

1      **Assessing concerns for the economic consequence of**  
2      **the COVID-19 response and mental health**  
3      **problems associated with economic vulnerability**  
4      **and negative economic shock in Italy, Spain, and**  
5      **the United Kingdom**

6            *Cristiano Codagnone<sup>1,2,3</sup>, Francesco Bogliacino<sup>4, 5, X</sup>, Camilo Gómez<sup>4, 5</sup>, Rafael Charris<sup>4, 5</sup>, Felipe*  
7            *Montealegre<sup>4, 5</sup>, Giovanni Liva<sup>2</sup>, Francisco Lupiáñez Villanueva<sup>2,3</sup>, Frans Folkvord<sup>5,2,6</sup>, Giuseppe A. Veltri<sup>7</sup>*

8            <sup>1</sup>*Università degli studi di Milano*

9            <sup>2</sup>*Open Evidence Research*

10            <sup>3</sup>*Faculty of Information and Communication Science, Universitat Oberta de Catalunya*

11            <sup>4</sup>*Universidad Nacional de Colombia*

12            <sup>5</sup>*Centro de Investigaciones para el Desarrollo*

13            <sup>6</sup>*Tilburg School of Humanities and Digital Sciences, Tilburg University*

14            <sup>7</sup>*Università degli Studi di Trento*

15            *X Corresponding author. Address for correspondence: Facultad de Ciencias Económicas, Universidad*  
16            *Nacional de Colombia, Kr 30, No 45-03, Bogotá (Colombia), fbogliacino@unal.edu.co*

17            **Abstract**

18            Currently, many different countries are under lockdown or extreme social distancing  
19            measures to control the spread of COVID-19. The potentially far-reaching side effects of these  
20            measures have not yet been fully understood. In this study we analyse the results of a multi-  
21            country survey conducted in Italy (N=3,504), Spain (N=3,524) and the United Kingdom  
22            (N=3,523), with two separate analyses. In the first analysis, we examine the elicitation of citizens'  
23            concerns over the downplaying of the economic consequences of the lockdown during the  
24            COVID-19 pandemic. We control for Social Desirability Bias through a list experiment included  
25            in the survey. In the second analysis, we examine the data from the same survey to estimate the  
26            consequences of the economic lockdown in terms of mental health, by predicting the level of  
27            stress, anxiety and depression associated with being economically vulnerable and having been  
28            affected by a negative economic shock. To accomplish this, we have used a prediction algorithm  
29            based on machine learning techniques. To quantify the size of this affected population, we  
30            compare its magnitude with the number of people affected by COVID-19 using measures of  
31            susceptibility, vulnerability and behavioural change collected in the same questionnaire. We find  
32            that the concern for the economy and for "the way out" of the lockdown is diffuse and there is  
33            evidence of minor underreporting. Additionally, we estimate that around 42.8% of the

1 populations in the three countries are at high risk of stress, anxiety and depression, based on  
2 their level of economic vulnerability and their exposure to a negative economic shock. Therefore,  
3 it can be concluded that the lockdown and extreme social distancing in the three countries has  
4 had an enormous impact on individuals' mental health and this should be taken into account for  
5 future decisions made on regulations concerning the pandemic.

6

7       **Keywords:** COVID-19; stress; anxiety; depression; vulnerability; social desirability bias;  
8 random forest

9       **Acknowledgment:** Funding has been provided by Open Evidence and BDI-Schlesinger  
10 Group. We are thankful to Christian Posso and Pietro Ortoleva for discussions around some of  
11 the points of the paper, and comments from participants to a seminar at Universidad del Rosario.  
12 We thank Douglas Rodriguez who helped as research assistant, and Noemi Andreu for help with  
13 programming and data collection. Contributors: CC, FLV, FF, GL, FB, GV conceived the study,  
14 FB, CG, RF, AM designed the list experiment, CC, CG, RF, AM, GL, FLV, FF, GV designed  
15 the rest of the survey, FB and CG supervised data collection, CG analysed the data, CC, CG,  
16 RF, AM, GL, FLV, FF, GV wrote the paper. The authors declare no conflict of interest.

17

## 18       Introduction

19       In March 2020, COVID-19 was declared a pandemic by the World Health Organization  
20 (WHO, 2020), and has rapidly brought most countries into a strict enforcement of extreme social  
21 distancing. In particular, lockdown (that is, restrictions on movement, work and travel in order  
22 to prevent contagion by persons potentially exposed to the virus) was first introduced in China  
23 (23 January 2020) and later, in most of the world's developed and developing countries. The  
24 lockdown has brought economies to a sudden and extreme halt: modern economies function on  
25 markets and markets require transactions and the mobility of factors. This mitigation strategy  
26 was justified by the evidence that social distancing works in flattening the curve of contagion  
27 and that it prevents health systems from being unable to cope (Barro, Ursúa, & Weng, 2020;  
28 Drozd & Tavares, 2020; Correia et al., 2020; Lau et al. 2020; Markel et al., 2007; McSweeney et  
29 al., 2007). A case in point is Italy, where in some regions (for example, Lombardy), the health  
30 system came close to collapsing after the country was reluctant to take measures to prevent a  
31 massive outbreak. The fear of having to deal with a similar situation contributed to convincing  
32 governments around the world that imposing such lockdown measures was necessary, given the  
33 notable reduction of the spread of the virus achieved in China (Tan et al., 2020; Wilder-Smith  
34 and Freedman, 2020; Wu and McCoogan, 2020 ).

35       Nevertheless, the Italian case presents several areas of doubt that are under investigation in  
36 order to determine whether or not they have had a causal impact: first, Italy has been reducing  
37 health expenditure significantly since the 2010 euro crisis (Indolfi and Spaccatella, 2020);  
38 second, it is one of the countries with the lowest intensive care units per 10,000 inhabitants

1 (Rhodes et al., 2012); third, it has one of the oldest populations in Europe (De Natale et al.,  
2 2020); and fourth, it is a society where the elderly have a high level of interaction with younger  
3 generations (Surico and Galeotti, 2020). These have been reinforced by a delay in adjusting  
4 protocols within hospitals; for example, avoiding the admittance of patients exhibiting mild  
5 symptoms of COVID-19 (Pisano et al., 2020), which has the potential to transform hospitals  
6 into clusters of contagion. This is reflected in the high mortality rate of medical personnel, in  
7 comparative terms (51 died before the end of March in Italy, De Natale et al., 2020).

8 Designing an optimal mitigation strategy requires a consideration of the costs of measures  
9 that are introduced (Stanczyk et al., 2020; Romer and Garber, 2020). In fact, there are strong  
10 arguments to suggest that the negative consequences of lockdown may have been  
11 underestimated and that they will have wide-reaching effects on various health dimensions, other  
12 than on the virus itself. First, it has been argued that the suicide rate, mental health, domestic  
13 violence, and the neglect of other health conditions (for example, cancers) may increase as a  
14 result of the lockdown and social distancing measures (Brooks et al., 2020; Nagar and Formenti,  
15 2020), however, these are not considered in the daily communications on the number of deaths  
16 due to COVID-19. Second, there are concerns related to the negative consequences of income  
17 shocks; for instance, data from applications for unemployment insurance have increased  
18 exponentially in the US (currently at 33m according to the Department of Labor, and likely  
19 underestimated, see Coibion et al., 2020). We know from studies on scarcity that this may cause  
20 long-term problems in terms of cognitive resources and behavioural change (Mani et al. 2014),  
21 and may weaken social cohesion and increase the crime rate once society is out of lockdown and  
22 functioning normally again (Bignon et al., 2017; Dix-Carneiro et al., 2018). Third, there is a  
23 fundamental argument that the current measures are driven by the precautionary principle and  
24 not by cost-benefit analysis. Although reasonable *a priori*, the precautionary principle is usually  
25 contested on two grounds: (a) if regulation is defended on the principle of the worst scenario,  
26 then a lack of regulation can be defended by the same argument when the consequences of strict  
27 regulations are potentially catastrophic; (b) the precautionary principle claims that fear should  
28 not be downplayed, even if the numbers do not agree, but this exposes the risk that *availability*  
29 *cascades* (the combination of availability heuristics and information cascade) dictate the agenda in  
30 public policy (Sunstein, 2003, 2019). As an example, sub (a), one could argue against the  
31 lockdown, *ex ante*, because it could cause the worst economic crisis since the Great Depression,  
32 and sub (b) in favour of an indefinite extension of the lockdown, *ex post*, on the basis of the fear  
33 of a new outburst of COVID-19.

34 Current scientific research on COVID-19 is increasingly focusing on the medical, physical  
35 and social consequences of the crisis; showing that the virus is posing societal challenges across  
36 multiple dimensions. Within social sciences, the current research has focused on perception and  
37 attitudes (Fetzer et al., 2020), on the threat posed by COVID-19 related fake news (Pennycook,  
38 McPhetres, Bago, & Rand, n.d.; Pennycook, McPhetres, Zhang, & Rand, 2020), and on designing  
39 nudges and other social and behavioural measures to support the COVID-19 pandemic response  
40 (Heffner et al., n.d.; Bavel et al., 2020), among the others. Unsurprisingly, evidence on the  
41 (mental health) side effects of the lockdown is largely missing, whereas in terms of contagion  
42 (reduction), data gathering has been wide-spread and systematic (almost) everywhere. Some

1 evidence of the negative impact on mental health has been documented in China (Wang et al.,  
2 2020; Liu et al., 2020), India (Roy et al., 2020), but mostly with convenience samples; yet, there  
3 is a consensus that mental health will be dramatically affected (Nature Medicine (Editorial) 2020).  
4 Given that the COVID-19 emergency has impacted developed countries before developing  
5 countries, and that the latter have stronger constraints in terms of savings, social policy and  
6 health infrastructure to face these problems, the assessment of the economic and health costs  
7 should be considered an immediate priority for public policy. There is also a hypothesis  
8 suggesting that the pandemic may last longer than 18 months and that periods of lockdown may  
9 need to be re-introduced (with second and potentially even further waves of the virus); this  
10 scenario also supports having enough evidence to make properly informed decisions (Lancet  
11 (Editorial), 2020; Kissler et al., 2020).

12 In this article, we intend to fill this void of evidence on the various side effects of the COVID-  
13 19 pandemic in the current literature by presenting the results of a multi-country (Italy, Spain  
14 and the United Kingdom [UK]) survey. This article is divided in two parts, based on separate  
15 analyses of the same data. In the first part, we elicit the level of concerns by citizens across three  
16 countries over the claim that the mitigation strategies used to contain COVID-19 have been  
17 neglecting or underestimating the magnitude of the economic consequences (Atkeson, 2020;  
18 McKee and Stuckler, 2020). In the second part, we attempt to map how these concerns for the  
19 economic consequences of the lockdown are related to mental health issues. In the multi-country  
20 survey, we assess the level of stress, anxiety and depression in the population as predicted by  
21 economic vulnerability (for example, low socio-economic background, low residential space,  
22 etc.), with the aim of identifying the potential size of mental health problems due to the side  
23 effects of the lockdown.

24 For the first part of this study, the outcome variables studied in this contribution are the level  
25 of support given to the following statements: “During the pandemic, the government should  
26 not only focus on preventing contagion but also on avoiding a major economic crisis”; and,  
27 “During the pandemic, the government should not only communicate to citizens what to do to  
28 adhere to the safety measures, but also clearly explain how it is planning the way out”. The first  
29 statement refers to the need to balance the losses in the domain of the pandemic and of the  
30 economy, as this need has been dismissed by part of the scientific community in favour of a  
31 unidimensional policy approach based on the precautionary principle (Anderson et al., 2020).  
32 The second statement refers to the need for transparent communication in order to allow  
33 households to plan their consumption, labour and investments during the year (Brooks et al.,  
34 2020).

35 If there is strong support for these two statements, we anticipate that such concerns will be  
36 reflected in various forms of stress associated with new sources of economic uncertainty and  
37 vulnerability, which we investigate in the second part of this study. Indeed, in the second part,  
38 the outcome variables are self-reported stress, anxiety and depression.

39 Stress occurs when the level of stimuli exceeds a human body’s regulatory capacity. Anxiety  
40 is a reaction to stress, with feelings of worry, nervousness or unease. Depression is a serious  
41 medical illness concerning feelings and emotions, and is usually associated with sadness and loss  
42 of interest causing a lack of ability to function in individuals (Beck and Beamesderfer, 1974).

1 Stress, anxiety and depression are used in this study to measure mental health (Cohen and  
2 Williamson, 1991).

3 In conducting these two analyses, we attempt to make three contributions in terms of  
4 estimating the side effects of the lockdown in response to COVID-19. First, we elicit support  
5 for the two statements related to the risk of neglecting the economic consequences. Since there  
6 is a clear social desirability bias (SDB) on this matter, we use a list experiment (included in the  
7 survey) to control for this. This is important because real support by citizens is fundamental to  
8 guarantee adherence to policy interventions, and because opposition to the current regulatory  
9 framework can be a predictor of the loss of social cohesion in the medium term.

10 Second, we estimate the extent to which the socio-economic background of a household can  
11 predict perceived stress, anxiety and other mental health issues in relation to the current  
12 pandemic and its consequences. To estimate the dimension of mental health related to the  
13 economic side effects of the lockdown, we use machine learning techniques (random forest) to  
14 predict the likelihood of being highly stressed, conditional on a number of critical factors; such  
15 as, organising home-schooling, having only a small living space, a low financial buffer stock,  
16 having suffered previous negative economic shocks, and so on. To provide some comparative  
17 quantification for this impact, we quantify through the same questionnaire the three components  
18 of exposure to COVID-19; namely susceptibility (the risk associated with the illness once  
19 contracted), vulnerability (the risk of exposure), and the behavioural response (people asking to  
20 be tested or contacting a doctor or health authorities due to COVID-19).

21 An additional contribution of this work is that it is a multi-country study of Italy, Spain and  
22 the UK. These countries have a high number of deaths in common and are currently among the  
23 harshest hit in Europe. They have also adopted quarantine and lockdown measures, but with  
24 some difference in degree (for example, the UK first announced an alternative strategy based on  
25 herd immunity before later reverting to the lockdown strategy). Finally, the timing for the curve  
26 of contagion in the three countries has differed (the sequence being first Italy, second Spain and  
27 last the UK), and this gives us a variation in terms of length of exposure to lockdown. These  
28 features increase the external validity of the study.

29 Our first theoretical hypothesis is that experiencing lockdown and a lack of transparent  
30 communication on how to move in an orderly fashion towards a post-lockdown scenario  
31 increases the focus on the economic situation by citizens. This is consistent with the hypothesis  
32 that frustration and demoralization are exacerbated by a lack of commitment to keep the  
33 lockdown to as short a duration as possible, and that extensions may backfire (Brooks et al.,  
34 2020). Another potential channel is the scarcity mind-set: having to face negative economic  
35 shocks may increase the tendency of citizens to think in terms of opportunity cost and trade-  
36 off, becoming more focused on economic consequences (Shah et al., 2015).

37 Our second hypothesis is that adverse economic conditions worsen psychological wellbeing.  
38 Studies on the relationship between economic contraction and mental health have shown that  
39 the relationship between adverse economic experiences and depression is one of the most  
40 consistent findings (Goldman-Mellor, Saxton, & Catalano, 2010; Wahlbeck, Anderson, Basu,  
41 McDaid, & Stuckler, 2011). Participants in these studies who lost their jobs for reasons unrelated  
42 to health had a greater chance of experiencing depressive symptoms, even after controlling for

1 workforce experience, mental ability and socioeconomic variables. Indeed, not only job loss but  
2 also the type of work contract is associated with mental health issues. People who move from  
3 stable to inadequate employment demonstrate an increased risk of depression. In their review,  
4 Wahlbeck et al. (2012) gathered evidence showing that people who experienced unemployment  
5 or impoverishment are at a greater risk of suffering from depression, alcohol abuse and suicide  
6 than people who did not. This problem is clearly aggravated for a household in a vulnerable  
7 situation, since a low economic background offers less monetary and cultural resources to cope  
8 with adversity.

9

## 10 Results

11

12 **List Experiment.** A list experiment is a questionnaire design technique used to mitigate the  
13 respondent's social desirability bias (SDB) when eliciting information about sensitive topics.  
14 With a large enough sample size, list experiments can be used to estimate the proportion of  
15 people for whom a sensitive statement is true. We measured the level of agreement with the  
16 following two statements:

- 17 • *During the pandemic, the government should not only focus on preventing contagion but also on avoiding  
18 a major economic crisis;*
- 19 • *During the pandemic, the government should not only communicate to citizens what to do to adhere to  
20 the safety measures, but also clearly explain how it is planning the way out.*

21 To prevent SDB from biasing the results, we considered four additional and unrelated  
22 statements (see Materials and Methods), which are not the object of analysis, and we asked  
23 participants to state *how many* (rather than *which*) statements they agreed with.

24 We proceeded in the following way. We selected at random four subsamples of participants  
25 and asked them to perform the following tasks: the control group is presented with four  
26 statements, without using the controversial ones above, and is asked how many they agree with;  
27 treatment group one is presented with a set of five statements (four of the control and the first  
28 statement object of analysis) and is asked how many statements they agree with; treatment group  
29 two is presented with a set of five statements (four of the control and the second statement  
30 object of analysis) and is asked how many statements they agree with; last, treatment group three  
31 is asked direct questions; that is, after being presented with the full set of six statements, it is  
32 asked which statements they agree with.

33 As a result, comparing the average number of items selected in the control with the average  
34 number of items selected in treatment one (two) group, we detect the share of people who agree  
35 with the first (second) controversial statement. By comparing the share of people who agree with  
36 a controversial statement, as estimated through the list treatment, with the share of people who  
37 declared that they agreed with it (from the direct questions in treatment group three), we can  
38 estimate the SDB.

39 In total, 10,551 participants answered the questionnaire: 3,504 in Italy, 3,524 in Spain and  
40 3,523 in the UK. We provide a set of statistical tests to assess the balancing of covariates (a  
41 dummy for female, age, a dummy for marital status, a dummy for unemployed, household size,  
42 the number of children of school age, country dummies, income level, educational level, a  
43 dummy for homeownership, and the size of the house) in Table S1 in the Supplementary Online  
44 Material (SOM). Covariates are not systematically different across the four groups, but we reject

1 the null hypothesis for some of them. All of the covariates included in Table S1 are used as  
2 controls in the regressions.

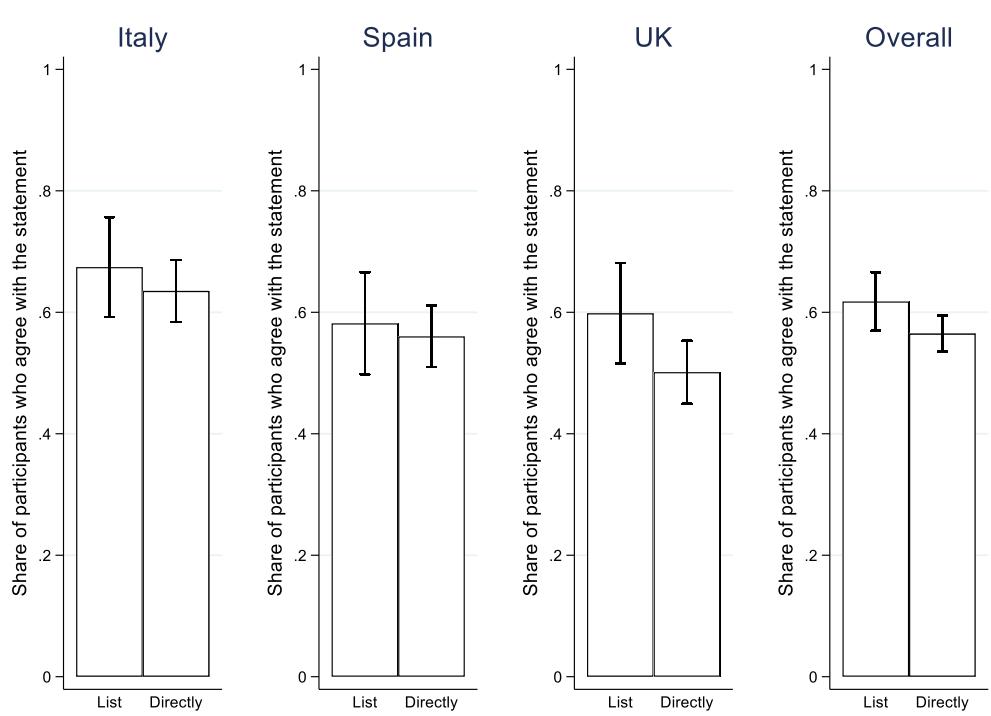
3 In Figures 1 and 2 below, we report the estimated support for the statements in the three  
4 countries and in the overall sample, and the extent of SDB, after controlling for a set of  
5 covariates. In the full sample, support for statement 1 is 62.09% estimated through the list  
6 experiment ( $t=25.34$ ,  $p<.000$ ), and 56.48% by direct method ( $t=244.62$ ,  $p<.000$ ). In the three  
7 countries, the results are as follows: in Italy, the average support revealed by the list experiment  
8 is 67.58% and 63.50% when asked directly; in Spain, the average support is 58.93% through the  
9 list method, and 56.03% through the direct method; and in the UK, it is 59.86% and 50.13%,  
10 respectively. Data support the presence of SDB ( $t=480.10$ ,  $p<.000$ ). All of the supporting  
11 regressions are reported in the SOM, Tables S2-S4.

12 Similar results hold for statement 2, the support of which is 69.65% when estimated through  
13 the list experiment ( $t=29.02$ ,  $p<.000$ ), and 66.29% by direct method ( $t=294.78$ ,  $p<.000$ ). In the  
14 three countries, the results are as follows: in Italy, the average support revealed by the list  
15 experiment is 64.57% through the list method and 64.93% through the direct method; in Spain,  
16 the average support is 72.20% through the list method, and 69.43% through the direct method;  
17 and in the UK, it is 72.49% and 64.33%, respectively. The data fail to reject the absence of SDB  
18 ( $t=387.10$ ,  $p<.000$ ). All of the supporting regressions are reported in the SOM, Tables S2-S4.

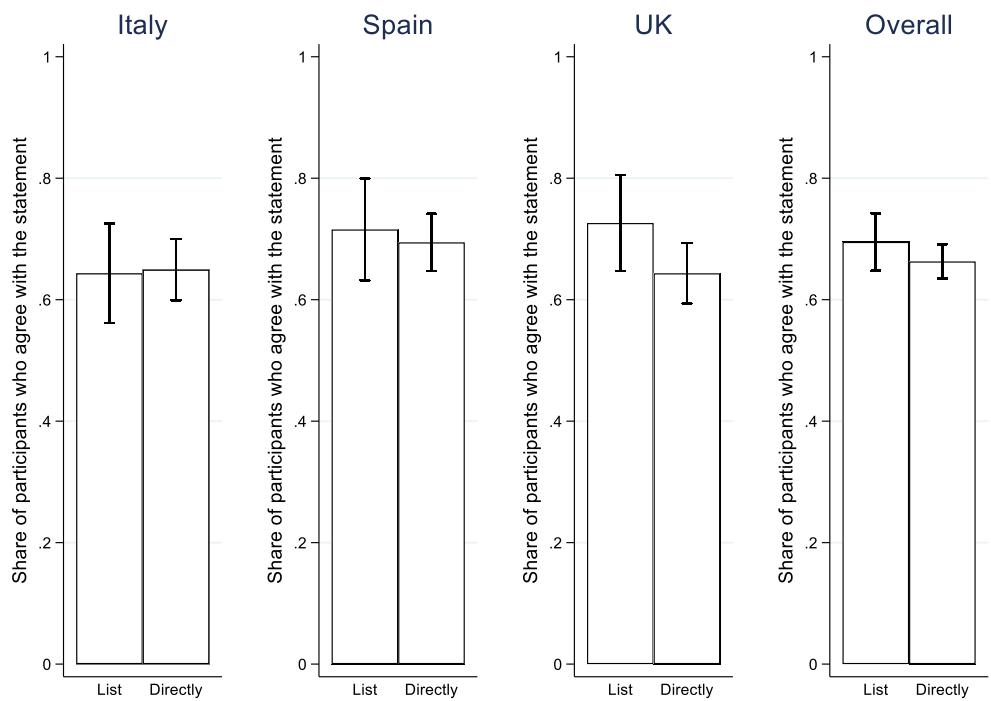
19 In Table S5 in the SOM, we report the frequencies for the number of items chosen, by  
20 treatment and country.

21 As argued by Blair and Imai (2012), the implicit assumptions in a list experiment are the  
22 absence of design effect and absence of liars. These assumptions state, respectively, that answers  
23 to uncontroversial statements do not change when controversial statements are added, and that  
24 participants do answer truthfully. The latter is untestable. The statistical procedure we use is one  
25 suggested by Blair and Imai (2012). These tests are reported in the SOM, Tables S6-S9. We fail  
26 to reject the null hypotheses of the absence of design effect. These results suggest that our  
27 inferences from the list experiments have robust internal validity.  
28

1      *Figure 1: During the pandemic, the government should not focus only on preventing contagion but also on avoiding a major*  
2      *economic crisis*



3  
4      *Figure 2: During the pandemic, the government should not only communicate to citizens what to do to adhere to the safety*  
5      *measures, but also clearly explain how it is planning the way out.*



1  
2  
3 **Economic vulnerability and negative shocks predict mental health.** Levels of stress,  
4 anxiety and depression were measured through an adapted version of the DASS-21 (Depression,  
5 Anxiety and Stress Scale–21 Items; Lovibond & Lovibond, 1995) and of SASRQ (Stanford  
6 Acute Stress Reaction Questionnaire; Cardeña, Koopman, Classen, Waelde, & Spiegel, 2000).  
7 Responses are elicited over a Likert scale from 1 to 4, where the items correspond to: rarely or  
8 none of the time (less than one day); some or a little of the time (1-2 days); occasionally or a  
9 moderate amount of time (3-4 days); most or all of the time (5-7 days).

10 In the Table 1 below, we report for each item the share of people who report having felt  
11 the symptoms at least one or two days in the previous week. The instrument is reliable  
12 (Cronbach's alpha is 0.91). The outcome variable is then normalized on a 0.25 to 1 scale,  
13 averaging across the eight items.  
14  
15

1 *Table 1 Stress, anxiety, and depression. Share of persons who felt the symptoms for at least one or two days of the previous week.*

Item	ES	UK	IT	Total
Felt down, depressed or hopeless about the future	67.4%	56.9%	58.6%	60.9%
Felt little interest or pleasure in doing things	67.1%	59.8%	67.0%	64.6%
Felt nervous, anxious or on the edge	64.8%	59.9%	59.0%	61.3%
Had trouble falling or staying asleep, or sleeping too much	73.5%	64.4%	66.3%	68.1%
Felt bad about yourself — or that you are a failure or have let yourself or your family down	50.8%	48.1%	42.7%	47.2%
Had troubles concentrating on things	61.0%	57.6%	54.9%	57.8%
Had a physical reaction when thinking about the outbreak	40.0%	30.1%	32.5%	34.2%
Feeling tired or having little energy	66.9%	68.9%	70.3%	68.7%

2

3 As suggested by our theoretical hypotheses, stress is highly correlated with economic  
 4 vulnerability and exposure to a negative economic shock. In Table 2 below, we report Spearman  
 5 correlations, in order to capture potential non-linearity and to minimize the effect of atypical  
 6 values or response error. According to Table 2, a higher income level is associated with lower  
 7 stress ( $\rho = -.04$ ,  $p < .01$ ), being unemployed is positively correlated with stress ( $\rho = .09$ ,  $p < .01$ ),  
 8 owning a house is negatively correlated ( $\rho = -.08$ ,  $p < .01$ ), having a larger house space is  
 9 negatively correlated ( $\rho = -.10$ ,  $p < .01$ ), household size ( $\rho = .10$ ,  $p < .01$ ) and especially having  
 10 children of school age are positively correlated ( $\rho = .12$ ,  $p < .01$ ), financial buffer stock (the time  
 11 that bills can be covered after losing a job) is negatively correlated ( $\rho = -.18$ ,  $p < .01$ ), having  
 12 faced negative events is positively correlated ( $\rho = .38$ ,  $p < .01$ ), as is having suffered job or  
 13 income losses ( $\rho = .19$ ,  $p < .01$ ). This is in line with our theoretical hypotheses.

14

15

Table 2 Relationship between economic vulnerability and stress, anxiety, and depression. Spearman correlation.

	Stress
Household income	-0.04***
Unemployed	0.09***
Home ownership	-0.08***
Living area	-0.10***
People in home	0.10***
Children in school	0.12***
Cover the bills	-0.18***
Stress events	0.38***
Income loss	0.19***

2 'Household income' is a categorical variable with the categories described in Q5 (SOM). 'Unemployed' is a dummy  
 3 variable with a value of 1 if the respondent is in search of a job and 0 otherwise. 'Homeownership' is a dummy  
 4 variable with the value of 1 if the respondent type of dwelling is owned and fully paid. 'Living area' is the  
 5 respondent's home useful living area in  $m^2$ . 'People in home' is the household size. 'Children in school' reports  
 6 how many children are of school age in the respondent's household. 'Cover the bills' is a categorical variable with  
 7 the categories described in Q16 (SOM). 'Stress events' is the sum of the response to the questions Q17-a), b), c),  
 8 d), e), f), h) & i) (SOM). 'Income loss' is a dummy variable with the value of 1 if the respondent's wage or earnings  
 9 have been negatively affected after the COVID-19 outbreak and 0 otherwise. \*\*\*  $p<0.01$ .

10 To quantify the extent of mental health issues associated with economic vulnerability and  
 11 worsened economic conditions, we cannot rely on ex ante-ex post variation due to the lack of a  
 12 pre-pandemic data point, and we do not have a source of exogenous variations of negative  
 13 economic shocks and vulnerability. As a result, we compute the conditional probability of being  
 14 under high stress, anxiety and depression given the independent variables in Table 1, being fully  
 15 aware that we cannot claim causality. We estimate a standard random forest model between the  
 16 outcome variable and the set of independent variables. We set the model using 550 iterations  
 17 (trees) and regression as type of the decision tree. After computing the regression model, we  
 18 estimate the share of those who are highly affected (outcome variable greater than or equal to  
 19 .5) and project over the entire population, post-stratifying on age, gender and macro-region of  
 20 residence. We compute that mental health problems predicted by the economic vulnerability and  
 21 negative economic shock are 41.5% in Italy, 45.8% in Spain and 41.8% in the UK. Weighting  
 22 for the population, this accounts for 42.8% in the three countries.

23 In the SOM (see Figures S1-S2 and Table S10), we report the fit of the model (Spearman  
 24 rank-order correlation coefficient=0.9168,  $p=0.0000$ ), the out-of-bag error convergence, which  
 25 stabilizes after 400 iterations at somewhere below 0.16, and the matrix of variable importance  
 26 for each variable used when building the classifier. The results are highly correlated when we  
 27 compare total sample and out of sample prediction with 15%, 25%, 33%, and 50% of the sample  
 28 for learning (see SOM, Section 2, Table S16-S17). From the diagnostic tests, we conclude in  
 29 favour of the robustness of the exercise.

1 One legitimate question is whether or not 42.8% represents many: the most obvious answer  
2 is to compare the exposure to mental health with the exposure to COVID-19 since the lockdown  
3 has been introduced to contain the risk of the pandemic.

4 There are three routes to estimate exposure to COVID-19: susceptibility, vulnerability and  
5 behavioural response. Susceptibility refers to how strong the impact is when an individual is  
6 affected by the virus. We already know from the literature that age, specific health problems and  
7 comorbidity (in particular Diabetes, Hypertension, Asthma, Cardiovascular Disease, Cancer  
8 according to Guan, et al., 2020; Yang et al., 2020; Richardson et al., 2020), and poor health  
9 conditions are all key factors that augment the negative consequences of contracting the disease.  
10 We collect this information through the questionnaire (SOM, Questionnaires Q18-21 and Q25).  
11 Vulnerability is the likelihood of getting the illness and is typically associated with communitarian  
12 exposure. We measure this component by eliciting the factors preventing full compliance with  
13 the quarantine (see SOM, Questionnaire, Q15). Finally, the behavioural response is elicited  
14 through questions on having contacted doctors or health authorities, or having sought to get  
15 tested (SOM, Questionnaires Q17g and Q24). We report these results in the SOM, Tables S11-  
16 S13.

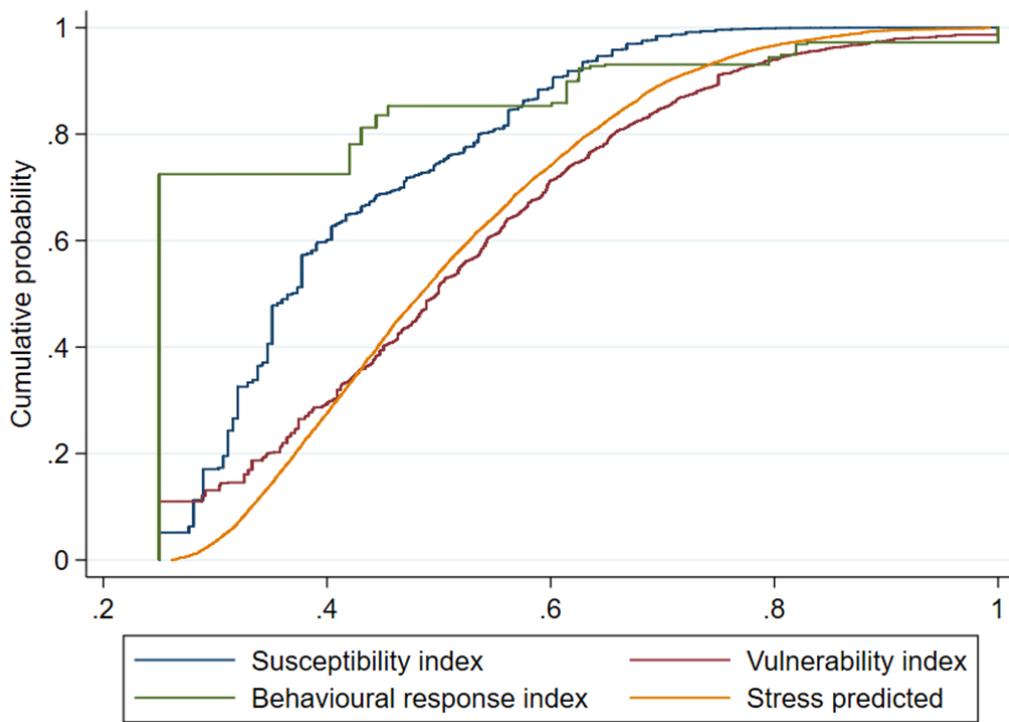
17 Obviously, comparing each variable in each dimension with the predicted likelihood of being  
18 stressed conditional on vulnerability and shock is not highly informative, because we would get  
19 a difference response from different comparison. To meaningfully summarize the information  
20 of the variables in each dimension of exposure to COVID-19, we perform a principal  
21 component analysis (that is, we represent each dimension -variable space- through a set of  
22 uncorrelated variables), which captures the largest part of its variability. In the three cases,  
23 sampling adequacy is acceptable (KMO sampling adequacy is 0.73 for susceptibility, 0.72 for  
24 vulnerability and 0.72 for behavioural response, see SOM, Table S15), and in all three cases the  
25 first component is the only one with an associated eigenvalue greater than one (2.5 for  
26 susceptibility, 50% of variance explained; 2.25 for vulnerability, 45% of variance explained; 2.22  
27 for behavioural response, 55% of variance explained): thus, we can use the associated  
28 eigenvector (see SOM, Table S14) to build a score, increasing in the level of exposure.

29 As a result, we built four indexes, all scaled from 0.25 to one, three for exposure to COVID-  
30 19 and one for exposure to stress. Of course, defining a threshold in the first three scores (for  
31 example, .5 as in the stress case) would be completely arbitrary, since there is no clear cardinality  
32 in the scale of the score. To prevent arbitrary choices from biasing the comparison, we plot the  
33 cumulative density function; that is, for any value of the index  $x$ , the share of respondents who  
34 have  $x$  at most,  $P(x \leq x)$ . Figure 3 plots the results and shows that stress stochastically dominates  
35 two out of the other three distributions at the first order. Formally, this can be written as  
36  $P(\text{stress} \leq x) \leq P(j \leq x)$  for all  $x$  between zero and one, and for  $j = \text{susceptibility, vulnerability and}$   
37  $\text{behavioural response}$ . Graphically, this can be seen from the fact that the distribution of  
38 predicted stress stands to the right of the susceptibility and behavioural change, but almost  
39 coincide with that of vulnerability. In simple words, for any level of the score from 0.25 to 1,  
40 the likelihood of observing more people exposed above the selected level at least equal for stress  
41 than for any other measure of exposure to COVID-19.

42

1  
2  
3

Figure 3 Comparing the cumulative distribution of exposure to susceptibility, vulnerability, behavioural response, and predicted stress conditional on economic vulnerability and negative economic shock.



4  
5

6  
7

## Discussion

8  
9  
10  
11  
12  
13  
14  
15  
16

In this study, we collect and analyse data from three European countries (Italy, Spain, and the United Kingdom), which have been under lockdown due to the recent outbreak of the COVID-19 pandemic that began in China in late 2019. The aim of the study is to measure the support for two statements related to the importance of the economic consequences of mitigation strategies and to measure the consequences of the lockdown in terms of mental health, as predicted by economic vulnerability and negative economic shocks. The hypotheses are that economic depression induces more worry for citizens regarding their economic situation, and that sharp negative economic shocks worsen psychological wellbeing.

17  
18  
19  
20  
21  
22  
23  
24

This study shows a prevalence of concern for the unidimensional policy orientation during the pandemic on protecting the current healthcare systems, by putting aside other important elements of societies currently hit by the COVID-19 crises, which is in line with recent other studies (Colbourn, 2020; Alwan et al., 2020). In particular, we found sizable support for a more traditional view of government as minimizing a loss function defined over different problems, health and the economic crisis, in this case. We also found general support for the idea that governments should communicate a coherent way out of the crisis: from an economic point of view, this involves asking the government to commit to certain long-term objectives to

allow a household to reasonably protect itself from uncertainty and achieve a more reasonable solution in terms of consumption smoothing and investment (the same applies for businesses and companies). Most countries have stressed that it is imperative to delay and flatten the curve of the pandemic in order to ensure that national health services can cope with the resulting situation, and indeed, most governments have asserted that their responses to the COVID-19 pandemic are based on evidence and expert modelling. Nevertheless, different scientists have arrived at different conclusions based on the same evidence: small differences in assumptions can lead to large differences in modelling predictions, as can be seen in the different regulations implemented by EU Member States, and beyond (Anderson, Heesterbeek, Klinkenberg, & Hollingsworth, 2020).

Another important finding of this study is that economic vulnerability is associated with a strong risk of stress and worsening mental health. We estimated that around 42.8% of the population is at risk because of the negative shocks and the conditions of economic vulnerability in the developed countries in which we have conducted our study. This suggests that in developing countries, which must still face the worst part of the health emergency and the economic consequences of potential governmental regulations, the consequences may be even worse. The pattern we encountered is similar across the three countries we study (Italy, Spain and the UK), even though the timing of the quarantine and the initial strategy by the government in each country has differed, with the UK first announcing the intention to pursue herd immunity, but then also rapidly shifting towards standard isolation measures. Moreover, these results have strong external validity because of the representativeness of the sample in the three countries.

Our results have additional implications: while the epidemiological literature has expended a great deal of effort in profiling citizens according to their COVID-19 risk, our article suggests that a similar task can be successfully conducted in order to maintain societal resilience to mental health problems (Duan and Zhu, 2020) and the resilience of the health system (Liu et al., 2020; Legido-Quigley et al., 2020). The social and economic effects of lockdown and other interventions that have halted the economy will have an immense impact on health care in the near future, including mental health, but also on interpersonal violence. These factors should be extensively empirically evaluated and incorporated into future models for global crises, such as the one we currently face (Colbourn, 2020). Models and projections that provide a deeper understanding of how decisions are made should become available in the public (and scientific) domains without delay, in order to inspire public trust and allow a wider and potentially more beneficial input (Alwan et al., 2020).

Our study has further public health implications, in terms of how to address these mental health problems. As suggested by Brooks et al. (2020), during the pandemic, therapy is obviously limited, and mild interventions such as Cognitive Behavioural Therapy or Mindfulness can be adapted to deal with the negative consequences of exposure.

One of the strengths of the current study is that we have assessed the differences between the three European countries studied, as they have all been significantly affected by COVID-19, while there are significant differences in each of their regulatory interventions. Second, considering the wide variety of studies published on this topic, we would argue that a

1 deeper analysis on the effects of the regulatory interventions on mental health within society is  
2 missing but highly necessary in order to better understand the effects of these regulations. Third,  
3 we have collected data from a large group of representative citizens, thereby being able to  
4 generalize the outcomes.

5 Naturally, our study has limitations. First, although we have external validity within the  
6 three countries, we cannot claim generalizability to Europe or the world. This is somewhat  
7 unavoidable in the current situation in which there are environmental conditions that are  
8 important, as reflected in the heterogeneity in the death rate, but whose role is not fully  
9 understood.

10 Another limitation is due to the self-reported measurement levels of mental health.  
11 Although highly reliable, these questions do not represent medical data. However, autoptic  
12 recognition of mental health is a necessary step in providing a medical assessment, and as a  
13 result, it could be noisier, but it is unlikely to be biased in the opposite direction with respect to  
14 more clinical measurements. Additionally, we used a validated scale.

15 Third, the comparison between the exposure to stress and the exposure to COVID-19  
16 is subject to critique. Although stochastic dominance is a conservative test the latter have been  
17 obtained through a filter (principal component analysis). This suggest that there may be some  
18 non-linear combination of the underlying variables (that is, some way in which to aggregate the  
19 information into a single dimension), for which the proposition no longer holds.

20 As has been argued, mental health could be the next threat to our societies, based on the  
21 conditions of the mitigation strategies and the hard-hitting economic depression that will likely  
22 follow. Mapping this evolution in terms of the population at risk, providing creative policy  
23 solutions that do not compromise the results achieved in terms of flattening the curve of  
24 contagion, and maintaining the resilience of our health system should be included among the  
25 future research priorities. Based on these results, it is also important for countries that are behind  
26 in controlling the spread of the virus, or vis-a-vis future outbreaks, to design ex ante more  
27 balanced mitigation strategies so as to prevent some of the side effects of lockdown and  
28 quarantine manifesting themselves.

29

30

### 31 Materials and Methods

32 We submit a link through an online panel in Italy, Spain, and the United Kingdom. We  
33 restrict participants to 18-75 years old. Although this is underestimating the impact on a subset  
34 of the population which is highly vulnerable to COVID-19, access to them through the online  
35 channel and the reliability of responses may be highly questionable. The initial sample is  
36 randomized. The study is preregistered on OSF (DOI:10.17605/OSF.IO/6XWE8). The  
37 English version of the questionnaire can be found in the Supplementary Online Materials,  
38 Section 1.

39 Ethics approval was obtained from the Institutional Review Board of the Universitat  
40 Oberta de Catalunya. All respondents provided informed consent.

41 In the list experiment, we have four treatments. The control group is presented with four  
42 statements, without any of the controversial ones, and is asked how many they agree with;

treatment group one is presented with a set of five statements (four of the control and the first statement object of analysis), and is asked how many statements they agree with; treatment group two is presented with a set of five statements, (four of the control and the second statement object of analysis), and is asked how many statements they agree with; last, treatment group three is asked direct questions; that is, after being presented with the full set of six statements, it is asked which statements they agree with. Assignment to treatments is as follows: 30% of the sample is randomly assigned to the control group, 30% to treatment group one, 30% to treatment group two, and 10% to treatment group three. The group with a direct question is smaller because the standard errors in direct response are much reduced than in the list experiment.

Uncontroversial items are: “Globalization has benefitted most of the population in the world”, “Immigration is a threat for our lifestyle”, “The health professionals are facing the largest risk in this pandemic”, “On important policy issues, the government should always follow the opinion of the experts”. Notice that we choose the first two and the fourth statements because people tend to have polarized opinions on them, and this guarantees that we are not facing ceiling effects. We add the third statement to ensure that we include a statement which is health-related, and that we do not prime participants too strongly towards reflecting on economic costs.

To analyse the list experiment, we followed Blair and Imai (2012), and used linear regressions, since we are not primarily interested in the identification of the impact of covariates. We used the following control variables, which in principle should not be causally affected by the treatment: a dummy for female, age, a dummy for marital status, a dummy for unemployed, household size, the number of children of school age, country dummies, income level, educational level, a dummy for homeownership, and the size of the house.

We measured stress, anxiety and depression through an adapted version of the DASS-21 (Depression, Anxiety and Stress Scale – 21 Items; Lovibond & Lovibond, 1995) and of SASRQ (Stanford Acute Stress Reaction Questionnaire; Cardeña, Koopman, Classen, Waelde, & Spiegel, 2000). The last questionnaire was created to measure acute reactions to stress, which means that the instrument is used to measure stress due to a specific stressor, not a general measure of stress (Cardeña et al., 2000). Our questionnaire is close to the one used by the multi-country study of Fetzer et al. (2020). This is an eight-items scale, with answers from one to four. To estimate the relationship between the factors of economic vulnerability and exposure to negative economic shocks and stress, anxiety and depression we used a random forest model, with bootstrapping, using 550 iterations. We used the following predictors in the model: household income, a dummy for unemployed, a dummy for homeownership, living space, household size, number of children of school age, financial buffer stock, negative events that occurred in the previous week, and change in income or earnings (SOM, Questionnaire, Q5, Q7, Q9, Q10, Q11, Q13, Q17a/b/c/d/e/f/h/i, Q27).

To project the results to the overall population, we post-stratified the results using gender, age (18-35; 36-55; 56-75) and residence (North; Centre; South; Isles for Italy, Madrid and Centre; Barcelona and West; North; Centre-East; South for Spain; East and Midlands, London, South; North; Scotland, Wales and Northern Ireland for the UK). Data are taken from Eurostat.

Finally, to summarize susceptibility, vulnerability and behavioural response, we performed principal component analysis. We assessed sampling adequacy using the Keyser-

1 Meyer-Olkin criterion. In all cases, we retain the component based on the eigenvalues greater  
2 than one. Stochastic dominance is assessed graphically.

3

4 **References**

- 5 Alon, T., Doepke, M., Olmstead-Rumsey, J., & Tertilt, M. (2020). *The Impact of COVID-19 on*  
6 *Gender Equality*. <https://doi.org/10.3386/w26947>
- 7 Alwan, N. A., Bhopal, R., Burgess, R. A., Colburn, T., Cuevas, L. E., Smith, G. D., ... &  
8 Greenhalgh, T. (2020). Evidence informing the UK's COVID-19 public health response  
9 must be transparent. *The Lancet*, 395(10229), 1036-1037.
- 10 Anderson, RM, Heesterbeek, H, Klinkenberg, D, Hollingsworth, TD, (2020) How will country-  
11 based mitigation measures influence the course of the COVID-19 epidemic? *The Lancet*,  
12 395: 931-934
- 13 Atkeson, A. (2020). What will be the economic impact of COVID-19 in the US? Rough estimates  
14 of disease scenarios (No. w26867). National Bureau of Economic Research.
- 15 Barro, R., Ursúa, J., & Weng, J. (2020). *The Coronavirus and the Great Influenza Pandemic: Lessons from*  
16 *the "Spanish Flu" for the Coronavirus's Potential Effects on Mortality and Economic Activity*.  
17 <https://doi.org/10.3386/w26866>
- 18 Bavel, J.J.V., Baicker, K., Boggio, P.S. et al. Using social and behavioural science to support  
19 COVID-19 pandemic response. *Nat Hum Behav* (2020). <https://doi.org/10.1038/s41562-020-0884-z>
- 20 Beck, A. T., & Beamesderfer, A. (1974). Assessment of depression: the depression inventory. In  
21 Psychological measurements in psychopharmacology (Vol. 7, pp. 151-169). Karger  
22 Publishers.
- 23 Bendavid, E., Mulaney, B., Sood, N., Shah, S., Ling, E., Bromley-Dulfano, R., ... Bhattacharya,  
24 J. (2020). COVID-19 Antibody Seroprevalence in Santa Clara County, California. *MedRxiv*,  
25 2020.04.14.20062463. <https://doi.org/10.1101/2020.04.14.20062463>
- 26 Bignon, V., Caroli, E., Galbiati, R (2017) STEALING TO SURVIVE? CRIME AND INCOME  
27 SHOCKS IN NINETEENTH CENTURY FRANCE. *The Economic Journal*, 127: 19-49
- 28 Blair, G, Imai, K (2012) Statistical Analysis of List Experiments. *Political Analysis*, 20:47-77
- 29 Brooks, S., Webster, R., Smith, L., Woodland, L., Wessely, S., Greenberg, N., James, G. (2020).  
30 The psychological impact of quarantine and how to reduce it- rapid review of the evidence.  
31 Department of Psychological Medicine, King's College, S0140-6736(20)30460-8. Advance  
32 online publication. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8)
- 33 Cardeña, E., Koopman, C., Classen, C., Waelde, L. C., & Spiegel, D. (2000). Psychometric  
34 properties of the Stanford Acute Stress Reaction Questionnaire (SASRQ): A valid and  
35 reliable measure of acute stress. *Journal of Traumatic Stress*, 13(4), 719–734.  
36 <https://doi.org/10.1023/A:1007822603186>
- 37 Coibion, O., Gorodnichenko, Y., & Weber, M. (2020). *Labor Markets During the COVID-19 Crisis: A Preliminary View*. <https://doi.org/10.3386/w27017>
- 38 Cohen, S., & Williamson, G. M. (1991). Stress and infectious disease in humans. *Psychological*  
39 *bulletin*, 109(1), 5.
- 40 Colbourn, T. (2020). COVID-19: extending or relaxing distancing control measures. *The Lancet*  
41 *Public Health*.
- 42 Correia, S., Luck, S., & Verner, E. (2020). Pandemics Depress the Economy, *Public Health*

- 1       Interventions Do Not: Evidence from the 1918 Flu. *SSRN Electronic Journal*.  
2       <https://doi.org/10.2139/ssrn.3561560>
- 3 De Natale, G, Ricciardi, V, De Luca, G, De Natale, D, Di Meglio, G, Ferragamo, A, Marchitelli,  
4       V, Piccolo, A, Scala, A, Somma, R, Spina, E, Troise, C (2020) The Covid-19 infection in  
5       Italy: a statistical study of an abnormally severe disease.,  
6       <https://doi.org/10.1101/2020.03.28.20046243>.
- 7 Dix-Carneiro, R, Soares, RR, Ulyssea, G (2018) Economic Shocks and Crime: Evidence from  
8       the Brazilian Trade Liberalization, *American Economic Journal: Applied Economics* 2018,  
9       10(4): 158–195
- 10 Drozd, L. A., & Tavares, M. M. (2020). *Responding to COVID-19: A Note Responding to COVID-19: A Note* \*. <https://doi.org/10.21799/frbp.wp.2020.14>
- 12 Duan, L, Zhu, G (2020) Psychological interventions for people affected by the COVID-19  
13       epidemic. *The Lancet*, VOLUME 7, ISSUE 4, P300-302
- 14 Fernandes, N. (2020). Economic Effects of Coronavirus Outbreak (COVID-19) on the World  
15       Economy. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3557504>
- 16 Fetzer, T., Witte, M., Hensel, L., Jachimowicz, J. M., Haushofer, J., Ivchenko, A., ... Yoeli, E.  
17       (2020). Global Behaviors and Perceptions in the COVID-19 Pandemic. *PsyArXiv [Working  
18 Paper]*. <https://doi.org/10.31234/OSF.IO/3KFMH>
- 19 Goldman-Mellor, S. J., Saxton, K. B., & Catalano, R. C. (2010). Economic contraction and  
20       mental health: A review of the evidence, 1990-2009. *International Journal of Mental Health*,  
21       39(2), 6–31. <https://doi.org/10.2753/IMH0020-7411390201>
- 22 Guan W-jie, Liang W-hua, Zhao Y, et al. Comorbidity and its impact on 1590 patients with  
23       Covid-19 in China: A Nationwide Analysis. *Eur Respir J* 2020; in press  
24       (<https://doi.org/10.1183/13993003.00547-2020>).
- 25 Heffner, J., Vives, M.-L., & FeldmanHall, O. (n.d.). Emotional responses to prosocial messages  
26       increase willingness to self-isolate during the COVID-19 pandemic. *Preprint*.  
27       <https://doi.org/10.31234/osf.io/qkxvb>
- 28 Indolfi, C and Spaccarotella, C (2020) The Outbreak of COVID-19 in Italy. Fighting the  
29       Pandemic. *JACC: Case reports*
- 30 Kissler, SM, Tedjanto, C, Goldstein, E, Grad, YH, Lipsitch, M (2020) Projecting the  
31       transmission dynamics of SARS-CoV-2 through the postpandemic period. *Science*, doi:  
32       10.1126/science.abb5793
- 33 Lancet (Editorial) (2020) COVID-19: Endgame. *The Lancet*, Vol 20: 511
- 34 Lau, H., Khosrawipour, V., Kocbach, P., Mikolajczyk, A., Schubert, J., Bania, J., &  
35       Khosrawipour, T. (2020). The positive impact of lockdown in Wuhan on containing the  
36       COVID-19 outbreak in China. *Journal of Travel Medicine*.  
37       <https://doi.org/10.1093/jtm/taaa037>
- 38 Legido-Quigley, H, Asgari, N, Teo, YY, Leung, GM, Oshitani, H, Fukuda, K, Cook, AR, Hsu,  
39       LY, Shibuya, K, Heymann, D (2020) Are high-performing health systems resilient against  
40       the COVID-19 epidemic? *The Lancet*, VOLUME 395, ISSUE 10227, P848-850,
- 41 Liu, J. J., Bao, Y., Huang, X., Shi, J., & Lu, L. (2020). Mental health considerations for children  
42       quarantined because of COVID-19. *The Lancet Child & Adolescent Health*, 4(5), 347–349.  
43       [https://doi.org/10.1016/S2352-4642\(20\)30096-1](https://doi.org/10.1016/S2352-4642(20)30096-1)
- 44 Liu, S, Yang, L, Zhang, C, Xiang, Y-T, Liu, Z, Hu, S, Zhang, B (2020) Online mental health  
45       services in China during the COVID-19 outbreak. *The Lancet*, VOLUME 7, ISSUE 4,

- 1 E17-E18,  
2 Lovibond, S.H. & Lovibond, P.F. (1995). Manual for the Depression Anxiety & Stress Scales.  
3 (2nd Ed.) Sydney: Psychology Foundation.
- 4 Mani A, Mullainathan S, Shafir E, Zhao J (2013) Poverty impedes cognitive function. *Science*  
5 341:976–980.
- 6 Markel, H., Lipman, H. B., Navarro, J. A., Sloan, A., Michalsen, J. R., Stern, A. M., & Cetron,  
7 M. S. (2007). Nonpharmaceutical Interventions Implemented by US Cities During the  
8 1918-1919 Influenza Pandemic. *JAMA*, 298(6), 644.  
9 <https://doi.org/10.1001/jama.298.6.644>
- 10 McKee, M., & Stuckler, D. (2020). If the world fails to protect the economy, COVID-19 will  
11 damage health not just now but also in the future. *Nature Medicine*, 1-3.
- 12 McSweeney, K., Colman, A., Fancourt, N., Parnell, M., Stantiall, S., Rice, G., ... Wilson, N. (2007).  
13 Was rurality protective in the 1918 influenza pandemic in New Zealand? *New Zealand  
14 Medical Journal*.
- 15 Nagar, H., & Formenti, S. C. (2020). Cancer and COVID-19 — potentially deleterious effects  
16 of delaying radiotherapy. *Nature Reviews Clinical Oncology*, 1–3.  
17 <https://doi.org/10.1038/s41571-020-0375-1>
- 18 Nature Medicine -Editorial (2020) Keep mental health in mind. *Nat Med* (2020).  
19 <https://doi.org/10.1038/s41591-020-0914-4>
- 20 Pennycook, G., McPhetres, J., Bago, B., & Rand, D. (n.d.). *Predictors of attitudes and misperceptions  
21 about COVID-19 in Canada, the U.K., and the U.S.A.*  
22 <https://doi.org/10.31234/OSF.IO/ZHJKP>
- 23 Pennycook, G., McPhetres, J., Zhang, Y., & Rand, D. (2020). Fighting COVID-19  
24 misinformation on social media: Experimental evidence for a scalable accuracy nudge  
25 intervention. *PsyArXiv [Working Paper]*, 1–24. <https://doi.org/10.31234/OSF.IO/UHBK9>
- 26 Pisano, GP, Sadun, R, Zanin, M (2020) Lessons from Italy's Response to Coronavirus. *Harvard  
27 Business Review*, March 27, 2020 <https://hbr.org/2020/03/lessons-from-italys-response-to-coronavirus>
- 28 Richardson, S, Hirsch, JS, Narasimhan, M, Crawford, JM, McGinn, T, Davidson, KW, the  
29 Northwell COVID-19 Research Consortium (2020) Presenting Characteristics,  
30 Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the  
31 New York City Area, *JAMA*
- 32 Rhodes, A., Ferdinand, P., Flaatten, H., Guidet, B., Metnitz, P. G., & Moreno, R. P. (2012).  
33 The variability of critical care bed numbers in Europe. *Intensive Care Medicine*, 38(10), 1647–  
34 1653. <https://doi.org/10.1007/s00134-012-2627-8>
- 35 Roy, D., Tripathy, S., Kar, S. K., Sharma, N., Verma, S. K., & Kaushal, V. (2020). Study of  
36 knowledge, attitude, anxiety & perceived mental healthcare need in Indian population  
37 during COVID-19 pandemic. *Asian journal of psychiatry*, 51, 102083. Advance online  
38 publication. <https://doi.org/10.1016/j.ajp.2020.102083>
- 39 Shah, AK, Shafir, E, Mullanaithan, S (2015) Scarcity Frames Value. *Psychological Science*, 26(4):  
40 402-412
- 41 Stanczyk, L., Cohen, I. G., Shachar, C., Allen, D., Sethi, R., Weyl, G., & Brooks, R. (2020).  
42 *Securing Justice, Health, and Democracy against the COVID-19 Threat*. 1–41. Retrieved from  
43 <https://ethics.harvard.edu/justice-health-white-paper>
- 44 Sunstein, C. R. (2003). *The Cost-Benefit State: The Future of Regulatory Protection*. Retrieved from

- 1 https://books.google.com.co/books?id=9MypTgnJOzcC&printsec=frontcover&dq=isbn:9781590310540&hl=en&sa=X&ved=0ahUKEwiqgrSUzJPpAhWSiOAKHb7cCREQ6AEIJzAA#v=onepage&q&f=false
- 2 Sunstein, C. R. (2019). The Cost-Benefit Revolution. In *The Cost-Benefit Revolution*.  
3 https://doi.org/10.7551/mitpress/11571.001.0001
- 4 Surico, P., Galeotti, A. (2020) The economics of a pandemic. The case of COVID-19.  
5 presentation, London Business School.
- 6 Tang, B., Xia, F., Tang, S., Bragazzi, N. L., Li, Q., Sun, X., ... Wu, J. (2020). The effectiveness  
7 of quarantine and isolation determine the trend of the COVID-19 epidemics in the final  
8 phase of the current outbreak in China. *International Journal of Infectious Diseases*.  
9 https://doi.org/https://doi.org/10.1016/j.ijid.2020.03.018
- 10 Wahlbeck, K., Anderson, P., Basu, S., McDaid, D., & Stuckler, D. (2011). Impact of economic  
11 crises on mental health. *World Health*, 34. Retrieved from  
12 http://www.euro.who.int/en/home
- 13 Wahlbeck, K., & McDaid, D. (2012, October 1). Actions to alleviate the mental health impact  
14 of the economic crisis. *World Psychiatry*. Blackwell Publishing Ltd.  
15 https://doi.org/10.1002/j.2051-5545.2012.tb00114.x
- 16 Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, RS, Choo, FN, Tran, B., Ho, R., Sharma, VK,  
17 Ho, C. (2020) A Longitudinal Study on the Mental Health of General Population during the  
18 COVID-19 Epidemic in China. *Brain, Behavior, and Immunity*, doi:  
19 https://doi.org/10.1016/j.bbi.2020.04.028
- 20 WHO (2020) WHO announces COVID-19 outbreak a pandemic, available at:  
21 https://bit.ly/3frWeLK
- 22 Wilder-Smith, A., & Freedman, D. O. (2020). Isolation, quarantine, social distancing and  
23 community containment: pivotal role for old-style public health measures in the novel  
24 coronavirus (2019-nCoV) outbreak. *Journal of Travel Medicine*, 27(2).  
25 https://doi.org/10.1093/jtm/taaa020
- 26 Wu, Z., & McGoogan, J. M. (2020). Characteristics of and Important Lessons From the  
27 Coronavirus Disease 2019 (COVID-19) Outbreak in China. *JAMA*, 323(13), 1239.  
28 https://doi.org/10.1001/jama.2020.2648
- 29 Yang, J., Zheng, Y., Gou, X., Pu, K., Chen, Z., Guo, Q., Ji, R., Wang, H., Wang, Y., Zhou, Y. (2020)  
30 Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients  
31 Hospitalized With COVID-19 in the New York City Area. *International Journal of  
32 Infectious Diseases* 94 (2020) 91–95
- 33 Zhang, J., Wu, W., Zhao, X., & Zhang, W. (2020). Recommended psychological crisis  
34 intervention response to the 2019 novel coronavirus pneumonia outbreak in China: a  
35 model of West China Hospital. *Precision Clinical Medicine*, 3(1), 3–8.  
36 https://doi.org/10.1093/pcmedi/pbaa006
- 37
- 38
- 39

# **Assessing concerns for economic consequence of the COVID-19 response and stress induced by economic vulnerability during the pandemic**

## **Supplementary Online Materials**

*Cristiano Codagnone, Francesco Bogliacino, Camilo Gómez, Rafael Charris, Felipe Montalegre, Giovanni Liva, Francisco Lupiáñez Villanueva, Frans Folkvord, Giuseppe Veltri*

### **Table of contents**

<b>Section 1. Questionnaire.....</b>	<b>22</b>
<b>Section 2. Supplementary Statistical Analysis.....</b>	<b>30</b>

## **Section 1. Questionnaire**

### **LIST EXPERIMENT**

#### Control

Below you will find a list of statements on which some people agree and others disagree. Please tell us how many of them you agree with. We do not need to know WHICH ones you agree with, just HOW MANY.

1. Globalization has benefitted most of the population in the world
2. Immigration is a threat for our lifestyle
3. The health professionals are facing the largest risk in this pandemic
4. On important policy issues, the government should always follow the opinion of the experts

#### Treatment one

Below you will find a list of statements on which some people agree and others disagree. Please tell us how many of them you agree with. We do not need to know WHICH ones you agree with, just HOW MANY.

1. Globalization has benefitted most of the population in the world
2. Immigration is a threat for our lifestyle
3. The health professionals are facing the largest risk in this pandemic
4. On important policy issues, the government should always follow the opinion of the experts
5. During the pandemic, the government should not only focus on preventing contagion but also on avoiding a major economic crisis.

#### Treatment two

Below you will find a list of statements on which some people agree and others disagree. Please tell us how many of them you agree with. We do not need to know WHICH ones you agree with, just HOW MANY.

1. Globalization has benefitted most of the population in the world
2. Immigration is a threat for our lifestyle
3. The health professionals are facing the largest risk in this pandemic
4. On important policy issues, the government should always follow the opinion of the experts
5. During the pandemic, the government should not only communicate to citizens what to do to adhere to the safety measures, but also clearly explain how it is planning the way out

#### Treatment three

Below you will find a list of statements on which some people agree and others disagree. Please tell us WHICH ones of them you agree with.

1. Globalization has benefitted most of the population in the world
  2. Immigration is a threat for our lifestyle
  3. The health professionals are facing the largest risk in this pandemic
  4. On important policy issues, the government should always follow the opinion of the experts
  5. During the pandemic, the government should not only focus on preventing contagion but also on avoiding a major economic crisis.
  6. During the pandemic, the government should not only communicate to citizens what to do to adhere to the safety measures, but also explain clearly how it is planning the way out
- 1) How old are you?  
\_\_\_\_ years old
- 2) What is your sex?
- a) Female
  - b) Male
  - c) Other
- 3) What is the highest level of education you have completed?
- a) Primary school or less
  - b) High school
  - c) Some years of university (not completed)
  - d) University degree completed
  - e) Post-graduate (master, PhD, other)
- 4) What is your marital status?
- a) Single (never married)
  - b) Married or in civil union
  - c) Divorced or Widowed
- 5) What is your household (yearly) income?
- a) 9.999 Euro or below
  - b) 10.000 Euro – 29.999 Euro
  - c) 30.000 Euro – 49.999 Euro
  - d) 50.000 Euro – 149.999 Euro
  - e) 150.000 Euro or above
- 6) Which of the following best describe the area of your primary residency?
- a) Urban
  - b) Suburban
  - c) Rural
- 7) Which of the following situations best describes your current labor market status?
- a) Employed
  - b) In search of job
  - c) Student
  - d) Retired
  - e) Other (no work/no search/no study, housekeeper, disabled non-working person)
- 8) Which of the following occupations best describes your current prevalent activity?
- a) DIRECTORS: Directors, Executives, Directors of a company

- b) BUSINESSMEN, HOLDERS OF ACTIVITIES: Entrepreneurs, small companies or holders of activities
- c) INTELLECTUAL PROFESSIONALS, SCIENTISTS: Physicians, Chemists, Statisticians, Computer Scientists, Engineers, Architects, Biologists, Veterinarians, Pharmacists, Doctors, Dentists, Specialists in management, commercial and banking sciences, Lawyers, Solicitors, Notaries, Magistrates, University Professors (ordinary and associate), Specialists in economic, sociological, psychological, artistic, political, philosophical and literary sciences, Journalists
- d) TEACHERS: Upper and lower secondary school teachers
- e) TECHNICAL PROFESSIONALS: Physical and Chemical Technicians, Stock and Exchange Brokers, Commercial Agents, Representatives, Aircraft Pilots and Civil Aviation Technicians, Photographers, Nurses, Midwives, Dieticians, Hygienists, Paramedics, Insurance Agents, Experts, Designers, Computer Social Workers, Civil Construction Engineers, Web Operators, Programmers
- f) EMPLOYEES: Administrative employees, secretarial staff, accountants, employees in direct contact with the public, cashiers, counter employees
- g) TRADERS OR SERVICES: Wholesalers and managers of wholesale and retail sales, Office workers and similar, Hotel service providers and similar, Waiters, Gunsmiths, Sports, recreational and cultural service providers, Hairdressers, Beauticians, Traffic Police, State Police, Firemen, Private security guards
- h) ARTISTS: Artisans, Plumbers, Electricians, Tilers, Installers, Mechanics, Appliance Repairers, Goldsmiths, Decorators, Tailors, Bakers, Carpenters, Butchers, Fruit and Vegetable Makers
  - i) SPECIALIZED WORKERS: Specialized workers
  - j) FARMERS: Farmers and agricultural workers, Breeders, Fishermen
  - k) MACHINE WORKERS AND DRIVERS: Industrial plant operators, founders, assembly line workers, general workers, drivers, carpenters
  - l) UNSKILLED PROFESSIONS: Bailiffs, Doormen, Warehouse Keepers, Delivery Workers, Street Vendors, Litter Bins, Street Sweepers, Launderers, Garages, Farmers, Craftsmen and similar workers
  - m) ARMED FORCES: Military of all orders and ranks
- 9) What is the type of dwelling occupied by your household?
  - a) Own, fully paid
  - b) Own, we are paying it
  - c) For rent, sublet or leasing
  - d) In usufruct
  - e) Other form of tenure (untitled possession, de facto occupant, collective property, etc.)
- 10) What is the useful living area of your home? (It is understood by useful living area, that included within the exteriors of the house, including the common spaces).
 

\_\_\_\_\_ squared meters ( $m^2$ ).
- 11) How many people usually live in your household?
  - a) Adult men (age 18 and above) [ ] persons
  - b) Adult women (age 18 and above) [ ] persons
  - c) Boy children (age 3 – 17) [ ] persons

- d) Girl children (age 3 – 17) [ ] persons
  - e) Babies (boy) (age under 3) [ ] persons
  - f) Babies (girl) (age under 3) [ ] persons
- 12) Are there other persons not living in your household because they are currently working away from home?
- a) Yes [ ] persons
  - b) No
- 13) How many children are of school age in your household?
- a) [ ] children 3-11 y.o.
  - b) [ ] children 12-18 y.o.
- 14) What behavior(s) have you adopted in response to COVID-19 outbreak? In case it applies, please select more than one item.
- a) Hand washing
  - b) Limiting exiting home.
  - c) Cover coughs/sneezes
  - d) Cleaning surfaces daily
  - e) Staying home when sick
  - f) Working from home
  - g) Nothing
  - h) Wearing face mask
  - i) Changing / cancelling travel plans
  - j) Making family / communication plans
  - k) Stocking up home supplies and medicine
- 15) How much would the following factors prevent you from fully isolating yourself?
- a. Need to earn an income
    - a) Very Unlikely
    - b) Somewhat Unlikely
    - c) Somewhat Likely
    - d) Very Likely
  - b. Need to care for others outside your home, such as elderly parents
    - a) Very Unlikely
    - b) Somewhat Unlikely
    - c) Somewhat Likely
    - d) Very Likely
  - c. Don't want to miss certain social events / gatherings
    - a) Very Unlikely
    - b) Somewhat Unlikely
    - c) Somewhat Likely
    - d) Very Likely
  - d. Urge to practice sports
    - a) Very Unlikely
    - b) Somewhat Unlikely
    - c) Somewhat Likely
    - d) Very Likely

- e. Need to leave the house for some time (for family tensions, psychological stress, boredom)
  - a) Very Unlikely
  - b) Somewhat Unlikely
  - c) Somewhat Likely
  - d) Very Likely
- 16) If you lose your job, for how long do you believe you could pay your bills?
  - a) 1 month or less
  - b) 2 -3 months
  - c) 4 -5 months
  - d) 6 months or more
- 17) Over the past week, have any of the following events happened to you?
  - a. Forced to stay at home (in shelter)
    - a) Yes
    - b) No
  - b. Lost your employment (job or livelihood)
    - a) Yes
    - b) No
  - c. Decrease in earning or income
    - a) Yes
    - b) No
  - d. Had to homeschool child(ren)
    - a) Yes
    - b) No
  - e. Unable to access health care when needed
    - a) Yes
    - b) No
  - f. Unable to get access to sufficient food
    - a) Yes
    - b) No
  - g. Sought to get tested for COVID-19
    - a) Yes
    - b) No
  - h. Had to fill application for unemployment subsidy or other government sponsored support
    - a) Yes
    - b) No
  - i. Sought help or support from charities or other non-governmental organizations
    - a) Yes
    - b) No
- 18) How is your health in general?
  - a) Very good
  - b) Good
  - c) Neither good nor bad

- d) Bad
  - e) Very bad
- 19) Do you have any long-standing illness or health problem?
- a) Yes
  - b) No
- 20) Are you undergoing a long-term medical treatment?
- a) Yes
  - b) No
- 21) Do you have or have you ever had any of the following health problems?
- a) Diabetes
  - b) An allergy
  - c) Asthma
  - d) Hypertension (high blood pressure)
  - e) Long-standing troubles with your muscles, bones and joints (rheumatism, arthritis)
  - f) Cancer
  - g) Cataract
  - h) Migraine or frequent headaches
  - i) Chronic bronchitis, emphysema
  - j) Osteoporosis
  - k) Stroke, cerebral hemorrhage
  - l) Peptic ulcer (gastric or duodenal ulcer)
  - m) Chronic anxiety or depression
- 22) Is someone close to you, currently experiencing long-term illness or disability?
- a) Yes
  - b) No
- 23) Are you taking care of such a person?
- a) Yes
  - b) No
- 24) As result of COVID-19 outbreak?
- a. Have you visited a doctor?
    - a) Yes
    - b) No
  - b. Have you called a doctor and/or your health care center?
    - a) Yes
    - b) No
  - c. Have you contacted any phone number to reach the health authorities?
    - a) Yes
    - b) No
- 25) How many times did you visit a doctor during the last 12 months, before the COVID-19 outbreak?
- a) A few times
  - b) Once
  - c) Never
- 26) How often have you been bothered by the following over the past seven days?

- a) Felt down, depressed, or hopeless about the future
    - i) Most or all the time (5-7 days)
    - ii) Occasionally or a moderate amount of time (3-4 days)
    - iii) Some or a little of the time (1-2) days
    - iv) Rarely or none of the time (less than 1 day)
  - b) Felt little interest or pleasure in doing things
    - i) Most or all the time (5-7 days)
    - ii) Occasionally or a moderate amount of time (3-4 days)
    - iii) Some or a little of the time (1-2) days
    - iv) Rarely or none of the time (less than 1 day)
  - c) Felt nervous, anxious or on the edge
    - i) Most or all the time (5-7 days)
    - ii) Occasionally or a moderate amount of time (3-4 days)
    - iii) Some or a little of the time (1-2) days
    - iv) Rarely or none of the time (less than 1 day)
  - d) Had trouble falling or staying asleep, or sleeping too much
    - i) Most or all the time (5-7 days)
    - ii) Occasionally or a moderate amount of time (3-4 days)
    - iii) Some or a little of the time (1-2) days
    - iv) Rarely or none of the time (less than 1 day)
  - e) Felt bad about yourself — or that you are a failure or have let yourself or your family down
    - i) Most or all the time (5-7 days)
    - ii) Occasionally or a moderate amount of time (3-4 days)
    - iii) Some or a little of the time (1-2) days
    - iv) Rarely or none of the time (less than 1 day)
  - f) Had troubles concentrating on things
    - i) Most or all the time (5-7 days)
    - ii) Occasionally or a moderate amount of time (3-4 days)
    - iii) Some or a little of the time (1-2) days
    - iv) Rarely or none of the time (less than 1 day)
  - g) Had a physical reaction when thinking about the outbreak
    - i) Most or all the time (5-7 days)
    - ii) Occasionally or a moderate amount of time (3-4 days)
    - iii) Some or a little of the time (1-2) days
    - iv) Rarely or none of the time (less than 1 day)
  - h) Feeling tired or having little energy
    - i) Most or all the time (5-7 days)
    - ii) Occasionally or a moderate amount of time (3-4 days)
    - iii) Some or a little of the time (1-2) days
    - iv) Rarely or none of the time (less than 1 day)
- 27) How has your wage/earnings been affected after the COVID-19 outbreak?
- a) No change, full pay
  - b) Reduced pay

- c) My contract was terminated
  - d) My business has closed temporarily or definitely
  - e) Not paid by the company, government is subsidizing pay
  - f) Not paid by company, employee takes unpaid leave
  - g) Not paid, spending my savings/helped by acquaintances.
- 28) Has your employer taken any actions at the plants/offices as a result of the COVID-19 outbreak?
- a) Yes, closed plants/offices
  - b) No, but monitoring closely
  - c) No, they do not intend to close any facilities
- 29) Which of the following arrangements has your employer taken, or is taking, in response to the COVID-19 outbreak? In case it applies, please select more than one item.
- a) Disseminated protective gear (i.e., hand sanitizer, masks, gloves) for employees to use at their discretion
  - b) Arranged for temperatures to be checked at the workplace
  - c) Arranged special flexible working hours (i.e., reduced operating hours)
  - d) Requested self-quarantine for employees who have travelled within the last 14 days
  - e) Required self-quarantine for employees who have travelled within the last 14 days
  - f) Cancelled all international travel
  - g) Cancelled all domestic travel
  - h) Cancelled only non-essential travel to countries where there are confirmed cases of the coronavirus
  - i) Implemented a shift schedule to rotate staff and minimize the number of people at the worksite
  - j) Addressed employee's psychological stress
  - k) Conducted internal survey, interview or focus groups to understand what employees are thinking and feeling
  - l) Captured informal information to better understand employee's state of mind
  - m) Enhanced cleaning and sanitizing efforts across facilities
  - n) Allowing employees to use their paid time off in whatever manner is most convenient to them
  - o) Providing employees with a "work from home" playbook of best practices we know to be effective
  - p) Distributed a series of checklists and FAQ's regarding our company's approach to health and wealth
  - q) Established a private hotline for employees to alert the company to their potential infection in order to encourage self-disclosure

## Section 2. Supplementary Statistical Analysis

*Table S 1 Balancing of the covariates*

VARIABLES	Control	Treatment 1	Treatment 2	Treatment 3	Balance test (Chi2)
Age	41.94 (13.59)	42.21 (13.94)	41.77 (13.54)	44.95 (13.57)	0.048
Female	0.50 (0.50)	0.48 (0.49)	0.50 (0.50)	0.55 (0.49)	0.003
Education	3.20 (1.15)	3.17 (1.13)	3.19 (1.15)	3.09 (1.14)	0.004
Married	0.59 (0.49)	0.59 (0.49)	0.59 (0.49)	0.61 (0.48)	0.538
Unemployed	0.11 (0.31)	0.13 (0.34)	0.13 (0.34)	0.11 (0.32)	0.025
Household income	2.65 (0.99)	2.61 (0.99)	2.64 (1.00)	2.50 (0.92)	0.000
Urban residency	0.56 (0.49)	0.55 (0.49)	0.55 (0.49)	0.53 (0.49)	0.451
Living area (m2)	928.06 (25311)	350.90 (3045)	614.51 (8826)	2734.76 (76309)	0.627
People in home	3.11 (2.27)	3.20 (3.39)	3.16 (2.35)	3.02 (2.64)	0.268
Children in school	0.70 (1.58)	0.71 (1.58)	0.68 (1.20)	0.62 (1.22)	0.635
Home ownership	0.39 (0.48)	0.40 (0.49)	0.41 (0.49)	0.39 (0.48)	0.550

Note: This table reports the mean, the standard deviation (in parenthesis) between treatments and the Chi2 test over all treatments and control condition. ‘Age’ is the age of the respondent; this variable is constrained between 18-75. ‘Female’ is a dummy variable with a value of 1 if the respondent is female and 0 otherwise. ‘Education’ is a categorical variable with the categories described in Q3. ‘Married’ is a dummy a variable with a value of 1 if the respondent is married and 0 otherwise. ‘Unemployed’ is a dummy variable with a value of 1 if the respondent is in search of job and 0 otherwise. ‘Household income’ is a categorical variable with the categories described in Q5. ‘Urban residency’ is a dummy variable with the value of 1 if the respondent residency area is urban and 0 otherwise. ‘Living area’ reports the respondent home useful living area in  $m^2$ . ‘People in home’ reports how many people usually live in the respondent household. ‘Children in school’ reports how many children are of school age in the respondent household. ‘Homeownership’ is a dummy variable with the value of 1 if the respondent type of dwelling is own and fully paid.

Table S 2 Statement “During the pandemic, the government should not focus only in preventing contagion but also in avoiding a major economic crisis”

VARIABLES	(1)	(2)	(3)	(4)
	Total	Spain	UK	Italy
Number of items				
T1	0.62*** (0.02)	0.59*** (0.04)	0.60*** (0.04)	0.67*** (0.04)
Age	0.00*** (0.00)	0.00* (0.00)	0.01*** (0.00)	0.00 (0.00)
UK	0.06* (0.03)	- -	- -	- -
Italy	0.09*** (0.03)	- -	- -	- -
Female	0.01 (0.02)	0.03 (0.04)	-0.01 (0.04)	0.04 (0.04)
Education	0.02 (0.01)	0.01 (0.02)	-0.04** (0.02)	0.06*** (0.02)
Married	0.05* (0.03)	0.05 (0.05)	0.09* (0.05)	0.00 (0.05)
Unemployed	-0.02 (0.04)	-0.11* (0.07)	0.00 (0.09)	0.05 (0.06)
2 Household Income bracket	0.06 (0.05)	-0.02 (0.08)	0.05 (0.09)	0.15** (0.07)
3 Household Income bracket	0.08* (0.05)	-0.01 (0.09)	0.05 (0.09)	0.19** (0.08)
4 Household Income bracket	0.12** (0.05)	0.00 (0.10)	0.21** (0.09)	0.11 (0.09)
5 Household Income bracket	0.42*** (0.09)	0.79*** (0.20)	0.34** (0.15)	0.47*** (0.14)
Suburban residency	0.07** (0.03)	0.02 (0.06)	0.07 (0.05)	0.07 (0.05)
Rural residency	0.02 (0.04)	-0.11 (0.07)	0.03 (0.06)	0.08 (0.06)
Living area	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
People in home	-0.01* (0.01)	-0.00 (0.01)	-0.03*** (0.01)	0.00 (0.01)
Children in school	-0.02** (0.01)	-0.05*** (0.01)	0.01 (0.01)	-0.02 (0.03)
Home ownership	0.02 (0.03)	-0.02 (0.05)	0.05 (0.05)	0.03 (0.04)
Constant	2.06*** (0.08)	2.24*** (0.13)	2.23*** (0.14)	1.91*** (0.13)
Observations	6,314	2,102	2,112	2,100
R-squared	0.11	0.10	0.11	0.12
F test	41.32	15.59	17.26	19

Note: The dependent variable ‘Number of items’ describes the number of statements that the respondent agreed with in the list experiment. ‘T1’ is a dummy variable that has the value of 1 whether the respondent was assigned to the treatment 1 and 0 whether she was assigned to the control condition. ‘Age’ is the age of the respondent; this variable is constrained between 18-75. ‘UK’ is a dummy variable with the value of 1 if the respondent is from UK

and 0 otherwise. ‘Italy’ is a dummy variable with the value of 1 if the respondent is from Italy and 0 otherwise. ‘Female’ is a dummy variable with a value of 1 if the respondent is female and 0 otherwise. ‘Education’ is a categorical variable with the categories described in Q3. ‘Married’ is a dummy a variable with a value of 1 if the respondent is married and 0 otherwise. ‘Unemployed’ is a dummy variable with a value of 1 if the respondent is in search of job and 0 otherwise. ‘2 Household Income bracket’ is a dummy variable with the value of 1 if the household income is between 10.000 Euro and 29.999 Euro and 0 otherwise. ‘3 Household Income bracket’ is a dummy variable with the value of 1 if the household income is between 30.000 Euro and 49.999 Euro and 0 otherwise. ‘4 Household Income bracket’ is a dummy variable with the value of 1 if the household income is between 50.000 Euro and 149.999 Euro and 0 otherwise. ‘5 Household Income bracket’ is a dummy variable with the value of 1 if the household income is 150.000 Euro or above and 0 otherwise. ‘Suburban residency’ is a dummy variable with the value of 1 if the respondent residency area is suburban and 0 otherwise. ‘Rural residency’ is a dummy variable with the value of 1 if the respondent residency area is rural and 0 otherwise. ‘Living area’ reports the respondent home useful living area in  $m^2$ . ‘People in home’ reports how many people usually live in the respondent household. ‘Children in school’ reports how many children are of school age in the respondent household. ‘Homeownership’ is a dummy variable with the value of 1 if the respondent type of dwelling is own and fully paid. Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table S 3 Statement "During the pandemic, the government should not only communicate citizens what to do to adhere to the safety measures, but also explain clearly how it is planning the way out"

VARIABLES	(1)	(2)	(3)	(4)
	Total	Spain	UK	Italy
Number of items				
T2	0.70*** (0.02)	0.72*** (0.04)	0.73*** (0.04)	0.65*** (0.04)
Age	0.00*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.00 (0.00)
UK	0.10*** (0.03)	- -	- -	- -
Italy	0.03 (0.03)	- -	- -	- -
Female	-0.02 (0.02)	-0.03 (0.04)	-0.00 (0.04)	-0.01 (0.04)
Education	0.04*** (0.01)	0.06*** (0.02)	0.00 (0.02)	0.05*** (0.02)
Married	0.03 (0.03)	0.04 (0.05)	0.10** (0.05)	-0.02 (0.05)
Unemployed	-0.05 (0.04)	-0.12* (0.06)	0.05 (0.08)	-0.04 (0.06)
2 Household Income bracket	0.17*** (0.05)	0.17** (0.08)	0.09 (0.09)	0.23*** (0.07)
3 Household Income bracket	0.19*** (0.05)	0.12 (0.09)	0.12 (0.09)	0.29*** (0.08)
4 Household Income bracket	0.17*** (0.05)	0.12 (0.10)	0.22** (0.09)	0.07 (0.09)
5 Household Income bracket	0.36*** (0.09)	0.13 (0.27)	0.24 (0.15)	0.57*** (0.15)
Suburban residency	0.02 (0.03)	-0.08 (0.06)	0.08 (0.05)	0.01 (0.05)
Rural residency	0.02 (0.04)	-0.09 (0.08)	0.06 (0.06)	0.04 (0.06)
Living area	-0.00** (0.00)	-0.00** (0.00)	-0.00* (0.00)	0.00 (0.00)
People in home	0.02** (0.01)	0.02** (0.01)	0.00 (0.01)	0.02 (0.01)
Children in school	-0.02** (0.01)	-0.01 (0.01)	-0.01 (0.02)	-0.07* (0.04)
Home ownership	0.04 (0.03)	0.02 (0.05)	0.02 (0.05)	0.05 (0.04)
Constant	1.83*** (0.08)	1.71*** (0.13)	1.95*** (0.14)	1.94*** (0.12)
Observations	6,323	2,094	2,122	2,107
R-squared	0.13	0.14	0.15	0.13
F test	53.96	21	24.44	18.31

Note: The dependent variable 'Number of items' describes the number of statements that the respondent agreed with in the list experiment. 'T2' is a dummy variable that has the value of 1 whether the respondent was assigned to the treatment 2 and 0 whether she was assigned to the control condition. 'Age' is the age of the respondent; this variable is constrained between 18-75. 'UK' is a dummy variable with the value of 1 if the respondent is from UK

and 0 otherwise. ‘Italy’ is a dummy variable with the value of 1 if the respondent is from Italy and 0 otherwise. ‘Female’ is a dummy variable with a value of 1 if the respondent is female and 0 otherwise. ‘Education’ is a categorical variable with the categories described in Q3. ‘Married’ is a dummy a variable with a value of 1 if the respondent is married and 0 otherwise. ‘Unemployed’ is a dummy variable with a value of 1 if the respondent is in search of job and 0 otherwise. ‘2 Household Income bracket’ is a dummy variable with the value of 1 if the household income is between 10.000 Euro and 29.999 Euro and 0 otherwise. ‘3 Household Income bracket’ is a dummy variable with the value of 1 if the household income is between 30.000 Euro and 49.999 Euro and 0 otherwise. ‘4 Household Income bracket’ is a dummy variable with the value of 1 if the household income is between 50.000 Euro and 149.999 Euro and 0 otherwise. ‘5 Household Income bracket’ is a dummy variable with the value of 1 if the household income is 150.000 Euro or above and 0 otherwise. ‘Suburban residency’ is a dummy variable with the value of 1 if the respondent residency area is suburban and 0 otherwise. ‘Rural residency’ is a dummy variable with the value of 1 if the respondent residency area is rural and 0 otherwise. ‘Living area’ reports the respondent home useful living area in  $m^2$ . ‘People in home’ reports how many people usually live in the respondent household. ‘Children in school’ reports how many children are of school age in the respondent household. ‘Homeownership’ is a dummy variable with the value of 1 if the respondent type of dwelling is own and fully paid. Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table S 4 Direct response

VARIABLES	(1) Item 5	(2) Item 6
Age	-0.00 (0.00)	0.00 (0.00)
UK	-0.07 (0.04)	-0.07* (0.04)
Italy	0.07* (0.04)	-0.05 (0.04)
Female	-0.03 (0.03)	0.03 (0.03)
Education	-0.01 (0.01)	0.02 (0.01)
Married	-0.01 (0.03)	-0.00 (0.03)
Unemployed	0.05 (0.05)	-0.09* (0.05)
2 Household Income bracket	0.08 (0.05)	0.03 (0.05)
3 Household Income bracket	0.08 (0.06)	0.01 (0.06)
4 Household Income bracket	0.13** (0.07)	0.08 (0.06)
5 Household Income bracket	-0.15 (0.14)	-0.04 (0.15)
Suburban residency	-0.01 (0.04)	-0.03 (0.04)
Rural residency	-0.00 (0.05)	-0.02 (0.04)
Living area	0.00*** (0.00)	0.00*** (0.00)
People in home	-0.00 (0.00)	0.00 (0.01)
Children in school	-0.01 (0.01)	-0.04*** (0.01)
Home ownership	-0.01 (0.03)	0.00 (0.03)
Constant	0.58*** (0.09)	0.57*** (0.09)
Observations	1,080	1,080
R-squared	0.02	0.02
F test	4.212	4.098

Note: The dependent variable 'Item 5' ('Item 6') is a dummy variable with the value of 1 if the respondent agreed with statement 5 (6) of the treatment 3 in the list experiment. 'Age' is the age of the respondent; this variable is constrained between 18-75. 'UK' is a dummy variable with the value of 1 if the respondent is from UK and 0 otherwise. 'Italy' is a dummy variable with the value of 1 if the respondent is from Italy and 0 otherwise. 'Female' is a dummy variable with a value of 1 if the respondent is female and 0 otherwise. 'Education' is a categorical variable with the categories described in Q3. 'Married' is a dummy variable with a value of 1 if the respondent is married and 0 otherwise. 'Unemployed' is a dummy variable with a value of 1 if the respondent is in search of job and 0 otherwise. '2 Household Income bracket' is a dummy variable with the value of 1 if the household income is

between 10.000 Euro and 29.999 Euro and 0 otherwise. ‘3 Household Income bracket’ is a dummy variable with the value of 1 if the household income is between 30.000 Euro and 49.999 Euro and 0 otherwise. ‘4 Household Income bracket’ is a dummy variable with the value of 1 if the household income is between 50.000 Euro and 149.999 Euro and 0 otherwise. ‘5 Household Income bracket’ is a dummy variable with the value of 1 if the household income is 150.000 Euro or above and 0 otherwise. ‘Suburban residency’ is a dummy variable with the value of 1 if the respondent residency area is suburban and 0 otherwise. ‘Rural residency’ is a dummy variable with the value of 1 if the respondent residency area is rural and 0 otherwise. ‘Living area’ reports the respondent home useful living area in  $m^2$ . ‘People in home’ reports how many people usually live in the respondent household. ‘Children in school’ reports how many children are of school age in the respondent household. ‘Homeownership’ is a dummy variable with the value of 1 if the respondent type of dwelling is own and fully paid. Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table S 5 Frequencies – list experiment

# List item	Control	T1	T2
Spain			
0	1.5%	1.2%	1.4%
1	13.6%	7.7%	6.5%
2	43.4%	25.3%	19.7%
3	32.3%	36.8%	37.5%
4	9.2%	21.6%	27.2%
5	-	7.5%	7.8%
UK			
0	1.1%	1.8%	1.0%
1	10.1%	6.4%	4.0%
2	41.5%	19.5%	17.9%
3	37.9%	39.0%	39.0%
4	9.3%	24.5%	30.0%
5	-	8.7%	7.9%
Italy			
0	1.2%	0.3%	0.9%
1	13.0%	6.1%	6.5%
2	39.9%	20.6%	18.5%
3	35.3%	38.8%	42.1%
4	10.6%	25.8%	24.4%
5	-	8.2%	7.6%
Total			
0	1.3%	1.1%	1.1%
1	12.2%	6.8%	5.7%
2	41.6%	21.8%	18.7%
3	35.2%	38.1%	39.6%
4	9.7%	24.0%	27.2%
5	-	8.2%	7.8%

Table S 6 Test ceiling and floor effects - treatment 1

	Coefficient	P>z
Pr (R=0, S=1)	0.01 (0.00)	0.7191 1.0000
Pr (R=0, S=0)	0.01 (0.01)	1.0000 1.0000
Pr (R=1, S=1)	0.05 (0.01)	1.0000 1.0000
Pr (R=1, S=0)	0.07 (0.01)	1.0000 1.0000
Pr (R=2, S=1)	0.25 (0.01)	1.0000 1.0000
Pr (R=2, S=0)	0.16 (0.01)	1.0000 1.0000

$\Pr(R=3, S=1)$	0.22 (0.01)	1.0000
$\Pr(R=3, S=0)$	0.13 (0.01)	1.0000
$\Pr(R=4, S=1)$	0.08 (0.01)	1.0000
$\Pr(R=4, S=0)$	0.02 (0.01)	1.0000
		0.9839

Note: Coefficient variable is the estimated probability of all possible types of item-count responses for treatment 1.

Table S 7 Test for design effects - treatment 1

	K	Lambda	P>Lambda	#P>Lambda
$\Pr(R, S=0)$	0	0.0000	1.0000	1.0000
$\Pr(R, S=1)$	0	0.0000	1.0000	1.0000

Note: K is the number of estimated probabilities needed to be tested. The test uses the generalized moment selection procedure. #P indicates the Bonferroni-adjusted p-values.

Table S 8 Test ceiling and floor effects – treatment 2

	Coefficient	P>z
Pr (R=0, S=1)	0.01 (0.00)	0.7626 1.0000
Pr (R=0, S=0)	0.01 (0.01)	1.0000 1.0000
Pr (R=1, S=1)	0.06 (0.01)	1.0000 1.0000
Pr (R=1, S=0)	0.05 (0.01)	1.0000 1.0000
Pr (R=2, S=1)	0.29 (0.01)	1.0000 1.0000
Pr (R=2, S=0)	0.11 (0.01)	1.0000 1.0000
Pr (R=3, S=1)	0.25 (0.01)	1.0000 1.0000
Pr (R=3, S=0)	0.09 (0.01)	1.0000 1.0000
Pr (R=4, S=1)	0.07 (0.01)	1.0000 1.0000
Pr (R=4, S=0)	0.01 (0.01)	1.0000 0.9969

Note: Coefficient variable is the estimated probability of all possible types of item-count responses for treatment 1.

Table S 9 Test for design effects - treatment 2

	K	Lambda	P>Lambda	#P>Lambda
Pr (R, S=0)	0	0.0000	1.0000	1.0000
Pr (R, S=1)	0	0.0000	1.0000	1.0000

Note: K is the number of estimated probabilities needed to be tested. The test uses the generalized moment selection procedure. #P indicates the Bonferroni-adjusted p-values.

Figure S 1 Spearman rank-order correlation between stress and conditional prediction

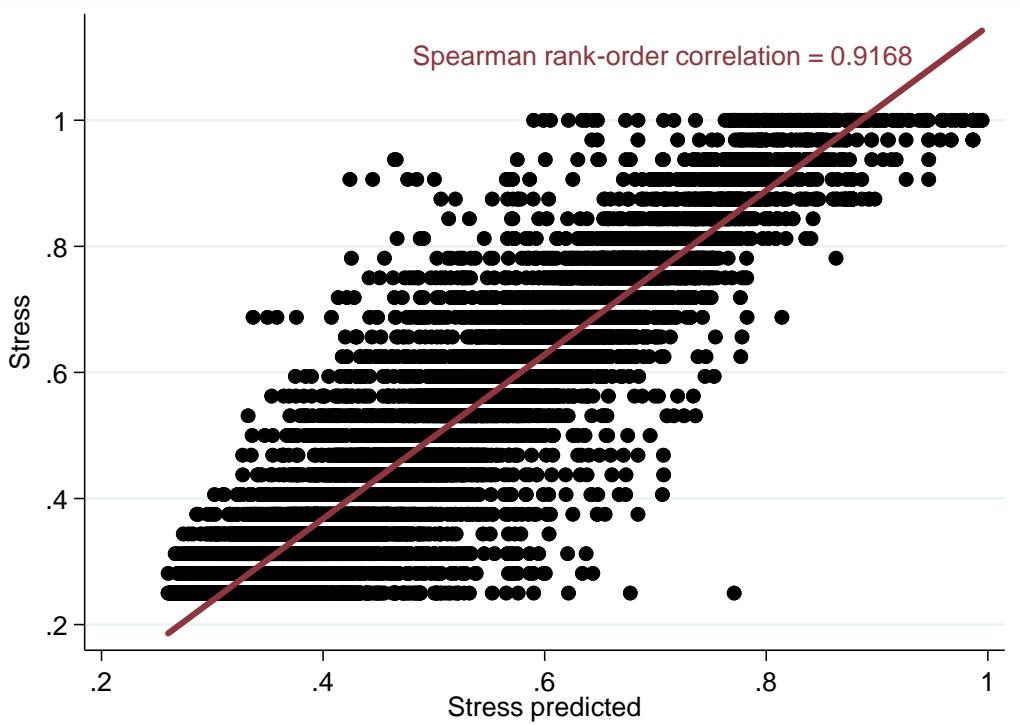


Figure S 2 Out-of-bag error (OOB error) convergence

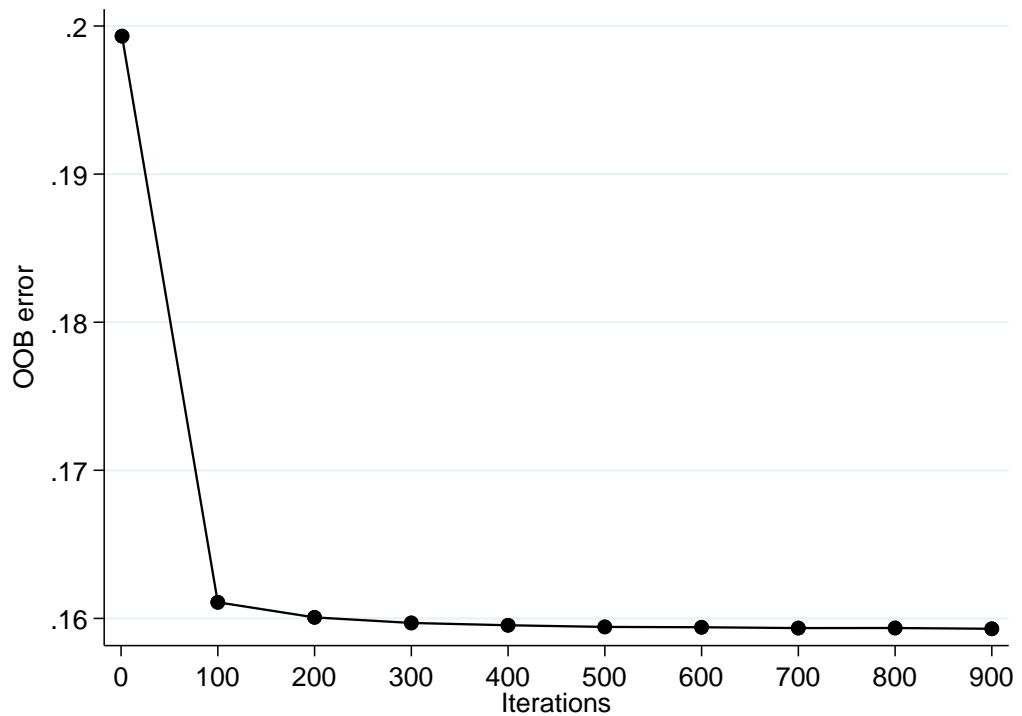


Figure S 3 Comparing the cumulative distribution of exposure to susceptibility, vulnerability, behavioural response, predicted stress conditional (50% of training sample) and predicted stress conditional on economic vulnerability and negative economic shock.

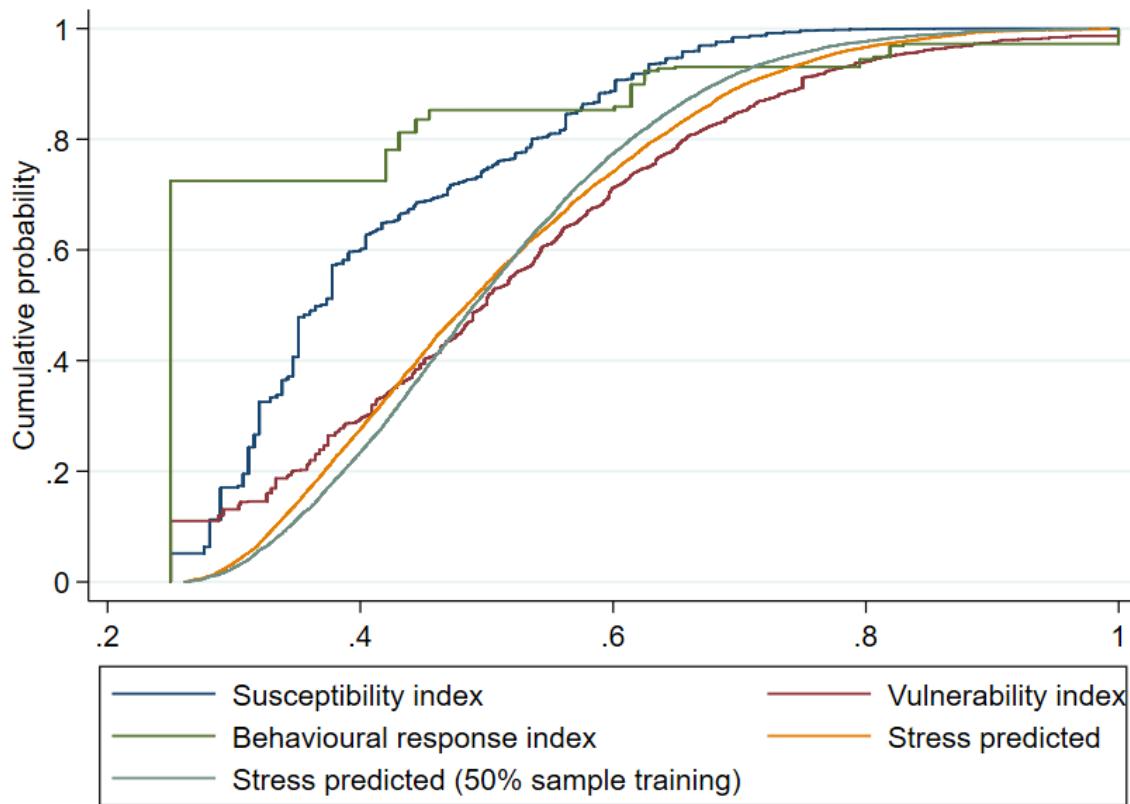


Table S 10 Variable importance – random forest algorithm

VARIABLES	IMPORTANCE
Household Income	0.50
Unemployed	0.58
Home ownership	0.54
Living area	0.58
People in home	0.51
Children in school	0.53
Cover the bills	0.65
Stress events	0.96
Income loss	1.00

Note: This table reports the importance for each variable used in the random forest estimation. The values are scaled proportional to largest value in the set (i.e. 'Income loss'). 'Household income' is a categorical variable with the categories described in Q5. 'Unemployed' is a dummy variable with a value of 1 if the respondent is in search of job and 0 otherwise. 'Homeownership' is a dummy variable with the value of 1 if the respondent's type of dwelling is own and fully paid. 'Living area' reports the respondent home useful living area in  $m^2$ . 'People in home' reports how many people usually live in the respondent household. 'Children in school' reports how many children

are of school age in the respondent household. ‘Cover the bills’ is a categorical variable with the categories described in Q16. ‘Stress events’ is an index composed by the questions Q17-a), b), c), d), e), f), h) & i). ‘Income loss’ is a dummy variable with the value of 1 if the respondent wage or earnings have been affected after the COVID-19 outbreak and 0 otherwise.

Table S11 Susceptibility to COVID-19

VARIABLES	Spain	UK	Italy	Total
Average age	41	43	42	42
At least one health problem	62.0%	56.8%	57.4%	58.7%
At least two health problems	28.2%	26.4%	23.7%	26.1%
At least one risky comorbidity	29.0%	33.2%	27.6%	29.9%
Bad or very bad health condition	4.9%	8.2%	3.0%	5.4%
Long-standing illness	32.0%	34.6%	27.5%	31.4%
Under long-term treatment	29.2%	24.9%	21.6%	25.2%
Visit a doctor during, more than once, the last 12 months	59.0%	42.9%	58.0%	53.3%

Note: ‘Average age’ is the average age of the respondents in each country. ‘At least one health problem’ is the share of respondents that reported have or ever had at least one health problem in the list in Q21. ‘At least two health problems’ is the share of respondents that reported have or ever had at least two health problems in the list in Q21. ‘At least one risky comorbidity’ is the share of respondents that reported have or ever had diabetes, hypertension, asthma, a cardiovascular disease or cancer (Guan, et al. 2020; Yang et al. 2020; Richardson et al. 2020). ‘Bad or very bad health condition’ is the share of respondents that answered “bad or very bad” to Q18. ‘Long-standing illness’ is the share of respondents that answered “yes” to Q19. ‘Under long-term treatment’ is the share of respondents that answered “yes” to Q20. ‘Visit a doctor during, more than once, the last 12 months’ is the share of respondents that answered “a few times” to Q25.

Table S 12 Vulnerability to COVID-19

VARIABLES	Spain	UK	Italy	Total
Need to earn an income	53.6%	48.7%	66.4%	56.2%
Need to care for others outside your home, such as elderly parents	43.0%	43.4%	47.7%	44.7%
Do not want to miss certain social events / gatherings	21.3%	15.2%	19.0%	18.5%
Urge to practice sports	38.0%	21.0%	33.8%	31.0%
Need to leave the house for some time (for family tensions, psychological stress, boredom)	25.5%	40.0%	42.3%	35.9%

Note: This table report the share of respondents that answered “very likely” or “somewhat likely” to Q15- a), b), c), d) and e), respectively.

Table S 13 Behavioural Response to COVID-19

VARIABLES	Spain	UK	Italy	Total
Sought to get tested for COVID-19	13.6%	7.3%	8.0%	9.6%
As result of COVID-19 outbreak? Have you visited a doctor?	12.8%	5.9%	11.0%	9.9%
As result of COVID-19 outbreak? Have you called a doctor and/or your health care centre?	26.3%	13.9%	16.0%	18.7%
As result of COVID-19 outbreak? Have you contacted any phone number to reach the health authorities?	19.2%	12.2%	9.6%	13.7%

Note: ‘Sought to get tested for COVID-19’ is the share of respondents that answered “Yes” to Q17- g). ‘As result of COVID-19 outbreak? Have you visited a doctor?’ is the share is the share of respondents that answered “Yes” to Q24- a). ‘As result of COVID-19 outbreak? Have you called a doctor and/or your health care centre?’ is the share of respondents that answered “Yes” to Q24- b). ‘As result of COVID-19 outbreak? Have

you contacted any phone number to reach the health authorities?’ is the share of respondents that answered “Yes” to Q24- c).

*Table S 14 Eigenvectors principal component analysis*

VARIABLES	Component 1
Susceptibility index	
Bad or very bad health condition	0.41
Long-standing illness	0.54
Under long-term treatment	0.51
Comorbidity	0.43
Visit a doctor during, more than once, the last 12 months	0.31
Vulnerability index	
Need to earn an income	0.41
Need to care for others outside your home, such as elderly parents	0.36
Don't want to miss certain social events / gatherings	0.49
Urge to practice sports	0.49
Need to leave the house for some time (for family tensions, psychological stress, boredom)	0.48
Behavioural response	
Sought to get tested for COVID-19	0.43
As result of COVID-19 outbreak? Have you visited a doctor?	0.49
As result of COVID-19 outbreak? Have you called a doctor and/or your health care centre?	0.53
As result of COVID-19 outbreak? Have you contacted any phone number to reach the health authorities?	0.54

Note: ‘Bad or very bad health condition’ is the share of respondents that answered “bad or very bad” to Q18. ‘Long-standing illness’ is the share of respondents that answered “yes” to Q19. ‘Under long-term treatment’ is the share of respondents that answered “yes” to Q20. ‘Comorbidity’ is the sum of health problems reported by the respondent in the list in Q21. ‘Visit a doctor during, more than once, the last 12 months’ is the share of respondents that answered “a few times” to Q25. This vulnerability index is composed by the variables that report the respondents that answered “very likely” or “somewhat likely” to Q15- a), b), c), d) and e), respectively. ‘Sought to get tested for COVID-19’ is the share of respondents that answered “Yes” to Q17- g). ‘As result of COVID-19 outbreak? Have you visited a doctor?’ describes the percentage of respondents that answered “Yes” to Q24- a). ‘As result of COVID-19 outbreak? Have you called a doctor and/or your health care centre?’ is the share of respondents that answered “Yes” to Q24- b). ‘As result of COVID-19 outbreak? Have you contacted any phone number to reach the health authorities?’ is the share of respondents that answered “Yes” to Q24- c).

Table S 15 Principal component analysis - Kaiser–Meyer–Olkin (KMO)

VARIABLES	KMO
Susceptibility index	0.73
Vulnerability index	0.72
Behavioural response index	0.72

Table S 16 Spearman correlation, total sample

	Stress	Stress predicted (15%)	Stress predicted (25%)	Stress predicted (33%)	Stress predicted (50%)
Stress predicted (15%)	0.43***	1			
Stress predicted (25%)	0.48***	0.57***	1		
Stress predicted (33%)	0.54***	0.56***	0.57***	1	
Stress predicted (50%)	0.65***	0.58***	0.60***	0.61***	1
Stress predicted (100%)	0.91***	0.55***	0.61***	0.66***	0.77***

Table S 17 Spearman correlation, out-of-sample

	Stress	Stress predicted (15%)	Stress predicted (25%)	Stress predicted (33%)	Stress predicted (50%)
Stress predicted (15%)	0.30***	1			
Stress predicted (25%)	0.29***	0.62***	1		
Stress predicted (33%)	0.30***	0.62***	0.65***	1	
Stress predicted (50%)	0.30***	0.64***	0.66***	0.67***	1
Stress predicted (100%)	0.91***	0.45***	0.47***	0.49***	0.53***