Determinants of self-reported adherence to COVID-19 regulations in Spain: social norms, trust and risk perception

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Summary
Failure of individuals to voluntarily observe regulations and recommendations around mitigating COVID-19 (e.g. social distancing; frequent handwashing) is often cited as a reason why some countries struggled to curtail the spread of the virus. Understanding the factors that are associated with people’s willingness to comply with COVID-19 regulations and recommendations is an important step in helping policy makers and health officials reduce the impact of this (and future) pandemics. In the current study we examined this question in one of the countries hardest hit by the pandemic: Spain. A large, representative survey (N = 2100) revealed that several factors were positively associated with willingness to comply to COVID-19 regulations and recommendations. In decreasing order of predictive value, these were: (i) perceptions of whether friends and family were complying (i.e. norms), (ii) trust in science as a basis for lawmaking, (iii) perceived effectiveness of regulations and (iv) perception of risk of infection. These results point to the importance of influencing social norms as the primary way to improve adherence to the health regulations of COVID-19; more important than intrapsychic considerations such as efficacy and risk.

Lay summary
Responding effectively to a pandemic such as COVID-19 requires citizens to voluntarily comply with certain recommendations and regulations; for example, social distancing and frequent handwashing. The current study examined a large, representative sample of over 2000 residents of Spain to find out what factors are associated with compliance (or non-compliance) with COVID-19 regulations and recommendations. The factor most closely associated with compliance was perceptions of whether friends and family were complying (i.e. the ‘social norm’). The second most important factor was trust in science as a basis for lawmaking. Two psychological factors that are normally considered important in driving health behaviours—perceived effectiveness of regulations and perception of risk of infection—had a much weaker relationship with compliance behaviours. The data suggest that social norms are a more important driver of compliance behaviour than individualistic, cost-benefit analyses such as whether the recommended strategies are perceived to be effective in reducing virus spread, and whether people feel they are personally at risk of contracting SARS-CoV-2. In sum, the results point to the importance of influencing social norms as a key way to improve adherence to health regulations associated with COVID-19.

Keywords: COVID-19, norms, trust in science, risk perceptions, health behaviour

INTRODUCTION
In most of the world, people’s lives have been strongly affected in 2020 by governmental policies aimed at the reduction of COVID-19’s spread and impact. Although the majority of people have followed these regulations, there have been reported violations of lockdown measures by individuals and groups, especially after the easing of lockdown regulations. Risk mitigation guidance—including self-quarantine and social distancing measures—cannot be implemented entirely through intimidation, especially in democratic societies. Failure of individuals to voluntarily observe regulations and
recommendations around mitigating COVID-19 is often cited as a reason why some countries have been observing further waves of infections.

In the current study we seek to understand why certain individuals are more likely to comply with COVID-19 regulations such as handwashing and social distancing. This paper focuses on two classes of factors that can influence people’s adherence to measures intended to stop the spread of the novel coronavirus: social norms and perceived risk (Bavel et al., 2020).

One possibility is that people will be influenced by their perceptions of what important others are doing (e.g. friends and family). In the literature, this is typically referred to as a descriptive norm, and there are at least two reasons why they are presumed to be influential. First, the perception that the majority of important others is doing a behaviour increases the conformity pressures around the behaviour (i.e. people fear judgement for behaving in a non-normative way). Second, the perception that the majority of important others is doing a behaviour can operate as a form of ‘social proof’: it is construed as information that this behaviour is the right or true course of action [the ‘consensus implies correctness’ heuristic (Cialdini and Goldstein, 2004)]. Given this, norms play a central role in many theories of decision-making, including the theory of planned behaviour (Ajzen, 1991), social identity theory (Turner, 1991) and norm focus theory (Cialdini et al., 1991). Examined in a diverse range of health and social science disciplines, it has become a favoured tool for increasing population compliance to collective challenges (Nyborg et al., 2016). In the context of health research, interventions that focus on social norms have been found effective to promote preventive behaviours such as handwashing (Judah et al., 2009; Updegraff et al., 2011; Dickie et al., 2018).

A second class of variables is individuals’ cost-benefit analyses about the extent to which observing COVID-19 regulations will reduce personal risk. For example, individuals may weigh up the level of threat presented by the disease; their perceived vulnerability to SARS-CoV-2 infection. As part of this mental algorithm, people may also weigh up the extent to which a course of action will have its intended effect [referred to in protection motivation theory as response efficacy (Maddux and Rogers, 1983)]. For example, people may factor in their perceptions of how likely it is that wearing a mask will reduce their chances of contracting COVID-19.

Finally, individuals may do so in an information climate that has increasingly called into question the role of science as the basis for lawmaking. Although trust in science (and scientists) is relatively high, political and ideological agendas have led to campaigns of misinformation around certain contentious scientific issues [e.g. COVID-19, vaccinations, climate change (Oreskes and Conway, 2010; Kahan et al., 2011; Horsey and Fielding, 2017)]. Doubting the science behind evidence-based policy-making could potentially erode people’s willingness to believe they are susceptible to infection, and/or their perception that risk-mitigation behaviours would be effective.

Together, these variables share a similar assumption: that human behaviour is oriented around a cost-benefit analysis, in which humans weigh the potential negative consequences of adopting such behaviours against the potential benefits. Several influential theories of health behaviour—including the health belief model (Becker, 1974), the extended parallel processing model (Witte, 1992, 1994), and protection motivation theory (Maddux and Rogers, 1983)—have this as a core assumption, and there is considerable evidence that threat and response efficacy do indeed play a role in shaping health behaviour.

This study summarizes results of a survey designed to explain and predict non-mandated (voluntary) compliance with guidance pertaining to the spread of the novel coronavirus (COVID-19). The two behaviours we seek to predict are social distancing and handwashing. The predictor variables are (i) social norms (i.e. the extent to which people perceive that friends and family were complying with COVID-19 regulations), (ii) perceived vulnerability (i.e. perceived risk of contagion), (iii) response efficacy (i.e. the perception of the effectiveness of various COVID-19 guidelines) and (iv) the belief that science is the best basis for developing laws and regulations. In examining the predictive value of these predictors, we controlled for various sociodemographic factors: age, gender, education, having children and employment status.

Each of our four variables of interest have previously been linked to health behaviours, and they are supported by a strong theoretical and empirical tradition. As such—and given the high levels of statistical power associated with a sample of 2100 people—we hypothesized that willingness to comply to COVID-19 guidelines would be positively associated with all four predictor variables: (i) perceptions that friends and family are complying, (ii) perceptions of vulnerability, (iii) response efficacy and (iv) belief in science as a basis for policy.

Perhaps of more relevance, the current study allows us to quantify the extent to which each of these factors are associated with compliance behaviours. If one class of predictors explains a larger proportion of variance than others, then it helps guide science communicators, governments and public health officials determine which psychological ‘levers’ to pull to increase compliance with recommendations around this pandemic (and potentially those in the future).
MATERIALS

Sampling

This research uses part of the first Survey on the Social Perception of the Scientific Aspects of COVID-19 Pandemic, conducted by the Spanish Foundation for Science and Technology and the Ministry of Science. Between 25 June and 15 July 2020, a total of 2100 telephone interviews (CATI) were carried out on people who had been residents in Spain for 5 or more years and were 18 years of age or older. No incentives were offered to encourage participation.

The sampling design was stratified by region and municipalities size. The phone numbers were randomly generated using the official prefixes for the landlines (75%). Consistent with the growth of cell-only population in the last years, one-quarter (25%) of the sample was made to cell-only households. Survey respondents were selected within the household using gender and age quotas. The sampling error for the total sample is ±2.2% for a confidence level of 95.5% and an estimate of 50%, with the assumption of simple random sampling.

Measures

Perceived level of compliance was measured with regard to two domains: social distancing and hand-washing. Compliance with social distancing was measured with the question ‘To what extent would you say that you practice social distancing?’ while compliance to the handwashing recommendation was based on the question ‘To what extent would you say that you follow the recommendation of washing your hands frequently?’. Respondents answered these questions using a 7-point scale with ‘not at all’ and ‘totally’ endpoints.

Social norms were measured with two items ‘My family and friends avoid social contact’ and ‘I see my family and friends washing their hands frequently’. The former measured perceived social norms around social distancing while the latter assessed perceived social norms regarding handwashing. These questions were answered using a 7-point scale (1 = strongly disagree to 7 = strongly agree).

Perceived effectiveness was measured with a question where respondents were asked to assess the level of effectiveness of different regulations to reduce the spread of COVID-19 (‘Please evaluate the effectiveness of the following measures to prevent the spread and infection of the new coronavirus’). Among these items we selected the one referred to ‘Social distancing’ and the one about ‘Washing hands for 20 seconds’. Respondents evaluated these items in a 7-point continuum from ‘not at all effective’ to ‘very effective’.

Perceived risk was measured using two survey items: ‘What would be the probability of you getting infected with the new coronavirus?’ (1 = very unlikely to 7 = very likely) and ‘To what extent would you say that getting the new coronavirus would be serious for you?’ (1 = not at all serious to 7 = very serious). The two items were reliably correlated and so were combined into a single scale ($r = 0.31, p < 0.001$).

Trust in science was measured with a single item: ‘Science is the best basis for lawmaking’. Respondents were asked about the level of agreement with the sentence using a 7-point scale (1 = strongly disagree, 7 = strongly agree).

Finally, a set of control variables were selected for the regression models. These include age, gender (1 = male, 2 = female), parental status (‘Do you have children?’ 0 = no, 1 = yes), education (1 = don’t know how to read, 6 = higher education) and whether the respondent was self-employed (0 = no, 1 = yes). Table 1 presents a summary of the variables.

Models

In order to examine which variables uniquely predicted compliance, we ran a set of OLS multiple regression models with stated adherence to regulations as the outcome variable. We tested two models. Model 1 used self-reported compliance with social distancing as the outcome variable. The predictor variable measuring social norms was based on the item ‘My family and friends avoid social contact’ while the measure of perceived effectiveness referred specifically to social distancing. The Model 2 outcome was self-reported adherence to handwashing. Social norms were measured with the statement ‘I see my family and friends washing their hands frequently’ and perceived effectiveness was based on the evaluations of the item ‘Washing hands for 20 seconds.’ Both models also included the measures of trust in science, perceived risk and the control variables described above.

Treatment of missing data

Overall, 9.4% of the sample had missing values on at least one variable (Figure 1). Analysis of the missing patterns shows that four variables present a significant level of missingness: trust in science, perceived risk, and both of the social norms measures. Moreover, the likelihood of these factors being observed is correlated with other variables in the study, which makes it plausible that the data is missing at random (i.e. other observed variables in the study can explain the missing data mechanism). To handle missing data, we used multiple imputation. This technique consists in producing a number of complete data sets, each composed of a series of plausible values that replace the missing ones. The models are then run on each of the complete data sets and combined to provide a final estimate (Carpenter and Kenward, 2012; van Buuren, 2018).
We generated 10 complete datasets (more information about the multiple imputation model can be found in Supplementary Appendix).

**RESULTS**

Table 2 shows the matrix of bivariate correlations among the key measures. In order of magnitude, high levels of regulation compliance were associated with greater perceptions that family and friends were complying (social norms); greater trust in science as a basis for lawmaking; greater perceived effectiveness of COVID-19 regulations; being a parent; being older; perceiving high risk; being relatively low-educated; and not being self-employed. The only variable that was not reliably associated with compliance was gender.

Table 3 shows the regression standardized coefficients using multiple imputation to deal with the missing values. For the sake of transparency, all regressions were repeated using both the multiple imputation strategy and the complete case strategy. The pattern of prediction was the same regardless of which technique was used.

In the two models, compliance with prevention measures by family and friends showed the strongest effect, followed by trust in science as the basis for lawmaking. This common pattern is not found for the effect of perceived effectiveness, which was lower in the case of social distancing compared to handwashing. In the same vein, perceived risk of contagion with SARS-CoV-2 was associated with the adherence to social distancing (Model 1), but it was not to the adherence to handwashing (Model 2).
**Table 2: Correlations among measures**

| Measure                          | 1. Compliance (SD) | 2. Compliance (HW) | 3. Gender | 4. Age | 5. Education | 6. Parental status | 7. Self-employed | 8. Trust in science | 9. Perceived effectiveness (SD) | 10. Perceived effectiveness (HW) | 11. Perceived risk | 12. Social norms (SD) | 13. Social norms (HW) |
|---------------------------------|--------------------|--------------------|-----------|--------|-------------|-------------------|-------------------|---------------------|----------------------------|----------------------------|----------------|----------------|------------------|
| 1. Compliance (SD)             | —                  | 0.55***            | 0.00      | 0.16***| −0.10***    | 0.21***           | −0.06**           | 0.30***             | 0.19***                  | 0.17***                   | 0.15***| 0.41***        | 0.42***         |
| 2. Compliance (HW)             | 0.55***            | —                  | 0.01      | 0.18***| −0.04       | 0.19***           | 0.01              | 0.00                | 0.39***                  | 0.26***                   | 0.06***| 0.26***        | 0.46***         |
| 3. Gender                      | 0.00               | −0.01              | —         | 0.05*  | −0.06**     | 0.49***           | 0.01              | 0.01                | −0.03                    | −0.05*                    | 0.02              | 0.01            | 0.01          |
| 4. Age                         | 0.16***            | 0.18***            | 0.05*     | —      | −0.33***    | 0.01              | 0.01              | 0.00                | 0.00                     | 0.00                     | 0.03              | 0.02            | 0.01          |
| 5. Education                   | −0.10***           | −0.04              | −0.06**   | −0.33***| —          | 0.49***           | 0.01              | 0.01                | 0.06**                   | 0.00                     | 0.03              | 0.02            | 0.01          |
| 6. Parental status             | 0.21***            | 0.19***            | 0.01      | 0.49***| 0.19***     | −0.19***          | 0.01              | 0.01                | 0.03                     | 0.07***                  | 0.02              | 0.04            | 0.01          |
| 7. Self-employed               | −0.06**            | −0.03              | −0.06***  | −0.04  | 0.01        | 0.49***           | 0.01              | 0.01                | −0.03                    | −0.05*                    | 0.02              | 0.02            | 0.01          |
| 8. Trust in science            | 0.30***            | 0.39***            | −0.03     | 0.00   | −0.04       | 0.00              | 0.03              | 0.03                | 0.06**                   | 0.26***                  | 0.03              | 0.05*           | 0.01          |
| 9. Perceived effectiveness (SD)| 0.19***            | 0.18***            | 0.02      | −0.01 | 0.00        | 0.00              | 0.03              | 0.03                | 0.07***                  | 0.26***                  | 0.16***| 0.27***        | 0.42***         |
| 10. Perceived effectiveness (HW)| 0.17***           | 0.26***            | 0.02      | −0.05*| 0.03        | 0.00              | 0.03              | 0.03                | 0.02                     | 0.26***                  | 0.16***| 0.05*          | 0.46***         |
| 11. Perceived risk             | 0.15***            | 0.06***            | −0.07*    | −0.17***| −0.02      | −0.02             | 0.03              | 0.02                | 0.16***                  | 0.06*                    | 0.16***| 0.27***        | 0.13***         |
| 12. Social norms (SD)          | 0.41***            | 0.26***            | −0.01     | 0.01   | −0.09***    | 0.05*             | 0.02              | 0.02                | 0.27***                  | 0.18***                  | 0.12***| 0.12***        | 0.52***         |
| 13. Social norms (HW)          | 0.42***            | 0.46***            | −0.03     | 0.01   | 0.01        | 0.06*             | −0.01             | 0.01                | 0.35***                  | 0.17***                  | 0.21***| 0.13***        | 0.17***         |

Note: SD, social distancing; HW, handwashing. Gender was coded such that 0 = male, 1 = female; parental status was coded such that 0 = no children, 1 = children; self-employed was coded such that 0 = no, 1 = yes.

* *p < 0.05, ** *p < 0.01, *** *p < 0.001.
Table 3: Regression models

|                      | (Model 1) Social distancing | (Model 2) Handwashing |
|----------------------|----------------------------|-----------------------|
| **B (SE)**           | **B (SE)**                  |
| Gender (0 = male, 1 = female) | 0.016 (0.019) | 0.008 (0.018) |
| Age                  | 0.131*** (0.023) | 0.145*** (0.023) |
| Education            | −0.031 (0.020) | 0.020 (0.020) |
| Parental status (0 = no children, 1 = has children) | 0.099*** (0.021) | 0.074*** (0.021) |
| Self-employed (0 = no, 1 = yes) | −0.059** (0.019) | −0.013 (0.018) |
| Trust in science     | 0.188*** (0.020) | 0.230*** (0.020) |
| Perceived effectiveness | 0.057*** (0.019) | 0.117*** (0.019) |
| Perceived risk       | 0.086*** (0.020) | −0.019 (0.020) |
| Social norms         | 0.339*** (0.020) | 0.340*** (0.020) |
| **F**                | 85.819                     | 99.272                |
| **p-value**          | 0.000                      | 0.000                 |
| **R^2**              | 0.273                      | 0.308                 |
| Observations         | 2100                       | 2100                  |
| Imputations          | 10                         | 10                    |

Note. B, unstandardized regression coefficients; SE, standard errors. **p < 0.01, *** p < 0.001.

Regarding sociodemographic variables, we observe a consistent positive effect of age: the older the person, the more likely they will comply with the regulation. There was also a consistent positive effect of having children. In the case of education [education was tested both as an ordinal and continuous variable to rule out a possible non-linear effect. The conclusions were consistent regardless the approach, so we decided to present the most parsimonious model (i.e. education as a continuous variable), we found no relationship with the adherence to the regulations once controlled by the other factors. Those self-employed were less likely to state a lower adherence to social distancing (Model 1); however, this effect was not observed in the case of handwashing (Model 2). No effect was observed for gender.

DISCUSSION

We drew on a large, representative sample of Spanish nationals to compare the extent to which various psychological factors predicted adherence to COVID-19 regulations. We focussed on two regulations that were key to controlling the spread of COVID-19: social distancing and handwashing. The results were clear: trust in science and social norms were uniquely predictive of individual adherence to COVID-19 regulations. Among these factors, social norms stood out as the most crucial variable predicting adherence to the studied COVID-19 regulation.

These findings remind us that people’s behaviour is often shaped by the perceptions of how relevant others are behaving. When friends and family are complying, it theoretically increases normative pressure to comply, and signals that compliance is the right or appropriate course of action (Jetten et al., 2020). In contrast, non-compliance from significant others releases the normative pressures to comply and increases ambiguity about whether compliance is the right and appropriate course of action (Jetten and Hornsey, 2014). Strikingly, this dynamic appears to shape compliance responses more than individualistic cost-benefit analyses about perceived risk of contracting SARS-CoV-2 (a finding that is consistent with Clark et al., 2020), and the efficacy of compliance in reducing that risk. For example, people’s perception of the severity of contracting the disease explained 1–2% of variance in their compliance with sanitary regulations. In contrast, social norms explained 13% of variance in people’s compliance.

Armed with this information, it is important to reflect on the health promotion implications for this (and future) pandemics. Obviously, clear and transparent information about risk and efficacy is a core feature of most health promotion interventions, and the current data are consistent with this. However, the current data do suggest that an exclusive focus on risk and efficacy may miss a powerful factor that shapes population compliance to health regulations: social norms. People are social creatures and the actions of valued others provides a powerful heuristic for how any one individual appraises the appropriate and expected way of behaving in a particular situation. Previous research has shown that messages about the normative climate can be very powerful ways of shaping behaviour in a range of domains [e.g. (Cialdini et al., 1991; Goldstein et al., 2008; Nyborg et al., 2016)] and the current data provides suggestive evidence that this pitch may be equally useful when it comes to adhering to health recommendations around pandemics.

One attraction of focussing on the normative context is that it is a variable that can be shaped by people at multiple levels across multiple sectors. Strong normative environments are created when there is community engagement and participation in planning; when there is a commitment to creating healthy settings (e.g. in schools, workplaces, municipalities); and
where communication messages tap into the socio-environmental context (Jackson et al., 2006). As made clear by the Ottawa Charter and subsequent WHO conferences, interventions that employ multiple strategies like this—operating at multiple levels—are especially effective in promoting population health [e.g. (Jackson et al., 2006)]. The fact that norms are by definition embedded within multiple systems—individual-, social- and population-level—means normative interventions potentially have a better chance of success.

The important role of norms also highlights the importance of avoiding unintentional backfire effects when it comes to communicating about behaviour. One common mistake is to communicate a prescriptive norm (a 'should' message) in a way that implies that compliance is low (e.g. pointing out lack of compliance with handwashing as an entrée to communicating the importance of handwashing). These types of prescriptive messages communicate negative information about descriptive norms that can inhibit compliance (Cialdini, 2003). It is important to avoid attacks on non-compliers that could send the signal that the behaviour is more common than it actually is (Steffens, 2020).

Over and above the role of norms, perceived risk and effectiveness also predicted self-reported adherence (but to a smaller degree). The perceived risk of contagion with SARS-CoV-2 was positively associated with keeping social distance from others; however, this was not the case with handwashing. The perceived effectiveness of the regulation was more predictive of self-reported handwashing than social distancing behaviours. The moderating effect of socio-structural factors could explain the differential effect of perceived effectiveness on stated adherence (Schiz et al., 2021). Some population subgroups, such as people in more deprived environments, might be less likely to comply with social distancing, although they believe it is an effective measure. For example, individuals from a more deprived background are more likely to commute to work on public transport or perform jobs where it is difficult to avoid contact with others (Lio et al., 2021). This interaction might be different for handwashing, where the perceived effectiveness and the stated adherence are more aligned. Trust in science as the basis for lawmaking was also a relevant predictor of compliance. In a context of crisis with uncertain (and even contradictory) information, lower levels of trust in science tend to erode compliance with public health directives. Recently, Plohl and Musil (Plohl and Musil 2020) identified the effect of trust in science in predicting compliance with COVID-19 prevention guidelines, measured with 14 items of the Trust in Science and Scientists Inventory (Nadelson et al., 2014). Our results are consistent with their recent study, as well as other studies stressing the role of trust in science in various social behaviours related with emotionally charged scientific issues, such as genetically modified foods (Deng and Hu, 2019), climate change (Hornsey et al., 2016), vaccination (Betsch et al., 2018; Hornsey et al., 2020), and the use of complementary and alternative medicine (Lobera and Rogero, 2020).

Additionally, the positive relationship between age and compliance with protection measures has serious implications for public health. International evidence on the effect of age on adherence to public health directives is inconsistent. While some studies indicate that age is an important factor in adhering to preventive measures against COVID-19 (Coroiu et al, 2020), other studies argue that age loses its predictive power once attitudes and beliefs are considered (Clark et al., 2020; Pedersen and Favero, 2020). Our findings are consistent with the idea that young people tend to comply less with COVID-19 regulations. Youngsters may have a stronger preference to socialize in person to seek and receive social support and facilitate feelings of belongingness (Isaac et al., 2021). Therefore, the design of safe alternative socialization for young people in times of pandemic should be an area of concern for public health research. In parallel, senior citizens could feel that COVID-19 is a collective threat and, regardless their individual risk perception, comply with the measures to a greater extent compared to the younger members of the population.

Moreover, greater protection for parents of young children may be an important factor, since schools are often considered to be COVID hotspots (Stein-Zamir et al., 2020). Encouraging parents to maintain greater prevention can have a multiplying effect by reducing child cases, in combination with other organizational measures within the school environment. To our knowledge, there are no studies that have evaluated the role of parental status in the adherence to regulations against COVID-19, so we hope that further studies will confirm this observation in other contexts.

A strength of the current study is that it draws on a representative sample of people in a nation that was one of the earliest to be hit by COVID-19. We acknowledge, however, that our conclusions are constrained by the measures that we inherited from the survey. Our measure of efficacy, for example, focused specifically on response efficacy. As such, we did not examine self-efficacy, or barriers and resources more generally, as explicated in models like the health belief model (Becker, 1974; Terry et al., 1999; Terry et al. (1999)). The relatively muted results for response efficacy in our data should not be construed as saying that similar effects would be found for other forms of efficacy, and certainly does not qualify as a critique of efficacy-based models more generally. A similar point
can be made about trust: we measured trust in science in a specific way, and so those results cannot be generalized to make a broader comment about the role of trust more generally. Like for any survey, extrapolation of conclusions from the specific domains measured should be made with caution.

Another limitation of the design is that we are not able to tap into actual behaviour (we are reliant on self-reports, which might be impacted by social desirability). Finally, the cross-sectional, correlational nature of the design means that we can only infer causality; we cannot demonstrate it.

Despite these limitations, the current data provide a useful counterpoint to those who assume that COVID-related health behaviours will be most impacted by individualistic, ‘under-the-skull’ calibrations of costs and benefits associated with risk and efficacy. Rather than focussing exclusively on the costs and benefits of compliance with COVID regulations, governments and health communicators might also want to focus on normative factors. One way of doing this is to communicate about evidence of widespread compliance to COVID regulations and recommendations. Communicators should also be mindful of how health messages can potentially create boomerang effects via social norms. For example, by highlighting and shaming those who do not comply, media and governments run the risk of (unintentionally) sending the signal that the broader public is non-compliant, diluting normative pressure (Steffens, 2020).

**Supplementary Material**

Supplementary material is available at *Health Promotion International* online.

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