)
France	1600	3.59 (1.22)	6.04 (2.06)	4.60 (2.32)
Germany	1488	3.26 (1.17)	5.97 (1.86)	4.38 (2.11)
Greece	2736	4.28 (.99)	6.03 (1.96)	4.65 (2.28)
Hong Kong S.A.R.	136	3.62 (1.16)	5.45 (1.49)	5.17 (1.78)
Indonesia	2255	3.95 (1.36)	5.77 (1.89)	4.80 (1.81)
Iran	247	4.48 (.75)	5.95 (2.11)	4.87 (1.77)
Italy	1867	4.27 (.98)	6.57 (2.24)	4.37 (2.29)
Japan	1268	4.16 (.93)	5.09 (1.45)	4.50 (1.62)
Kazakhstan	774	3.43 (1.24)	5.91 (2.00)	4.53 (1.62)
Kosovo	724	3.04 (1.36)	5.13 (1.93)	3.70 (1.91)
Malaysia	670	3.85 (1.18)	5.54 (1.92)	4.49 (1.64)
Netherlands	2108	3.91 (1.14)	5.77 (1.83)	4.10 (1.96)
Pakistan	595	3.52 (1.20)	5.14 (1.94)	4.40 (1.89)
Peru	288	4.02 (1.04)	6.97 (1.88)	4.37 (1.81)
Philippines	1403	4.16 (1.09)	5.49 (1.76)	4.18 (1.80)
Poland	680	3.57 (1.31)	5.44 (1.97)	3.66 (1.83)
Republic of Serbia	1984	3.38 (1.24)	5.43 (2.18)	5.68 (2.19)
Romania	2583	4.34 (.99)	5.96 (2.16)	4.58 (1.97)
Russia	1402	3.72 (1.14)	5.84 (1.89)	5.53 (1.79)
Saudi Arabia	1089	3.79 (1.23)	5.16 (2.29)	3.94 (2.18)
Singapore	200	3.96 (1.13)	6.07 (1.61)	3.22 (1.55)
South Africa	1314	4.22 (1.07)	5.77 (2.13)	4.68 (2.06)
South Korea	1388	3.98 (1.01)	6.01 (1.66)	4.42 (1.56)
Spain	2930	3.79 (1.16)	6.62 (2.07)	3.70 (1.97)
Taiwan	109	3.95 (1.21)	5.19 (1.63)	3.59 (1.46)
Thailand	154	3.18 (1.66)	4.80 (1.83)	4.69 (1.33)
Turkey	1648	4.35 (1.01)	6.78 (2.18)	5.53 (2.10)
Ukraine	1377	3.66 (1.27)	6.22 (1.92)	4.77 (1.76)
United Kingdom	1622	4.02 (1.08)	5.63 (2.08)	3.79 (2.21)
USA	10067	4.04 (1.07)	5.28 (2.13)	3.42 (2.06)
Vietnam	239	3.22 (1.40)	6.37 (1.59)	4.10 (1.41)

Table 3
Descriptive statistics for study variables (wave 5 and wave 7).

Country	N	Concern with COVID-19 M(SD)	Desire for Tightness (wave 5) M(SD)	(Negative) Attitudes Towards Immigrants (wave 7) M(SD)
France	146	3.67 (1.24)	6.20 (1.86)	4.13 (2.36)
Germany	190	3.31 (1.26)	5.77 (1.78)	4.37 (1.95)
Greece	238	4.40 (0.96)	6.16 (1.66)	4.65 (2.16)
Italy	174	4.35 (1.00)	6.40 (1.93)	4.41 (2.39)
Netherlands	272	4.02 (1.05)	5.76 (1.69)	4.01 (2.11)
Republic of Serbia	178	3.38 (1.32)	5.46 (1.82)	4.93 (2.12)
Romania	127	4.49 (0.96)	6.32 (1.75)	4.05 (1.93)
Spain	442	3.80 (1.21)	6.53 (1.64)	3.33 (1.79)
United Kingdom	218	4.09 (1.16)	6.02 (1.77)	3.78 (2.12)
USA	364	3.97 (1.20)	5.42 (1.81)	3.18 (2.11)

Table 4
Predictive effects of concern with COVID-19 threat (Baseline) on desire for tightness (Wave 5).

Predictor	β	SE	t	p	95% CI
Concern with COVID-19	.11	.017	6.63	< .001	.081 .148
Desire for Tightness (Baseline)	.41	.019	21.73	< .001	.373 .447

4. Discussion

We predicted and found that across 41 nations, individuals' concern with the COVID-19 threat was positively correlated with their desire for tighter rules, which was, in turn, associated with negative attitudes towards immigrants. While these results were cross-sectional, we extended them with a longitudinal model which enabled us to show a link between the variables of interest and attitudes towards immigrants. Results showed that higher concern with COVID-19 in an earlier stage of

Table 5
Predictive effects of concern with COVID-19 threat (Baseline) on attitudes towards immigrants (wave 7).

Predictor	β	SE	t	p	95% CI
Concern with COVID-19	.03	.011	2.78	.006	.010 .051
(Negative) Attitudes towards Immigrants (Baseline)	.81	.012	66.79	< .001	.784 .831

the pandemic, in March 2020, predicts an increased desire for tightness and negative attitudes towards immigrants later in time, at the beginning of May 2020 and in the middle of May 2020 respectively. Our findings highlighted that desired tightness can be, as previously found (e.g., Jackson et al., 2019), a mediator between perceived threat and prejudiced attitudes. However, as the effects of two partial mediations showed, desire for tightness may not be the only mediator capable of explaining the direct relationship between threat and prejudice. It would be interesting to explore other possible variables in future studies.

Moreover, while our work theorizes desired tightness as a mediator, it is possible that it could also be activated after prejudiced attitudes increase. For example, in line with Tightness-Looseness theory, it could be plausible to hypothesize a sequential model in which threat may activate desired tightness, that would trigger prejudice, which, in turn, could yet again affect desire for tightness. Future researchers should keep in mind that the endorsement of tightness can eventually be not only an activator of increased xenophobia or increased prejudice, but also an outcome.

The current study complements previous research, which has largely been done on hypothetical threats (see Inbar et al., 2016 and Person et al., 2004 for exceptions), by examining individuals' perceptions, needs, and attitudes during a real world-wide pathogen threat. Specifically, in this study we focused on the perceived threat to the self. Future studies should consider the other facets of the COVID-19 threat (e.g., worry about other family members or significant others, concern about public health, etc).

Our findings are useful in order to gain a deeper understanding of the underlying mechanisms linking threat, desired tightness, and prejudice. Understanding the cultural and individual impact of the COVID-19 pandemic is extremely important to mitigate its effects. A strong desire for tight norms is extremely functional to cope with the pandemic situation, allowing individuals to better coordinate, adhere to social norms (e.g., COVID-19 restrictions), and avoid deviant behaviors. In support of this, Gelfand et al. (2021) recently showed that tight (vs loose) nations that have stricter norms and punishments for deviance are more successful in dealing with COVID-19 (i.e., limiting the number of cases and deaths).

Tightening social norms to help coordinate social action when groups face collective threats may be adaptive (Gelfand et al., 2011; Roos et al., 2015); yet this research shows that there are potentially negative consequences of these measures. Although important for minimizing virus transmission, tightening can be accompanied by negative attitudes and prejudice towards outgroups which, in the long-term, may easily lead to discrimination and injustice (Soral, Bilewicz, & Winiewski, 2018). Now more than ever, leaders need to help foster both order and openness—or what has been referred to as *tight-loose ambidexterity* (Gelfand, 2018) during times of collective threat. It is no coincidence that the countries that have promoted such balanced strategies the most are those that have handled Coronavirus the best. Among them we recognize the successful management of COVID-19 in Taiwan, New Zealand, and Singapore. These countries adopted clear and inclusive communication, emphasizing the *togetherness* (e.g., the “We’re all in this together” or “We’re a team of 5 million” messages adopted in New Zealand), and quickly tightened in the meanwhile (e.g., instituting border control policies, halting flights and ships, implementing widespread testing and country-wide lockdown). These early actions were crucial to increasing citizens' willingness to cooperate and, consequently, to these countries' success in containing the virus.

COVID-19 will probably not be the last disease menace our world will face. We all need to learn and implement these practices to deal with future threats.

Declaration of Competing Interest

Given their role as Editor, Gelfand M.J. had no involvement in the peer-review of this article and had no access to information regarding its peer-review. All other authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary data associated with this article can be found, in the online version, at [10.1016/j.cresp.2021.100028](https://doi.org/10.1016/j.cresp.2021.100028).

References

- Aktas, M., Gelfand, M.J., Hanges, P.J., 2016. Cultural Tightness–Looseness and Perceptions of Effective Leadership. *J. Cross-Cult. Psychol.* 47 (2), 294–309 <https://doi.org/10.1177/0022022115606802>.
- Aratani, L., 2020. Coughing while Asian': Living in fear as racism feeds off coronavirus panic. Racist incidents are increasing while Trump promotes racism by calling coronavirus 'the Chinese virus'. *The Guardian*. Available online at: <https://www.theguardian.com/world/2020/mar/24/coronavirus-us-asian-americans-racism>.
- Beauducel, A., Wittmann, W.W., 2005. Simulation study on fit indexes in CFA based on data with slightly distorted simple structure. *Struct. Eq. Model. Multidisciplin. J.* 12, 41–75 http://dx.doi.org/10.1207/s15328007sem1201_3.
- Burke, B.L., Martens, A., Faucher, E.H., 2010. Two decades of terror management theory: A meta-analysis of mortality salience research. *Pers. Soc. Psychol. Rev.* 14 (2), 155–195 <https://doi.org/10.1177/1088868309352321>.
- Chua, R.Y.J., Roth, Y., Lemoine, J.-F., 2015. The impact of culture on creativity: How cultural tightness and cultural distance affect global innovation crowdsourcing work. *Adm. Sci. Q.* 60 (2), 189–227 <https://doi.org/10.1177/0001839214563595>.
- Cikara, M., Bruneau, E.G., Saxe, R.R., 2011. Us and them: Inter-group failures of empathy. *Curr. Dir. Psychol. Sci.* 20 (3), 149–153 <http://dx.doi.org/10.1177/0963721411408713>.
- Cohn, S.K., 2012. Pandemics: waves of disease, waves of hate from the Plague of Athens to AIDS. *Histor. Res.* 85 (230), 535–555 <http://dx.doi.org/10.1111/j.1468-2281.2012.00603.x>.
- Cole, D.A., Maxwell, S.E., 2003. Testing mediational models with longitudinal data: questions and tips in the use of structural equation modeling. *J. Abnorm. Psychol.* 112 (4), 558 <http://dx.doi.org/10.1037/0021-843X.112.4.558>.
- Davidov, E., Meuleman, B., Cieciuch, J., Schmidt, P., & Billiet, J. (2014). Measurement equivalence in cross-national research. *Annual review of sociology*, 40. <http://dx.doi.org/10.1146/annurev-soc-071913-043137>
- De, S., Nau, D.S., Gelfand, M.J., 2017. Understanding norm change: An evolutionary game-theoretic approach. In: *AAMAS*, pp. 1433–1441 Retrieved from.
- Enders, C.K., 2010. *Applied missing data analysis*. Guilford press, New York, NY.
- Enders, C.K., Tofighi, D., 2007. Centering predictor variables in cross-sectional multilevel models: a new look at an old issue. *Psychol. Methods* 12 (2), 121 <http://dx.doi.org/10.1037/1082-989X.12.2.121>.
- Faulkner, J., Schaller, M., Park, J.H., Duncan, L.A., 2004. Evolved disease-avoidance mechanisms and contemporary xenophobic attitudes. *Group Processes & Intergroup Relations* 7 (4), 333–353 <https://doi.org/10.1177/1368430204046142>.
- Feldman, S., Stenner, K., 1997. Perceived threat and authoritarianism. *Political Psychology* 18 (4), 741–770 <http://dx.doi.org/10.1111/j.1751-2409.2011.01027.x>.
- Fritzsche, I., Jonas, E., Kessler, T., 2011. Collective reactions to threat: Implications for intergroup conflict and for solving societal crises. *Social Issues and Policy Review* 5 (1), 101–136 <https://doi.org/10.1111/j.1751-2409.2011.01027.x>.
- Gelfand, M.J., 2018. *Rule Makers, Rule Breakers: How Tight and Loose Cultures Wire Our World*. Scribner, New York.
- Gelfand, M.J., Jackson, J.C., Pan, X., Nau, D., Pieper, D., Denison, E., ... Wang, M., 2021. The relationship between cultural tightness–looseness and COVID-19 cases and deaths: a global analysis. *The Lancet Planetary Health*.
- Gelfand, M.J., Raver, J.L., Ehrhart, K.H., 2008. Methodological Issues in Cross-Cultural Organizational Research. In: Rogelberg, S. (Ed.), *Handbook of research methods in industrial and organizational psychology*, pp. 216–246 <http://dx.doi.org/10.1002/9780470756669.ch11>.

- Gelfand, M.J., Raver, J.L., Nishii, L., Leslie, L.M., Lun, J., Lim, B.C., ... Aycan, Z., 2011. Differences between tight and loose cultures: A 33-nation study. *Science* 332 (6033), 1100–1104 <https://doi.org/10.1126/science.1197754>.
- Gollob, H.F., Reichardt, C.S., 1991. Interpreting and estimating indirect effects assuming time lags really matter. In: Collins, L.M., Horn, J.L. (Eds.), *Best methods for the analysis of change: Recent advances, unanswered questions, future directions*. American Psychological Association, Washington, DC, pp. 243–259 <http://dx.doi.org/10.1037/10099-015>.
- Han, S., 2018. Neurocognitive basis of racial ingroup bias in empathy. *Trends Cogn. Sci.* 22 (5), 400–421 <http://dx.doi.org/10.1016/j.tics.2018.02.013>.
- Han, X., Gelfand, M.J., Wu, B., Zhang, T., Li, W., Gao, T., ... Wu, X., 2020. A neurobiological association of revenge propensity during intergroup conflict. *Elife* 9, e52014 <http://dx.doi.org/10.7554/eLife.52014>.
- Han, Q., Zheng, B., Leander, N. P., Agostini, M., ... & Bélanger, J. J. Impact of COVID-19 lockdowns on anti-migrant attitudes: A naturalistic quasi-experiment on pandemic scapegoating. (2020). Unpublished manuscript.
- Hofstede, G., 1980. *Culture's consequences*. Sage, Beverly Hills, CA.
- Inbar, Y., Westgate, E.C., Pizarro, D.A., Nosek, B.A., 2016. Can a naturally occurring pathogen threat change social attitudes? Evaluations of gay men and lesbians during the 2014 Ebola epidemic. *Soc. Psychol. Personal. Sci.* 7 (5), 420–427 <http://dx.doi.org/10.1177/1948550616639651>.
- Jackson, J.C., Gelfand, M., Ember, C.R., 2020. A global analysis of cultural tightness in non-industrial societies. *Proc. R. Soc. B* 287 (1930), 20201036 <https://doi.org/10.1098/rspb.2020.1036>.
- Jackson, J.C., van Egmond, M., Choi, V.K., Ember, C.R., Halberstadt, J., Balanovic, J., ... Fulop, M., 2019. Ecological and cultural factors underlying the global distribution of prejudice. *PLoS One* 14 (9) <https://doi.org/10.1371/journal.pone.0221953>.
- Jang, S., Kim, E.S., Cao, C., Allen, T.D., Cooper, C.L., Lapierre, L.M., ... Woo, J.M., 2017. Measurement invariance of the satisfaction with life scale across 26 countries. *J. Cross-Cult. Psychol.* 48 (4), 560–576 <http://dx.doi.org/10.1177/0022022117697844>.
- Kenny, D.A., Kaniskan, B., McCoach, D.B., 2015. The performance of RMSEA in models with small degrees of freedom. *Sociological Methods and Research* 44, 486–507 <https://doi.org/10.1177/0049124114543236>.
- Kline, R.B., 2015. *Principles and practice of structural equation modeling*. Guilford publications.
- Kteily, N., Hodson, G., Bruneau, E., 2016. They see us as less than human: Metadehumanization predicts intergroup conflict via reciprocal dehumanization. *J. Pers. Soc. Psychol.* 110 (3), 343 <http://dx.doi.org/10.1037/pspa0000044>.
- Lemay, E., Kruglanski, A. W., Molinaro, E., Agostini, M., ... & Leander, P. (2020). The role of values in coping with health and economic threats of COVID-19. Unpublished manuscript.
- Marcus, G.E., Theiss-Morse, E., Sullivan, J.L., Wood, S.L., 1995. *With malice towards some: How people make civil liberties judgments*. Cambridge University Press.
- Margolin, J., 2020. FBI warns of potential surge in hate crimes against Asian Americans amid coronavirus. ABC News. Available online at <https://abcnews.go.com/US/fbi-warns-potential-surge-hate-crimes-asian-americans/story?id=69831920>.
- Muthén, L.K., Muthén, B.O., 1998. *Mplus user's guide*, 8th ed. -2017. Muthén & Muthén, Los Angeles, CA.
- Navarrete, C.D., Fessler, D.M., 2006. Disease avoidance and ethnocentrism: The effects of disease vulnerability and disgust sensitivity on intergroup attitudes. *Evol. Hum. Behav.* 27, 270–282. <https://doi.org/10.1016/j.evolhumbehav.2005.12.001>.
- Parmet, W.E., Sinha, M.S., 2017. A panic foretold: Ebola in the United States. *Critical Public Health* 27 (1), 148–155 <https://doi.org/10.1080/09581596.2016.1159285>.
- Person, B., Sy, F., Holton, K., Govert, B., & Liang, A. (2004). Fear and stigma: The epidemic within the SARS outbreak. *Emerging Infectious Diseases*. 10, 358–363. <https://doi.org/10.3201/eid1002.030750>
- Proulx, T., Inzlicht, M., Harmon-Jones, E., 2012. Understanding all inconsistency compensation as a palliative response to violated expectations. *Trends Cogn. Sci.* 16 (5), 285–291 <http://dx.doi.org/10.1016/j.tics.2012.04.002>.
- Roos, P., Gelfand, M., Nau, D., & Lun, J. (2015). Societal threat and cultural variation in the strength of social norms: An evolutionary basis. *Organizational Behavior and Human Decision Processes*. 129, 14–23. <https://doi.org/10.1016/j.obhdp.2015.01.003>
- Rutkowski, L., Svetina, D., 2014. Assessing the hypothesis of measurement invariance in the context of large-scale international surveys. *Educ. Psychol. Measure.* 74, 31–57 <http://dx.doi.org/10.1177/0013164413498257>.
- Schaller, M., Neuberg, S.L., 2012. Danger, disease, and the nature of prejudice (s). In *Advances in experimental social psychology*. Academic Press 46, 1–54 <http://dx.doi.org/10.1016/B978-0-12-394281-4.00001-5>.
- Soral, W., Bilewicz, M., Winiewski, M., 2018. Exposure to hate speech increases prejudice through desensitization. *Aggress. Behav.* 44 (2), 136–146 <http://dx.doi.org/10.1002/ab.21737>.
- Sorokowski, P., Groyecka, A., Kowal, M., Sorokowska, A., Białek, M., Lebeda, I., ... Karwowski, M., 2020. Can information about pandemics increase negative attitudes toward foreign groups? A case of COVID-19 outbreak. *Sustainability* 12 (12), 4912 <http://dx.doi.org/10.3390/su12124912>.
- Stenzel, N.M., Vaske, I., Kuehl, K., Kenn, K., Rief, W., 2015. Prediction of end-of-life fears in COPD—hoping for the best but preparing for the worst. *Psychology & Health* 30 (9), 1017–1034 <http://dx.doi.org/10.1080/08870446.2015.1014816>.
- Van de Vijver, F.J., Leung, K., 1997. *Methods and data analysis for cross-cultural research*. Sage (Vol. 1).
- Yamagata, M., Teraguchi, T., & Miura, A. (2020). The Relationship between Infection Avoidance Tendency and Exclusionary Attitudes towards Foreigners: A Case Study of the COVID-19 Outbreak in Japan. *PsyArXiv*. <https://doi.org/10.31234/osf.io/vhrqn>.