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Can Psychological Traits Explain Mobility Behavior during the COVID-19 Pandemic?

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Can Psychological Traits Explain Mobility Behavior during the COVID-19 Pandemic?

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Abstract:
The current COVID-19 pandemic is a global exogenous shock, impacting individuals' decision making and behaviour allowing researchers to test theories of personality by exploring how traits, in conjunction with individual and societal differences affect compliance and cooperation. Study 1 used Google Mobility data and nation-level personality data from 31 countries, both before and after region-specific legislative interventions, finding that agreeable nations are most consistently compliant with mobility restrictions. Study 2 (N= 105,857) replicated these findings using individual-level data, showing that several personality traits predict sheltering in place behavior, but extraverts are especially likely to remain mobile. Overall, our analyses reveal robust relationships between traits and regulatory compliance (mobility behaviour) both before and after region specific legislative interventions, and the global declaration of the pandemic. Further, we find significant effects on reasons for leaving home, as well as age and gender differences, particularly relating to female agreeableness for previous and future social mobility behaviours.

Keywords:
BIG 5 personality traits; COVID19; social mobility; Google mobility data

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Introduction

A large body of work in personality psychology reveals two important points about personality: first, personality traits are stable, heritable, and consistently predict behavior even across cultural or environmental variation (Black et al., 2010); second, personality represents fundamental responses to biological challenges encountered across human evolution (Heine & Buchtel, 2009). It is not surprising, then, that different cultures, which face distinct structural and ecological challenges, vary in personality (Schmitt et al., 2007).

No personality trait is unconditionally optimal (Nettle, 2006); any universally beneficial trait would quickly become a universal. Instead, each personality trait represents a fundamental behavioral tradeoff. For example, extraversion seems to confer a swath of important benefits—more sexual & reproductive opportunities (Nettle, 2005; Whyte et al. 2017; Whyte et al. 2019), greater social support (Franken, Gibson, & Mohan, 1990), and (in some cultures) life satisfaction (Kim, Schimmack, Oishi, & Tsutsui, 2018). Yet social interaction is not without risk, and extraversion is likely to be a liability when pathogen loads are high. Accordingly, exposure to pathogens is associated with reductions in both extraversion and agreeableness (Mortensen, Becker, Ackerman, Neuberg, & Kenrick, 2010; Schaller & Murray, 2008). Similarly, agreeableness may facilitate cooperation and trust among group members (White et al., 2012)—yet excessive trust and regard for the interests of others can lead to exploitation or may cause individuals not to advocate for their own interests (Nettle, 2006).

These personality traits are thought to facilitate adaptive behavior that aids in cooperation or disease avoidance—but do extraverted people and nations actually fare worse when a pandemic arrives? Do agreeable and conscientious people actually cooperate more when the stakes are high? The COVID-19 pandemic offers a unique opportunity to test these

theories of personality, disease threat, and cooperation hold using real-world data impacting people socially, emotionally, and cognitively (Psychological Science Editorial, 2020).

In the present investigation, we examine whether the Big 5 personality traits (Mccrae & John, 1992), at both national- and individual-levels, are associated with compliance to mobility restrictions during the COVID-19 pandemic. Given previous work on personality and pathogen threats (Mortensen et al., 2010; Schaller & Murray, 2008; Schaller & Park, 2011), we expect several broad trends. First, we expect extraverts to value social interaction more highly, and thus to discount the risks faced by social mobility; thus, nations and people high in extraversion will be less likely to reduce their mobility than more introverted nations and people, particularly in domains associated with optional social behavior. Second, given that conscientiousness is associated with reduced risk-tolerance and a future-oriented mindset, and agreeableness with empathy and cooperation, we expect conscientiousness and agreeableness to be associated with greater reductions in mobility, perhaps especially when restrictions are required by law.

In Study 1, we combine Google mobility data (Google LLC, 2020) and nation-level personality data to examine whether national differences in personality traits are associated with reductions in social mobility. Results vary depending on domain of mobility (e.g., school vs. social gatherings), but we broadly find that agreeableness and (less consistently) conscientious regions show greater reductions in mobility, whereas regions with greater openness to experience show smaller reductions. Extroverted nations also show smaller reductions in mobility, but this effect disappears when controlling for other personality traits.

In Study 2, we seek to replicate these findings at the individual level, using data from the International Survey on Coronavirus (Fetzer et al., 2020), which includes personality and demographic variables for 113,083 individuals across 164 countries collected in March and April of 2020. We again find that conscientiousness and agreeableness (but only for women)

are associated with the likelihood of staying home; contrary to regions-level results, individual-level openness to experience and neuroticism are both positively associated with staying home. The only personality trait that negatively predicted staying at home was extraversion.

General Method

In this study we will use both dynamic mobility data at the regional or national level as well as cross-sectional individual mobility data based on large-scale international survey. We run random effects models when exploring Google mobility data (study 1) and OLS regression when working with the international survey data (study 2). Analyses were performed in Stata 16 (Version 16.1 MP).

Study 1

To begin analysing how personality traits influence social mobility looking at regional and cross-country data over time. Daily data provide the opportunity to link the social mobility data with different stages of the pandemic and allows to take into account the dynamic nature of the pandemic and how responses occurred at different periods. The different stages of responses also hold different implications for the expected level of norm compliance (e.g., recommended versus mandatory social distancing).

Data

Mobility Data. We use mobility measures on a country and regional level from the COVID-19 Community Mobility Reports (Google LLC, 2020), accessed on May 12, 2020 (see also Chan et al. 2020). The data are anonymized and aggregated based on Google users who have opted in to their location history service. Mobility measure records the percent change in total number of visitors to places classified as Retail & Recreation, Grocery & Pharmacy, Parks, Transit

Stations, Workplaces, and percentage change to duration of stay at Residential places within the geographic area, from 15 February to 5 May 2020, compared to the median value of the same day of the week between 3 January and 6 February 2020. We use principal component analysis to extract the first principal component from the six (standardized) mobility measures to form our outcome variable. The first principal component has an eigenvalue of 4.83, explaining 80.45% of the total variance of the partial mobility to each of the six localities. The corresponding eigenvectors are 0.438 (*Retail & recreation*), 0.404 (*Grocery & pharmacy*), 0.31 (*Parks*), 0.433 (*Transit stations*), 0.420 (*Workplaces*), and -0.429 (*Residential*). The sample includes 586 geographical units from a total of 31 countries, with 24 countries at the subnational region levels (579 regions) and 7 countries at the national level (see Supplemental Material for details on region classification). For privacy reasons, Google censored values if the traffic volume is not high enough to ensure anonymity.

Personality traits. Big Five personality traits at the country level are based on Terracciano et al. (2005). The study explored whether national character is reflected in personality trait levels looking at 49 cultures. The five factors are standardized to unit variance.

COVID-19 Response Indicators. We explore an indicator variable denoting period before and after the WHO declared a world-wide pandemic on 11 March 2020. A set of government response indicators (recorded daily on a country level) on closures and containment relating to schools, workplaces, public events, private gatherings, public transport, residential confinement, and domestic travel, are obtained from the Oxford Covid-19 Government Response Tracker (OxCGRT). Each indicator categorises the level of strictness of the respective policy on an ordinal scale[7].

[7] Description of level of strictness are provided in detail in the Codebook for the Oxford Covid-19 Government Response Tracker (version 2.1, https://github.com/OxCGRT/covid-policy-tracker/blob/master/documentation/codebook.md, accessed 12 May 2020).

Controls. From the OxCGRT database, we also obtain the daily record of the number of Covid-19 related deaths and confirmed cases, taken from the European Centre for Disease Prevention and Control (ECDC) and from the JHU CSSE data repository. We derived the number of days since or before the first confirmed death in the country and number of confirmed cases (in natural log) as controls. We also include country-level variables: population density (people per squared km of land area), urban population (%), share of population over 65, GDP per capita (constant 2010 USD, in log), and unemployment rate (% of total labour force) obtained from the latest World Development Indicators. In terms of household composition, we control for the average household size and the percentage of households whose head is aged between 20-64 years; this data is obtained from the United Nations Household Size & Composition, 2019. We also include a binary variable denoting whether the day is a weekend according to the each country's definition[8]. Lastly, we also control for the average temperature (tenths of degrees C), recorded on a daily basis at the regional level, obtained from the Global Historical Climate Network Daily database (see Supplemental Material for details).

Descriptive statistics for the variables used in Study 1 are reported in Table S2 in the Supplemental Material. Correlations between personality traits are reported in Table S3, showing high-levels of correlations between the five personality traits (based on our sample countries).

Method

First, the relationship between personality traits and mobility changes was examined with random effects regressions across the entire sample period. In each regression, we include all control variables to control for mobility changes due to heterogeneity in social and population

[8] Definition of weekend is based on https://en.wikipedia.org/wiki/Workweek_and_weekend (accessed 07 May 2020).

structure, the severity of the situation, containment policies across countries, and temperature across geographic areas. Due to the high correlation between traits, we conduct our analysis examining one trait at a time. For robustness, we also present the result including all five traits in a single specification. Then, we examine whether such relationships are more salient after the WHO declares COVID-19 as a world pandemic by including an interaction term between trait and the declaration variable. To understand how different personalities respond to each confinement policy, we also show the changes to mobility with respect to each personality trait at different levels of strictness for each policy. We conduct all analyses with interaction terms for each trait separately.

Results

Our random effects regression reveal changes in mobility are significantly predicted by openness (β = .0725, *SE* = .0313, 95% CI = [.0112, .134], p = .0205) and agreeableness (β = -.0511, *SE* = .018, 95% CI = [-.0864, -.0158], p = .00454) (see Fig. 1). Regions with one standard deviation higher in openness are associated with a .1 SD increase in overall change in mobility; likewise, regions with one SD higher in agreeableness have .05 SD decrease in mobility change. Extraversion seems to be positively associated with mobility change (β = .0592, *SE* = .0306, 95% CI = [-.000829, .119], p = .0533) but the effect is not precisely estimated when other personality traits are controlled for (β = .0593, *SE* = .0583, 95% CI = [-.0549, .174], p = .309). On the other hand, conscientiousness is only negative and significant when all five traits are included in the model (β = -.0459, *SE* = .0239, 95% CI = [-.0928, .000927], p = .0547).

The results in Fig. 2 show that the effects of extraversion (χ^2 = 5.35, p = .021), openness (χ^2 = 11.86, p < .001), and agreeableness (χ^2 = 18.72, p < .001) on mobility change are more prominent in the period after COVID19 was declared as a global pandemic (the pre-declaration slope is not significantly different from 0, except for openness (at 10%)). Although the

interaction term for conscientiousness is significant (χ^2 = 5.44, p = .02), the post-declaration slope is significantly different from 0.

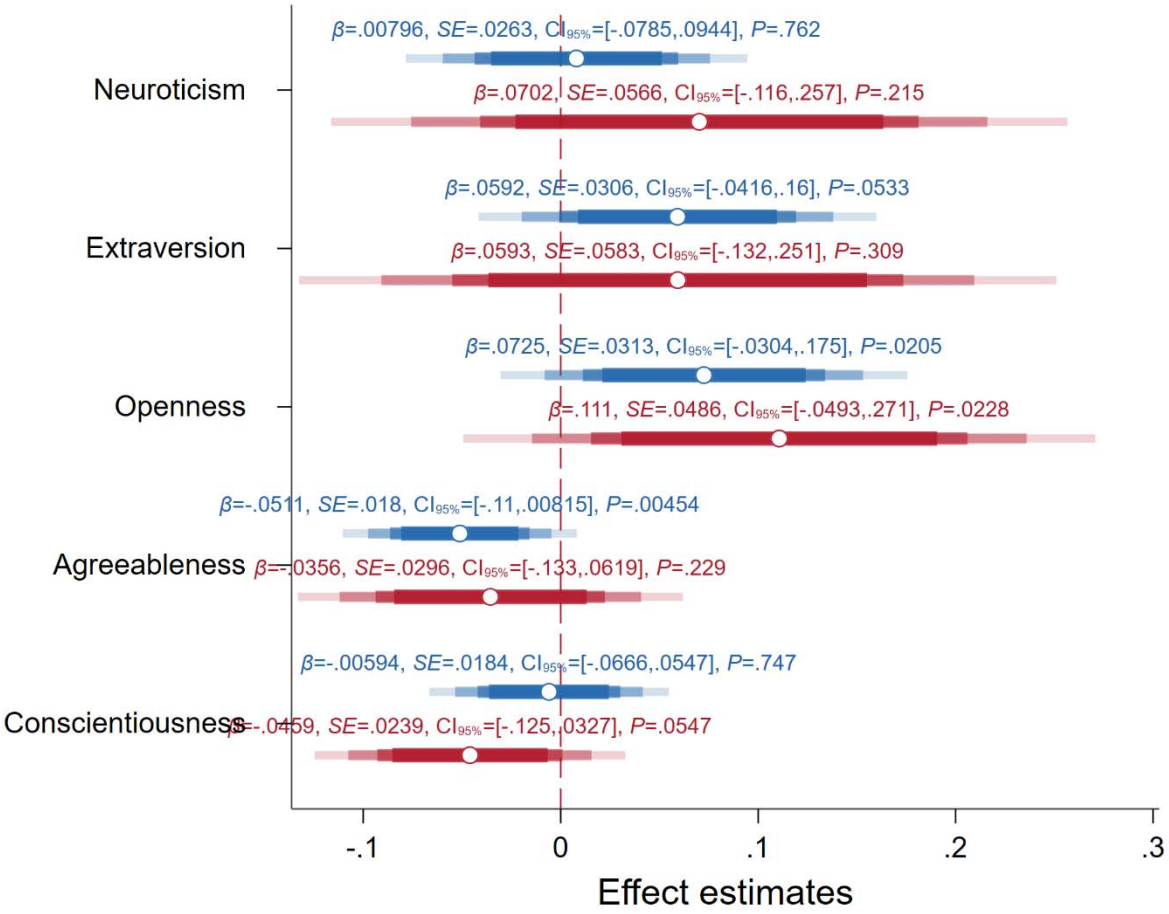

Fig. 1. Change in human mobility during Covid-19 as predicted by regional level personality traits. Results are shown for models with single trait (Blue) and all five traits (Red). All estimates are obtained from random effects model with control variables (Table S4). Error bars represent 99.9%, 99%, 95%, and 90% confidence intervals, respectively.

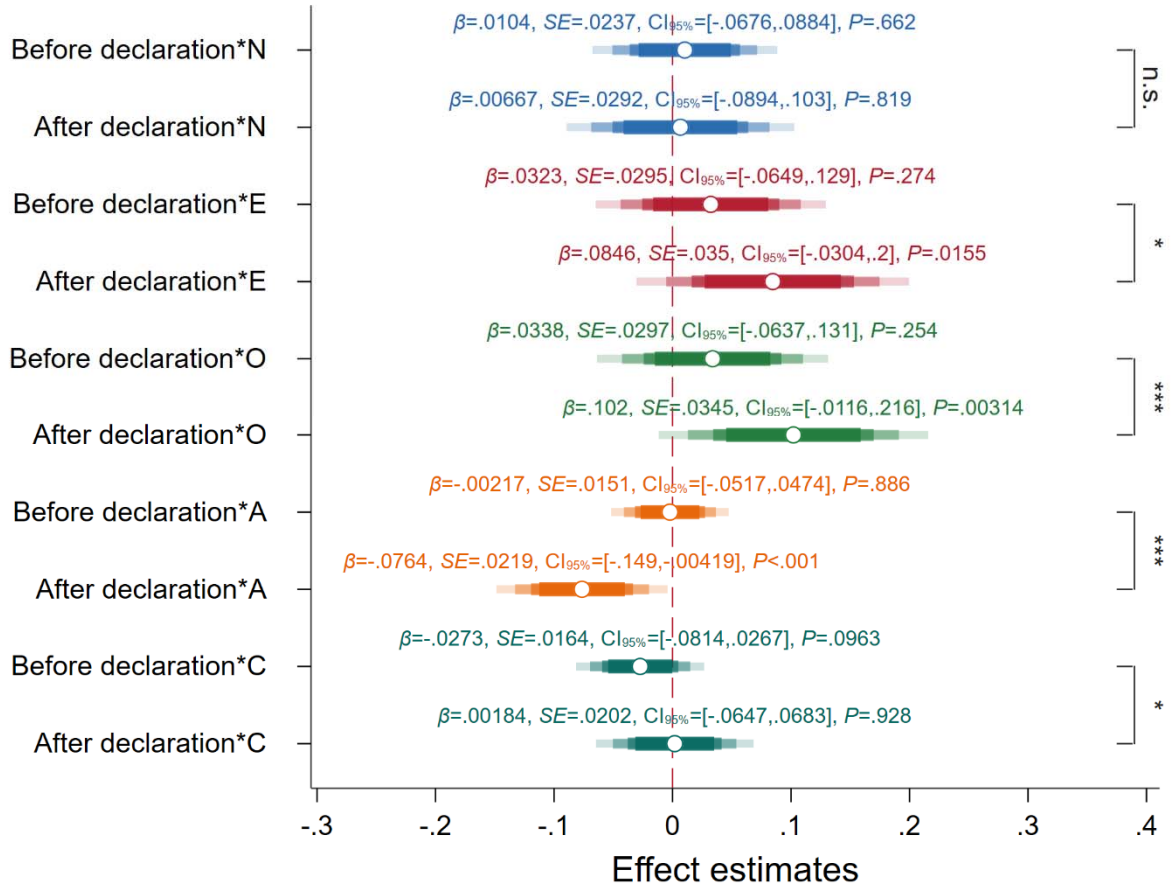

Fig. 2. Big 5 before and after pandemic declaration (each bar represents the slope estimate pre- and post-declaration period). The signs shows whether the two slopes (effect of personality on mobility) are significantly different to each other.
n.s. not significant; † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

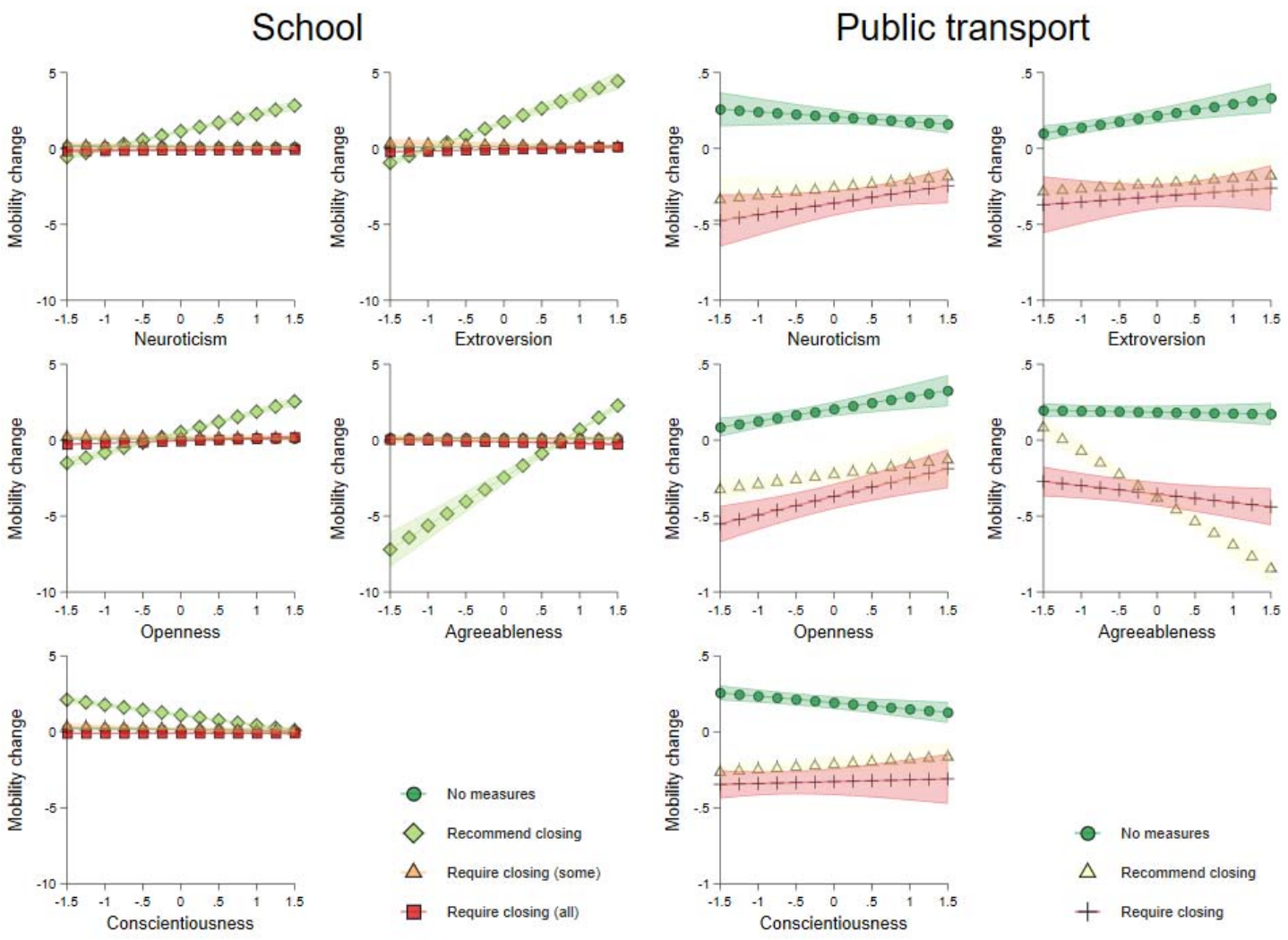

Fig. 3. Big 5 and mobility change with respect to School and Public Transport clousure policies. Estimates obtained from Table S6 and S7.

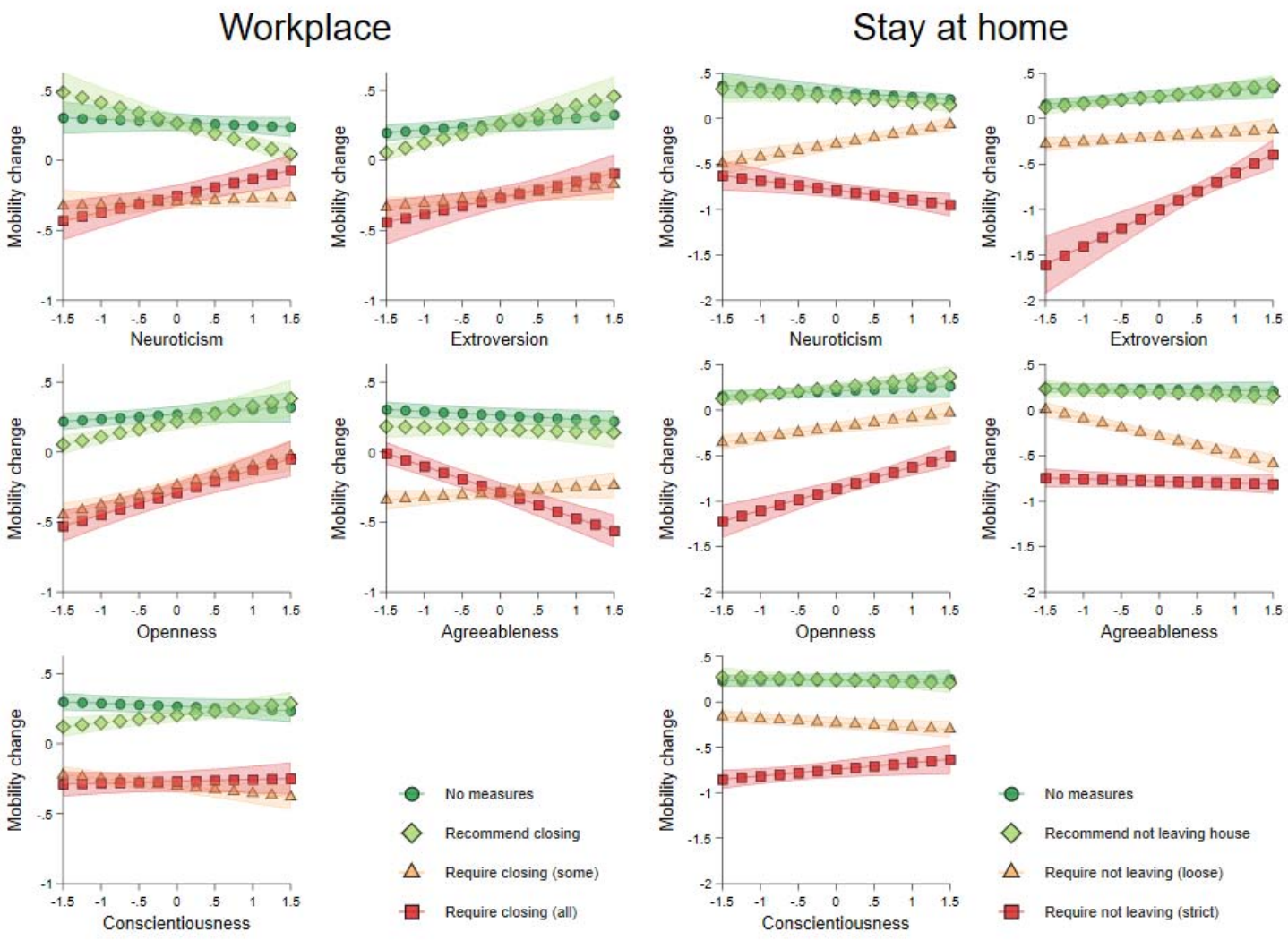

Fig. 4. Big 5 and mobility change with respect to Workplace clousure and Stay-at-Home policies. Estimates obtained from Table S8 and S9.

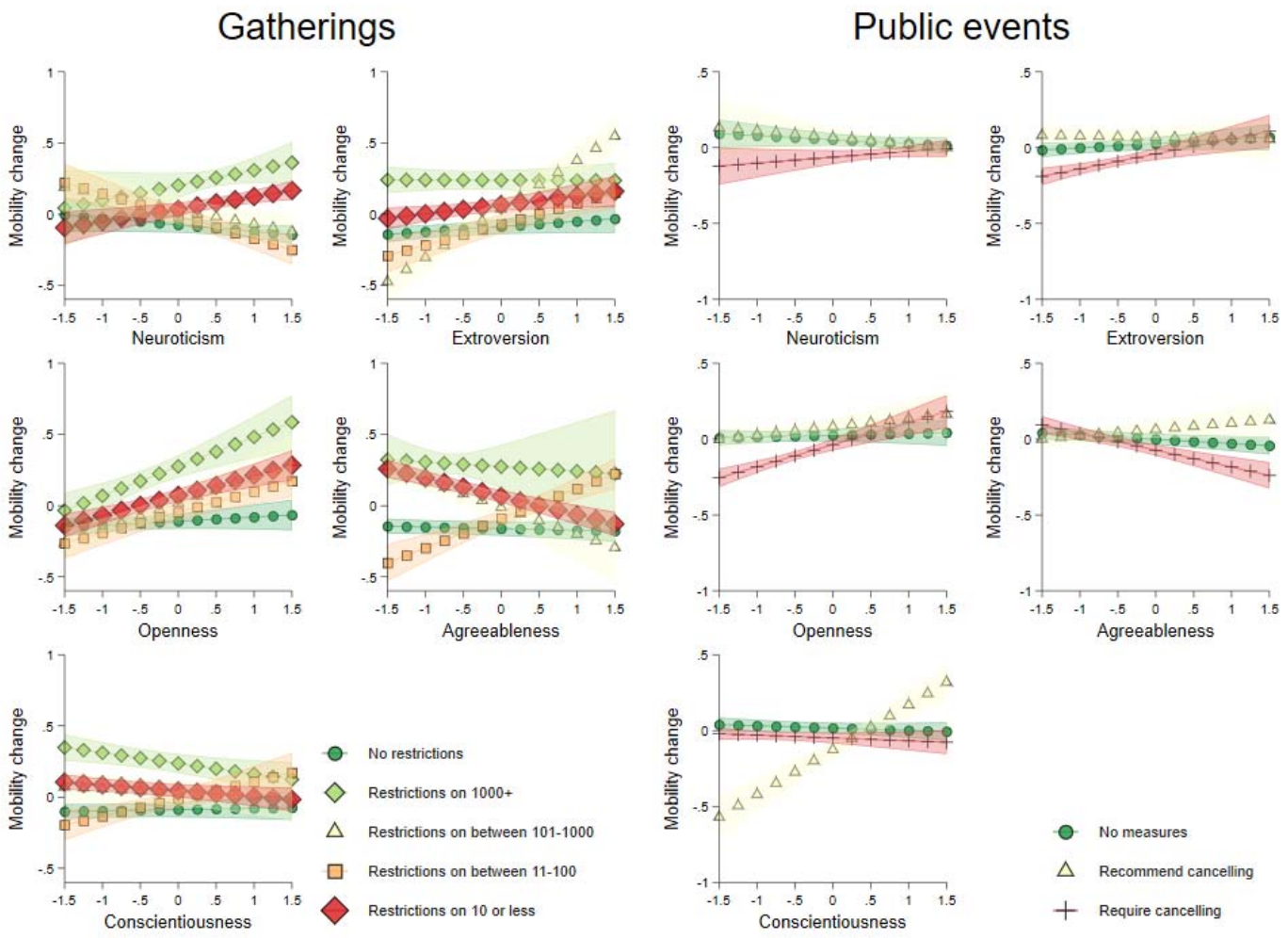

Fig. 5. Big 5 and mobility change with respect to Gatherings restrictions and Public Events cancellation policies. Estimates obtained from Table S10 and S11.

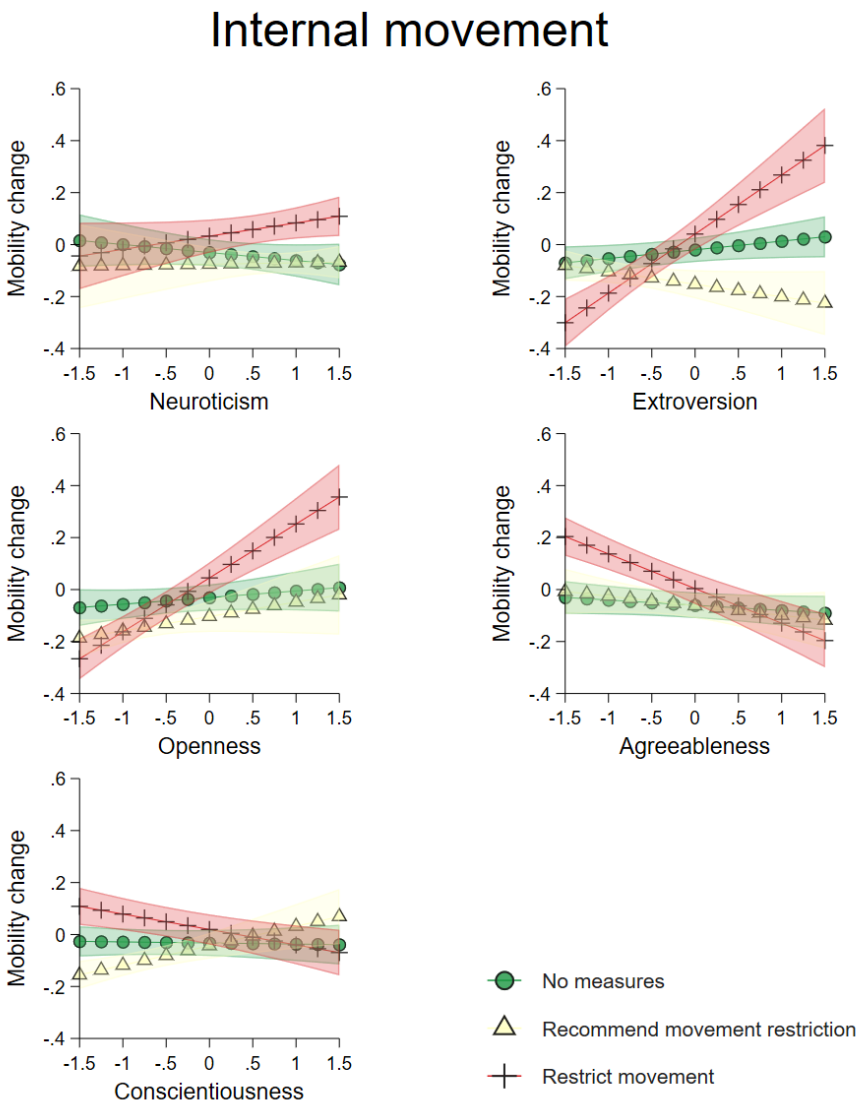

Fig. 6. Big 5 and mobility change with respect to Internal movement (Domestic Travel) restriction policies. Estimates obtained from Table S6 and S7.

In Fig. 3 we see regions that are higher in extraversion and openness are more likely to increase school related mobility when only "recommended closures" are in place. Together with Fig. 4, the results show that mobility incorporating public transport, workplaces and residential confinement reduces significantly and uniformly for all traits (at all levels) once policies restricting movement are put in place. Interestingly, for mobility relating to domestic travel (internal movement) and public events (see Fig. 5 and 6), regions high in openness and extraversion appear to behave in a counter-compliant way once movement restrictions are put

in place. Environments high in openness and extraversion appear to see an increase in citizen mobility relating to domestic travel (internal movement) and public events. Overall, higher levels of agreeableness compared to other traits lead to stronger mobility responses when recommendation are in place or when restrictions are loose. On the other hand, more extravert and more open societies are less likely reducing their mobility due to enforcements.

Study 2

In Study 2 we complement Study 1 by utilising individual-level data on psychological traits and social mobility, controlling for both individual and unique regional based characteristics. Utilising participant variables such as age, gender, marital status, years of schooling, household size, self-rated health, as well as country specific data (population density, climate, GDP per capita, age distribution) and national COVID information (total number of confirmed cases, number of days since first death, government response) we are able to provide a more nuanced analysis of the role of personality in norm compliance (e.g., recommended versus mandatory restrictions on social mobility).

Data

Individual-level Data. In study two we utilise micro-level data from the International Survey on Coronvirus (Fetzer et al., 2020) (*N*=113,083 from 164 countries between 20 March to 16 April 2020, Table S13 shows the list of countries with more than 300 respondents). 48,894 (43.62%) Male (M_{age}=39.39; SD_{age}=12.9); 63,193 (56.38%) Female (M_{age}=38.45; SD_{age}=13.05); 0.88% (n=996) selected other (M_{age}=37.25; SD_{age}=17.1) (see Fig. S1 and Table S14 for summary statisticson respondents' charateristics).

Personality trait. Based on the Ten-Item Personality Inventory (TIPI) (Gosling, Rentfrow, Swann, 2003). The Cronbach alphas (scale reliability coefficient) were .67, .3, .54, .65, and .4 for the Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience scales, with inter-item correlation of .5, .18, .37, .49, and .25, respectively. The

Cronbach alphas results are quite similar to the original version (.68, .40, .50, .73, and .45, respectively; Gosling et al. 2003). Personality trait measures are calculated as the average of the two-items (and are reverse coded). The resulting scales are standardized across individuals; Table S15 shows the summary statistics and correlations of the five personality traits.

Mobility. Responses (self-rated from 0=*Does not apply at all* to 100=*Applies very much*) to questions regarding near past behaviour: "*To what extent do the following statements describe your behavior for the past week?*" and we took the responses to "*I stayed at home*" (M=80.53, SD=24.57) and "*I did not attend social gatherings*" (M=90.95, SD=23.35) as indicating mobility in the past. Responses to the propensity to leave home in the near future: "*Do you need to leave your home in the next 5 days*?" with response dichotomized (*Yes* or *No*; 59.82% indicated Yes) were complemented with the reasons for leaving home where respondents chose multiple response options. The correlation between participants' tendency to stay home in the past week and need to leave home in the next five days is -.274 ($P < .001$, N = 113,083). Summary statistics and correlations of mobility responses are presented in Table S16.

Reasons to leave home. We use PCA to reduce the dimensionality of reasons to leave home into four factors with Eigenvalue above 1 (see Table S17), excluding the option *Other*. The first factor (psychological needs) has high factor loadings on reasons such as *Getting bored* (.73), *Getting tired of being inside of the house* (.7), *Exercising my freedom* (.66), and *Meeting friends or relatives* (.5); the second factor (deemed ***basic necessity***) has high factor loadings on *Procuring food for yourself or family* (.76) and *Doing physical activity* (.65) (with loadings just below 0.5 for *Going to work* (.43) and Walking a pet (.48)); the third factor (deemed ***medical necessity***) has high factor loadings on *Going to the pharmacy* (.62), *Going to the hospital / receiving medical treatments* (.69), and *Taking care of dependents* (.5). The reason *Getting some adrenaline (from breaking the law)* does not have high factor loading in any factors but is relatively high for factor 1 (.36).

Method

We regress the two outcome mobility measures (past behaviour and future propensity) on participants' five personality traits using an ordinary least squares model. Both mobility measures and personality traits are standardized. In each regression model, we control for respondents' demographic characteristics such as age, gender (*male, female*, or *other*), marital status (*married/co-habiting* or *single/divorced*), years of schooling, and household size. A squared term for age is also included to assess non-linearity of the age effect. We also control for participants' self-rated health and self-reported number of comorbid conditions (e.g., cardiovascular diseases or diabetes). Additionally, we controlled for the total number of confirmed Covid-19 cases (in logs) in the country where the respondent resides on the day of survey completion, the number of days since the first nationwide Covid-19 related death, population density, and a set of government response indicators relating to social movement restrictions (e.g., school, workplace, or public transport closures) recorded daily. Finally, we include country fixed effects. We analysed the data with three model specifications, 1) without sampling weights, 2) employing sampling weights constructed by Fetzer et al. (2020) according to representation of income, education, and age and gender structure in the population in each country, and 3) sampling weights, which also take into account the size of the population of each country.

Results

Extroverts report lower likelihood of staying home in the previous week. Individuals with higher openness and or agreeableness report the opposite, and are more likely to stay home in the previous week (Table 1). Those lower in openness report report being less likely to to leave home in the next five days. Strong age and gender effects are evident in our control measures. Younger, and older respondents are more likely to have stayed home and less likely to leave home in the near future. Females (compared to males) are also more likely to have stayed home

previously, and continue to stay at home in the future. Finally, the number of confirmed cases in the country is negatively correlated with the tendency to have stayed home in the past week.

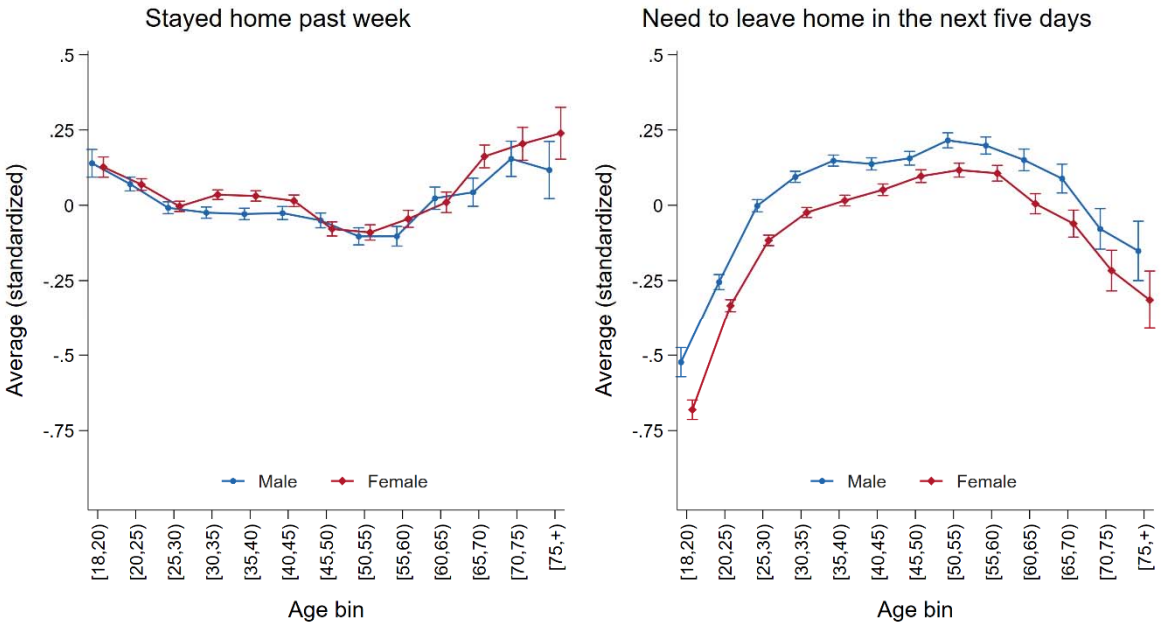

Fig. 7. Propensity to stay home across participants' age by gender

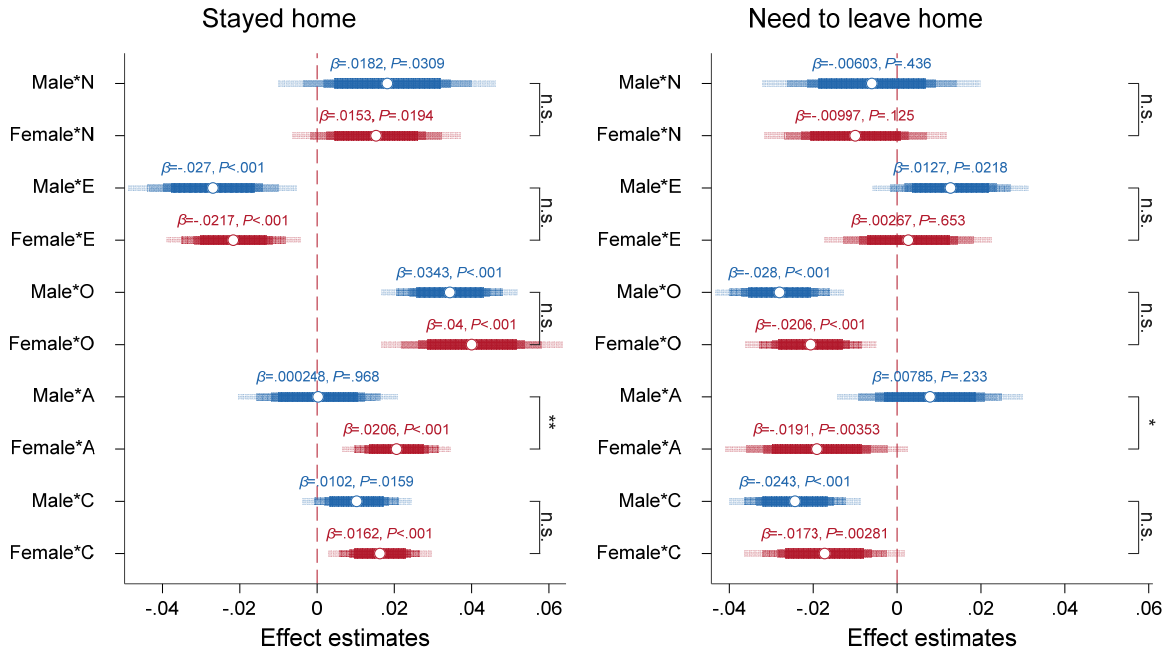

Figure 8. Interaction between Big 5 and gender on stay-at-home. Estimates obtained from Table S18.

Table 1. Propensity to stay home during COVID-19 and personality traits

	Stayed home past week			Need to leave home in the next five days		
Personality traits						
Neuroticism	0.017**	-0.0046	-0.016	-0.0022	-0.0092	0.0048
	(0.00631)	(0.0132)	(0.0282)	(0.00252)	(0.0175)	(0.0315)
Extraversion	-0.024***	-0.040**	-0.072*	0.00095	-0.026	-0.0096
	(0.00498)	(0.0132)	(0.0325)	(0.00226)	(0.0184)	(0.0270)
Openness	0.038***	0.046*	0.053*	-0.0075***	-0.046†	-0.057†
	(0.00514)	(0.0178)	(0.0233)	(0.00146)	(0.0267)	(0.0290)
Agreeableness	0.012**	0.042**	0.030	-0.0025	-0.031†	-0.072**
	(0.00400)	(0.0125)	(0.0255)	(0.00158)	(0.0174)	(0.0247)
Conscientiousness	0.013***	-0.0054	-0.0011	-0.0087***	-0.020	-0.0072
	(0.00274)	(0.00985)	(0.0286)	(0.00212)	(0.0196)	(0.0268)
Controls						
Age	-0.018***	0.0061	-0.0033	0.021***	0.030***	0.028***
	(0.00301)	(0.00723)	(0.00961)	(0.00193)	(0.00548)	(0.00678)
Age*Age	0.00017***	-0.000073	0.000055	-0.00021***	-0.00029***	-0.00023***
	(0.0000362)	(0.0000795)	(0.000105)	(0.0000206)	(0.0000518)	(0.0000662)
Gender						
Male	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Female	0.039*	0.058*	0.039	-0.050***	-0.081*	-0.14*
	(0.0151)	(0.0245)	(0.0560)	(0.0115)	(0.0401)	(0.0538)
Other	-0.029	-0.20	-0.32	-0.034*	-0.080	0.27
	(0.0219)	(0.133)	(0.297)	(0.0143)	(0.120)	(0.166)
Marital status						
Married / co-habiting	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Single / divorced	-0.028*	0.016	0.096	-0.0037	-0.057	-0.048
	(0.0133)	(0.0372)	(0.0682)	(0.00662)	(0.0463)	(0.0653)
Years of schooling	0.0089***	0.0091*	0.013†	0.00080	0.0035	0.012*
	(0.00131)	(0.00408)	(0.00720)	(0.000640)	(0.00304)	(0.00613)
Household size						
One	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Two	0.021	0.017	0.14	-0.030***	-0.099	-0.093
	(0.0163)	(0.0502)	(0.103)	(0.00737)	(0.0627)	(0.0926)
Three	0.026	-0.088	0.12	-0.043***	-0.11*	-0.10
	(0.0158)	(0.0622)	(0.103)	(0.0107)	(0.0425)	(0.0915)
Four to five	0.034†	-0.0086	0.17†	-0.064***	-0.13*	-0.090
	(0.0200)	(0.0636)	(0.0972)	(0.0107)	(0.0601)	(0.104)
Five+	0.024	-0.034	0.16	-0.072***	-0.17**	-0.19
	(0.0202)	(0.0759)	(0.116)	(0.0121)	(0.0532)	(0.123)
Self-rated health	-0.015	-0.039	-0.049	-0.00071	0.0090	-0.025
	(0.0140)	(0.0292)	(0.0371)	(0.00314)	(0.0155)	(0.0319)
Comorbidities	0.024**	-0.012	-0.19*	-0.0079†	0.024	-0.0098
	(0.00847)	(0.0402)	(0.0745)	(0.00423)	(0.0366)	(0.0429)
Day since first death	-0.011†	-0.022*	-0.0093	-0.000054	0.012	0.022
	(0.00647)	(0.0112)	(0.0170)	(0.00196)	(0.0161)	(0.0169)
ln(# confirmed cases+1)	0.18*	0.23**	0.11	0.030†	-0.048	-0.21†
	(0.0739)	(0.0736)	(0.120)	(0.0168)	(0.108)	(0.111)
Population density	-0.000020***	-0.0036	-0.0010	0.000019***	0.0053	0.0090†
	(0.00000227)	(0.00339)	(0.00575)	(0.000000852)	(0.00360)	(0.00540)
Stayed home				-0.12***	-0.25***	-0.21***
				(0.00726)	(0.0164)	(0.0266)
Government response indicators	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Weights	Unweighted	Weights 1	Weights 2	Unweighted	Weights 1	Weights 2
Observations	106833	106720	106720	106833	106720	106720
Number of clusters	125	124	124	125	124	124
R^2	0.121	0.137	0.303	0.130	0.149	0.265

Notes: OLS estimates. Standard errors (clustered at country level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. Reference categories are: *Male*, *Married / co-habiting,* and *One member in household*. *Weights 1* = sampling weights calculated to reflect sample representation in terms of age, gender, income, and education in the country's population. *Weights 2* = sampling weights also accounting for the different population sizes across countries.

Exploring the sex differentiated age distribution of participant responses for previous and future mobility variables shows that (in general) males are more likely to need to leave home in the next five days, with this pattern holding across all age groups, while gender differences in past behaviour (stayed home in the last week) are only observed for 30 to 45 and 65+, with females reporting a higher tendency towards staying home during the past week than their male counterparts (Fig. 7). For both mobility variables we see a clear pattern that younger and older people are more likely to remain at home. Interacting the Big 5 traits with sex shows a strong statistically significant gender effect difference for agreeableness (Fig. 8) but not on other traits. More agreeable women respond substantially stronger with a reduction in mobility than more agreeable men. This effect holds for both mobility variables.

Discussion

Living in modern developed economies – particularly in dense urbanised population – provides significant advantages to the human species; for example, legal and economic advantages such as assigned property rights, economies of scale for commerce, healthcare and education, public infrastructure, and many different forms of government support services. There are also personal, inter-personal and social advantages, such as increased marital and reproductive opportunities, exposure and access to science and the arts, the luxury of sporting endeavours, and religious and political freedoms. However, these potential gains come with risks and costs. Societies are often structured in ways that reflect these particular tradeoffs—some aspects of culture may, for example, prioritize order over creativity (Jackson et al., 2019). Rule of law dictates that populations must behave in a rational, organised and uniform way. A "herd mentality", whereby each individual's reciprocal agreement and compliance with not just the law, but also the social norm, results in both individual and socially optimal outcomes. A health epidemic presents a unique problem for society in that a potentially life threatening

exogenous shock may cause some individuals to question whether they should continue to make decisions in line with what is best for themselves, or for society, especially when the outcomes for each may differ. A global pandemic is even more unique in that the micro and macro behaviours of specific regions or countries can systematically impact other societies and environments. Exploring whether country level psychological trait analysis can explain regulatory compliance (mobility behaviour) is not just important for the current global COVID19 crisis, but may also provide vital insight into a host of current and ongoing trans-national issues and behaviours such as global trade, public health and education, armed conflict, climate change, and human rights or disasters and high stress life events in general (Gomez et al., 1999; Kopala-Sibley et al., 2016; Savage et al., 2020). The degree to which societies and individuals are impacted by their personality type, how they cope with stress (Monroe & Simons, 1991; Blatt & Zuroff, 1992; Ingram & Price, 2010) and the coping mechanisms they choose to employ based on those types (see Chung et al. 2005) is less clear.

The current study explores how psychological traits can be utilised to understand and explain domestic mobility behaviour during the COVID19 pandemic. Our study repeatedly finds statistically significant relationships between particular traits and regulatory compliance (mobility behaviour) both before and after region specific legislative interventions, and the global announcement of the pandemic. Our random effects analysis indicates that societies higher in openness to experience less mobility decrease compared to the average, both pre and post the pandemic announcement, while regions higher in agreeableness showed a stronger decreased mobility compared to the average. When exploring specific reasons for personal movement changes such as work attendance, public transport and residential isolation, our study reports somewhat uniform behaviours across all traits. More specific analysis of individuals' willingness for domestic movement (internal travel) after the implementation of movement restrictions indicates that regions high in openness and extraversion appear to

behave in a counter-compliant way, in fact increasing their social mobility which societies with higher levels of agreeableness show already cooperate behaviour when recommendations are lighter enforcements are in place.

Our micro level analysis in study 2 re-iterates our study 1 findings; i.e. higher extraversion is shown as a predictor of increased mobility, both through previous behaviour, and future intended movement. Interestingly our age and gender analysis indicate that younger and older individuals (compared to middle aged (30-60 years old)), and females (compared to males) are more likely to reduce mobility. Higher agreeableness in females (compared to males) results in an increased likelihood of staying home previously, and an increased likelihood to stay home in the future. Such findings mirror a body of scientific research findings identifying women as less risk seeking, more altruistic, and more cooperative or compliant (Andreoni & Vesterlund 2001; Seguino et al. 2006; Jianakoplos & Bernasek 1998; Hasseldine 2002; Croson & Gneezy 2009; Vugt et al. 2007; Torgler & Valev 2010, Kastlunger et al. 2010; Brañas-Garza et al. 2018).

The current study is not without limitations. Firstly, the BIG 5 personality traits, while shown to be globally present across cultures, are not a measure of the level of individuality or collectivism of a nation or group. As several traits directly impact a person's perception of their own individuality, the relevance of the BIG 5 are arguably diminished in more collectivistic cultures. This may be because people in collectivistic countries may rely less on traits when understanding themselves and others, compared to those from more individualistic societies (Heine & Buchtel 2009, p. p.369).

Secondly, personality is not uniform inside any population. Arguably, and for future research, a country's sense of nationalism may be more homogenous across a population, and may be extremely influential on human behaviour, particularly in developed economies. But again, this becomes scientifically problematic as both domestic and international perceptions

of national character are more likely generalised stereotypes that serve a function of nationalistic identity (Terraciano et al. 2005) which is why it is important to note that an abundance of symmetry in the personality profiles of a particular population may not equate to casual findings of any particular behaviour, rather, just provide a reflection of similar cultural standards for a particular in-group (Heine & Buchtel 2009).

Regional level personality trait analysis is an innovative way to understand human behaviour in the context of large-scale exogenous health shocks such as the current COVID19 pandemic. And while the specific life threatening health issue of the novel coronavirus may be overcome by medical science in the not too distant future (in the form of a vaccine), scientific research that seeks to understand how individuals and groups react to societal level emergencies and the ensuing government regulatory responses is of critical importance. In fact, in the absence of such vaccinating silver bullets for this or future epidemics and pandemics, behavioural interventions may be humanity's best and only option.

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Supplementary Information

Region classification

Most regions are identified as level-1 and level-2 administrative areas in the GADM Database of Global Administrative Areas (version 3.6; https://gadm.org/index.html). Specifically, out of the 579 sample regions, 371 and 191 are level-1 and level-2 administrative areas, respectively, with most level-2 regions from the United Kingdom and Japan and 17 regions with administrative area level unclassified (16 are from the UK, e.g., Ards and North Down).

Table S1. List of sample countries

Country	ISO2	Level	Number of regions
Argentina	AR	Regional	24
Australia	AU	Regional	8
Belgium	BE	Regional	3
Burkina Faso	BF	Country	
Brazil	BR	Regional	27
Botswana	BW	Country	
Canada	CA	Regional	9
Switzerland	CH	Regional	16
Chile	CL	Regional	16
Germany	DE	Regional	16
France	FR	Regional	13
United Kingdom	GB	Regional	132
Croatia	HR	Regional	11
Hungary	HU	Regional	18
Indonesia	ID	Regional	34
India	IN	Regional	35
Italy	IT	Regional	20
Japan	JP	Regional	47
South Korea	KR	Country	
Malaysia	MY	Country	
Nigeria	NG	Regional	20
New Zealand	NZ	Regional	11
Peru	PE	Regional	23
Philippines	PH	Country	
Poland	PL	Regional	16
Portugal	PT	Regional	18
Yugoslavia	RS	Country	
Slovenia	SI	Regional	3
Slovak Republic	SK	Regional	8
Turkey	TR	Country	
United States	US	Regional	51

Table S2. Descriptive Statistics for variables used in Study 1

Variables	n	Mean	SD	Min	Max
Mobility	44,316	-0.01	2.24	-6.41	24.46
Neuroticism	31	51.05	6.15	38.6	60.6
Extraversion	31	49.46	5.56	39.5	58.1
Openness	31	49.03	4.82	40.8	59.5

Agreeableness	31	50.9	5	42.4	59.9
Conscientiousness	31	49.01	6.16	34.3	60.63
Weekends	44,316	0.26	0.44	0	1
Pandemic declaration	44,316	0.70	0.46	0	1
Population ages 65 and above (% of total population)	31	14.21	6.72	2.41	27.58
Population density (people per sq. km of land area)	31	149.36	140.78	3.25	529.65
Unemployment, total (% of total labour force)	31	6.40	3.67	2.45	17.94
GDP per capita (constant 2010 US$)	31	25450.41	20417.78	709.76	78816.22
Urban population (% of total population)	31	70.68	17.12	29.36	98
Average household size (number of members)	31	3.13	0.95	2.14	5.92
% of household with the head of household aged 20-64	31	77.05	6.91	61.82	89.14
Days after first death	16.06	28.20	-52	97	16.06
ln(# confirmed cases+1)	6.19	3.80	0	14.07	6.19
School closing	2.07	1.35	0	3	2.07
Workplace closing	1.55	1.26	0	3	1.55
Cancel public events	1.40	0.88	0	2	1.40
Restrictions on gatherings	2.08	1.82	0	4	2.08
Close public transport	0.64	0.81	0	2	0.64
Stay at home requirements	1.18	1.05	0	3	1.18
Restrictions on internal movement	1.11	0.92	0	2	1.11
Average temperature (tenths of degrees C)	44,316	142.00	90.27	-234.41	362.67
Altruism	495	.02	.36	-1.17	1.69

Note: *n* shows the number of observations based on the observational level on the variables. For *mobility*, *weekends*, *pandemic declaration* and *temperature*, descriptive statistics are reported at the regional/country-day level. *Personality traits*, *macroeconomic variables*, *population structure*, and *household compositions* are at the country level. National-wide *death* and *case statistics* and containment and closure policies indicators are at the country-day level. Statistics for *altruism* is reported at the regional/country level. Both *mobility* and *personality traits* reported here are prior to standardisation.

Table S3. Correlations among personality traits

	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Neuroticism	1				
Extroversion	-0.576***	1			
Openness	-0.547**	0.780***	1		
Agreeableness	-0.632***	0.226	0.329†	1	
Conscientiousness	-0.544**	0.014	0.180	0.243	1

Note: $N = 31$. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table S4. Full regression results for Fig. 1.

Dependent variable	*Mobility change*					
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
Neuroticism	0.0080					0.070
	(0.0263)					(0.0566)
Extraversion		0.059†				0.059
		(0.0306)				(0.0583)
Openness			0.073*			0.11*
			(0.0313)			(0.0486)
Agreeableness				-0.051**		-0.036
				(0.0180)		(0.0296)
Conscientiousness					-0.0059	-0.046†
					(0.0184)	(0.0239)
Weekends	0.032***	0.033***	0.033***	0.032***	0.032***	0.032***
	(0.00669)	(0.00668)	(0.00667)	(0.00666)	(0.00667)	(0.00670)
Pandemic declared	-0.13***	-0.13***	-0.13***	-0.13***	-0.13***	-0.13***
	(0.0313)	(0.0313)	(0.0312)	(0.0313)	(0.0314)	(0.0314)
Days after first death	0.0013	0.0014	0.0014	0.0013	0.0013	0.0013
	(0.000931)	(0.000930)	(0.000928)	(0.000929)	(0.000928)	(0.000925)
ln(# confirmed cases+1)	-0.047***	-0.048***	-0.047***	-0.047***	-0.047***	-0.047***
	(0.00810)	(0.00808)	(0.00806)	(0.00806)	(0.00808)	(0.00802)
Population ages 65 and above	-0.053***	-0.037**	-0.030†	-0.038***	-0.052***	0.00079
	(0.0110)	(0.0140)	(0.0157)	(0.0104)	(0.0102)	(0.0174)
Population density	-0.00021	-0.00017	-0.00034*	-0.00014	-0.00020	0.00016
	(0.000168)	(0.000210)	(0.000169)	(0.000180)	(0.000189)	(0.000254)
Unemployment	-0.033***	-0.042***	-0.045***	-0.030***	-0.033***	-0.049***
	(0.00624)	(0.00731)	(0.00786)	(0.00562)	(0.00569)	(0.00835)
GDP per capita	0.23***	0.16**	0.16**	0.23***	0.23***	0.20***
	(0.0550)	(0.0556)	(0.0513)	(0.0468)	(0.0524)	(0.0579)
Urban population	-0.0088***	-0.0068***	-0.0064***	-0.0090***	-0.0086***	-0.0056***
	(0.00144)	(0.00152)	(0.00150)	(0.00150)	(0.00141)	(0.00166)
Average temperature	0.0016***	0.0016***	0.0016***	0.0016***	0.0016***	0.0016***
	(0.000177)	(0.000176)	(0.000175)	(0.000178)	(0.000175)	(0.000177)
Average household size	-0.10	-0.15†	-0.12	-0.029	-0.10	-0.070
	(0.0759)	(0.0752)	(0.0786)	(0.0819)	(0.0776)	(0.131)
Household head aged 20-64	-0.032***	-0.021†	-0.019†	-0.025**	-0.032***	0.0058
	(0.00809)	(0.0110)	(0.0114)	(0.00794)	(0.00818)	(0.0117)
Constant	3.09**	2.73*	2.41†	2.11†	3.08**	-0.66
	(1.126)	(1.203)	(1.320)	(1.179)	(1.188)	(1.527)
Policy response controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	42315	42315	42315	42315	42315	42315
Number of clusters	586	586	586	586	586	586
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2-between	0.836	0.836	0.836	0.836	0.836	0.836
R^2-within	0.454	0.459	0.461	0.458	0.454	0.480
R^2-overall	0.758	0.759	0.760	0.759	0.758	0.764

Notes: Random-effects GLS estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table S5. Regression results for Fig. 2.

Dependent variable	*Mobility change*				
Independent variable	(1) Neuroticism	(2) Extraversion	(3) Openness	(4) Agreeableness	(5) Conscientiousness
Pandemic declared	-0.13***	-0.11**	-0.10**	-0.13***	-0.13***
	(0.0336)	(0.0396)	(0.0374)	(0.0319)	(0.0321)
Personality trait	0.010	0.032	0.034	-0.0022	-0.027†
	(0.0237)	(0.0295)	(0.0297)	(0.0151)	(0.0164)
Pandemic declared* Personality	-0.0037	0.052*	0.068***	-0.074***	0.029*
	(0.0163)	(0.0226)	(0.0198)	(0.0171)	(0.0125)
Weekends	0.032***	0.033***	0.033***	0.033***	0.033***
	(0.00671)	(0.00671)	(0.00668)	(0.00664)	(0.00667)
Pandemic declared	0.0013	0.0015†	0.0014	0.0023*	0.0013
	(0.000932)	(0.000898)	(0.000895)	(0.000897)	(0.000937)
Days after first death	-0.047***	-0.047***	-0.045***	-0.056***	-0.045***
	(0.00807)	(0.00796)	(0.00812)	(0.00761)	(0.00810)
ln(# confirmed cases+1)	-0.053***	-0.038**	-0.031*	-0.042***	-0.052***
	(0.0108)	(0.0138)	(0.0153)	(0.0107)	(0.0102)
Population ages 65 and above	-0.00021	-0.00018	-0.00038*	-0.00011	-0.00019
	(0.000168)	(0.000209)	(0.000169)	(0.000179)	(0.000189)
Population density	-0.033***	-0.040***	-0.042***	-0.030***	-0.033***
	(0.00624)	(0.00714)	(0.00771)	(0.00561)	(0.00569)
Unemployment	0.23***	0.16**	0.16**	0.24***	0.23***
	(0.0547)	(0.0551)	(0.0504)	(0.0488)	(0.0518)
GDP per capita	-0.0088***	-0.0071***	-0.0066***	-0.0097***	-0.0085***
	(0.00144)	(0.00150)	(0.00149)	(0.00153)	(0.00140)
Urban population	0.0016***	0.0016***	0.0015***	0.0016***	0.0015***
	(0.000176)	(0.000176)	(0.000173)	(0.000171)	(0.000180)
Average temperature	-0.10	-0.15*	-0.12	-0.053	-0.092
	(0.0758)	(0.0734)	(0.0764)	(0.0823)	(0.0764)
Average household size	-0.032***	-0.021†	-0.019†	-0.026**	-0.032***
	(0.00807)	(0.0109)	(0.0112)	(0.00809)	(0.00814)
Constant	3.09**	2.75*	2.51†	2.29†	3.03**
	(1.124)	(1.178)	(1.283)	(1.193)	(1.175)
Observations	42315	42315	42315	42315	42315
Number of clusters	586	586	586	586	586
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000
R^2-between	0.836	0.836	0.837	0.837	0.836
R^2-within	0.454	0.463	0.469	0.455	0.457
R^2-overall	0.758	0.761	0.763	0.759	0.759

Notes: Random-effects GLS estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table S6. Regression results for Big 5 and school closure policies' strictness interaction.

	Policy: *School closure*				
	N	E	O	A	C
Personality trait	-0.020	0.019	0.0065	-0.015	-0.059***
	(0.0222)	(0.0185)	(0.0200)	(0.0124)	(0.0159)
Recommend closing	1.00***	1.64***	0.43***	-2.60***	0.95***
	(0.0520)	(0.0906)	(0.0404)	(0.228)	(0.0500)
Require closing (some levels)	-0.011	0.12	0.091	-0.050	0.043
	(0.0536)	(0.0724)	(0.0597)	(0.0664)	(0.0420)
Require closing (all)	-0.23***	-0.16***	-0.14***	-0.24***	-0.23***
	(0.0263)	(0.0269)	(0.0253)	(0.0245)	(0.0250)
Recommend closing*Personality trait	1.15***	1.77***	1.34***	3.18***	-0.61***
	(0.0851)	(0.132)	(0.0987)	(0.234)	(0.0467)
Require closing (some levels)*Personality trait	-0.027	-0.10†	-0.028	0.025	-0.032
	(0.0307)	(0.0591)	(0.0469)	(0.0531)	(0.0736)
Require closing (all)*Personality trait	0.050*	0.091***	0.15***	-0.093***	0.062***
	(0.0213)	(0.0206)	(0.0170)	(0.0186)	(0.0156)
Constant	-0.37	-0.14	0.0044	-0.28	-0.33
	(0.366)	(0.256)	(0.243)	(0.240)	(0.296)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	45802	45802	45802	45802	45802
Number of clusters	638	638	638	638	638
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000
R^2-between	0.834	0.835	0.836	0.835	0.834
R^2-within	0.485	0.504	0.514	0.497	0.497
R^2-overall	0.758	0.764	0.768	0.763	0.762

Notes: Dependent variable: *Mobility change*. Random-effects GLS estimates. Baseline = *no measures*. N=Neuroticism; E=Extraversion; O=Openness; A=Agreeableness; C=Conscientiousness. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table S7. Regression results for Big 5 and public transport closure policies' strictness interaction.

	Policy: *Public transport closure*				
	N	E	O	A	C
Personality trait	-0.033	0.078***	0.080***	-0.0082	-0.043**
	(0.0256)	(0.0206)	(0.0239)	(0.0148)	(0.0148)
Recommend closing	-0.47***	-0.45***	-0.43***	-0.57***	-0.41***
	(0.0397)	(0.0394)	(0.0405)	(0.0305)	(0.0337)
Require closing	-0.57***	-0.53***	-0.58***	-0.54***	-0.52***
	(0.0541)	(0.0520)	(0.0541)	(0.0521)	(0.0561)
Recommend closing*Personality trait	0.083**	-0.043	-0.015	-0.30***	0.076***
	(0.0273)	(0.0286)	(0.0355)	(0.0239)	(0.0155)
Require closing*Personality trait	0.11**	-0.041	0.041†	-0.047†	0.055†
	(0.0343)	(0.0460)	(0.0249)	(0.0250)	(0.0325)
Constant	-0.30	-0.19	-0.17	0.16	-0.29
	(0.375)	(0.263)	(0.254)	(0.231)	(0.298)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	45802	45802	45802	45802	45802
Number of clusters	638	638	638	638	638
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000
R^2-between	0.835	0.834	0.834	0.840	0.834
R^2-within	0.481	0.499	0.504	0.545	0.502
R^2-overall	0.757	0.762	0.763	0.779	0.763

Notes: Dependent variable: *Mobility change*. Random-effects GLS estimates. Baseline = *no measures*. N=Neuroticism; E=Extraversion; O=Openness; A=Agreeableness; C=Conscientiousness. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table S8. Regression results for Big 5 and workplace closure policies' strictness interaction.

	Policy: *Workplace closure*				
	N	E	O	A	C
Personality trait	-0.022	0.043*	0.034	-0.028*	-0.021
	(0.0247)	(0.0194)	(0.0222)	(0.0139)	(0.0153)
Recommend closing	-0.0069	-0.0052	-0.051†	-0.10***	-0.065*
	(0.0259)	(0.0272)	(0.0288)	(0.0292)	(0.0287)
Require closing (some levels)	-0.57***	-0.51***	-0.51***	-0.55***	-0.57***
	(0.0447)	(0.0431)	(0.0439)	(0.0410)	(0.0446)
Require closing (all)	-0.52***	-0.53***	-0.56***	-0.55***	-0.54***
	(0.0552)	(0.0545)	(0.0545)	(0.0512)	(0.0553)
Recommend closing*Personality trait	-0.13***	0.091***	0.076***	0.013	0.077***
	(0.0166)	(0.0192)	(0.0168)	(0.0200)	(0.0118)
Require closing (some levels)*Personality trait	0.042†	0.012	0.11***	0.063**	-0.032†
	(0.0224)	(0.0233)	(0.0233)	(0.0194)	(0.0187)
Require closing (all)*Personality trait	0.14***	0.073†	0.13***	-0.16***	0.034
	(0.0255)	(0.0405)	(0.0251)	(0.0186)	(0.0224)
Constant	-0.20	-0.13	-0.026	-0.28	-0.40
	(0.380)	(0.261)	(0.257)	(0.242)	(0.297)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	45802	45802	45802	45802	45802
Number of clusters	638	638	638	638	638
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000
R^2-between	0.837	0.834	0.835	0.839	0.835
R^2-within	0.476	0.503	0.515	0.517	0.498
R^2-overall	0.759	0.764	0.767	0.771	0.762

Notes: Dependent variable: *Mobility change*. Random-effects GLS estimates. Baseline = *no measures*. N=Neuroticism; E=Extraversion; O=Openness; A=Agreeableness; C=Conscientiousness. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table S9. Regression results for Big 5 and stay-at-home requirement policies' strictness interaction.

	Policy: *Stay-at-home requirement*				
	N	E	O	A	C
Personality trait	-0.050†	0.060**	0.037	-0.010	0.0063
	(0.0263)	(0.0201)	(0.0237)	(0.0151)	(0.0168)
Recommend not leaving house	-0.051	-0.0028	0.037	-0.036	-0.00077
	(0.0452)	(0.0406)	(0.0417)	(0.0398)	(0.0448)
Require not leaving (loose)	-0.57***	-0.45***	-0.40***	-0.52***	-0.47***
	(0.0570)	(0.0552)	(0.0570)	(0.0535)	(0.0597)
Require not leaving (strict)	-1.08***	-1.25***	-1.08***	-1.01***	-0.98***
	(0.0683)	(0.0782)	(0.0664)	(0.0629)	(0.0736)
Recommend not leaving house* Personality trait	-0.0084	0.020	0.045*	-0.017	-0.029
	(0.0252)	(0.0225)	(0.0210)	(0.0283)	(0.0289)
Require not leaving (loose)* Personality trait	0.19***	-0.0089	0.071**	-0.19***	-0.053***
	(0.0235)	(0.0261)	(0.0260)	(0.0222)	(0.0161)
Require not leaving (strict)* Personality trait	-0.056	0.34***	0.20***	-0.012	0.067*
	(0.0370)	(0.0752)	(0.0401)	(0.0227)	(0.0320)
Constant	-0.39	-0.092	-0.092	-0.11	-0.44
	(0.378)	(0.258)	(0.251)	(0.232)	(0.299)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	45802	45802	45802	45802	45802
Number of clusters	638	638	638	638	638
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000
R^2-between	0.838	0.834	0.834	0.838	0.834
R^2-within	0.508	0.513	0.522	0.529	0.504
R^2-overall	0.767	0.766	0.768	0.773	0.763

Notes: Dependent variable: *Mobility change*. Random-effects GLS estimates. Baseline = *no measures*. N=Neuroticism; E=Extraversion; O=Openness; A=Agreeableness; C=Conscientiousness. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table S10. Regression results for Big 5 and gathering restriction policies' strictness interaction.

	Policy: *Gathering restrictions*				
	N	E	O	A	C
Personality trait	-0.047†	0.036†	0.029	-0.011	0.0092
	(0.0266)	(0.0204)	(0.0238)	(0.0140)	(0.0160)
Restrictions on very large gatherings (1000+)	0.28***	0.33***	0.38***	0.43***	0.32***
	(0.0436)	(0.0361)	(0.0399)	(0.0798)	(0.0381)
Restrictions on gatherings between 101-1000 people	0.11*	0.12**	0.13**	0.15**	0.12**
	(0.0438)	(0.0423)	(0.0437)	(0.0509)	(0.0435)
Restrictions on gatherings between 11-100 people	0.061†	0.017	0.063	0.073*	0.076*
	(0.0364)	(0.0414)	(0.0389)	(0.0364)	(0.0381)
Restrictions on gatherings of 10 people or less	0.11**	0.15***	0.18***	0.23***	0.13**
	(0.0359)	(0.0357)	(0.0384)	(0.0371)	(0.0425)
Restrictions (1000+ people)*Personality trait	0.15*	-0.038	0.18***	-0.021	-0.084***
	(0.0614)	(0.0232)	(0.0458)	(0.104)	(0.0248)
Restrictions (101-1000 people)*Personality trait	-0.057*	0.30***	0.16***	-0.18***	-0.037
	(0.0225)	(0.0289)	(0.0373)	(0.0438)	(0.0272)
Restrictions (11-100 people)*Personality trait	-0.11***	0.11***	0.12***	0.22***	0.11***
	(0.0218)	(0.0299)	(0.0260)	(0.0317)	(0.0335)
Restrictions (10 people or less)*Personality trait	0.13***	0.027	0.11***	-0.12***	-0.050**
	(0.0198)	(0.0259)	(0.0235)	(0.0169)	(0.0155)
Constant	-0.34	-0.071	-0.071	-0.053	-0.42
	(0.380)	(0.258)	(0.251)	(0.237)	(0.297)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	45802	45802	45802	45802	45802
Number of clusters	638	638	638	638	638
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000
R^2-between	0.837	0.835	0.835	0.837	0.834
R^2-within	0.489	0.518	0.520	0.505	0.503
R^2-overall	0.761	0.768	0.768	0.768	0.763

Notes: Dependent variable: *Mobility change*. Random-effects GLS estimates. Baseline = *no measures*. N=Neuroticism; E=Extraversion; O=Openness; A=Agreeableness; C=Conscientiousness. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table S11. Regression results for Big 5 and public events cancellation policies' strictness interaction.

	Policy: *Public events cancellation*				
	N	E	O	A	C
Personality trait	-0.026	0.028	0.011	-0.028*	-0.015
	(0.0218)	(0.0189)	(0.0196)	(0.0119)	(0.0138)
Recommend movement restriction	0.013	0.041	0.055*	0.065*	-0.14***
	(0.0265)	(0.0283)	(0.0271)	(0.0288)	(0.0301)
Restrict movement	-0.12***	-0.068**	-0.063**	-0.072**	-0.065**
	(0.0242)	(0.0246)	(0.0238)	(0.0233)	(0.0227)
Recommend movement restriction*Personality trait	-0.017	-0.037	0.044†	0.070***	0.31***
	(0.0293)	(0.0232)	(0.0232)	(0.0211)	(0.0305)
Restrict movement*Personality trait	0.065***	0.071**	0.13***	-0.083***	-0.0035
	(0.0185)	(0.0226)	(0.0180)	(0.0184)	(0.0125)
Constant	-0.36	-0.26	-0.053	-0.36	-0.58†
	(0.382)	(0.273)	(0.265)	(0.241)	(0.305)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	45802	45802	45802	45802	45802
Number of clusters	638	638	638	638	638
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000
R^2-between	0.834	0.834	0.835	0.835	0.835
R^2-within	0.485	0.507	0.519	0.500	0.488
R^2-overall	0.758	0.764	0.769	0.764	0.759

Notes: Dependent variable: *Mobility change*. Random-effects GLS estimates. Baseline = *no measures*. N=Neuroticism; E=Extraversion; O=Openness; A=Agreeableness; C=Conscientiousness. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table S12. Regression results for Big 5 and internal movement restriction policies' strictness interaction.

	Policy: *Internal movement restriction*				
	N	E	O	A	C
Personality trait	-0.031	0.033†	0.026	-0.020	-0.0041
	(0.0255)	(0.0184)	(0.0220)	(0.0143)	(0.0156)
Recommend movement restriction	-0.045	-0.13***	-0.073*	-0.0020	-0.011
	(0.0340)	(0.0318)	(0.0305)	(0.0296)	(0.0290)
Restrict movement	0.063	0.061	0.076†	0.064	0.052
	(0.0455)	(0.0425)	(0.0453)	(0.0456)	(0.0463)
Recommend movement restriction*Personality trait	0.036	-0.082***	0.030	-0.017	0.079***
	(0.0235)	(0.0190)	(0.0219)	(0.0230)	(0.0166)
Restrict movement*Personality trait	0.082***	0.19***	0.18***	-0.11***	-0.055***
	(0.0204)	(0.0304)	(0.0225)	(0.0190)	(0.0153)
Constant	-0.34	-0.16	-0.041	-0.28	-0.28
	(0.387)	(0.253)	(0.248)	(0.246)	(0.306)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	45802	45802	45802	45802	45802
Number of clusters	638	638	638	638	638
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000
R^2-between	0.834	0.838	0.836	0.836	0.835
R^2-within	0.483	0.517	0.522	0.493	0.486
R^2-overall	0.758	0.770	0.770	0.762	0.759

Notes: Dependent variable: *Mobility change*. Random-effects GLS estimates. Baseline = *no measures*. N=Neuroticism; E=Extraversion; O=Openness; A=Agreeableness; C=Conscientiousness. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

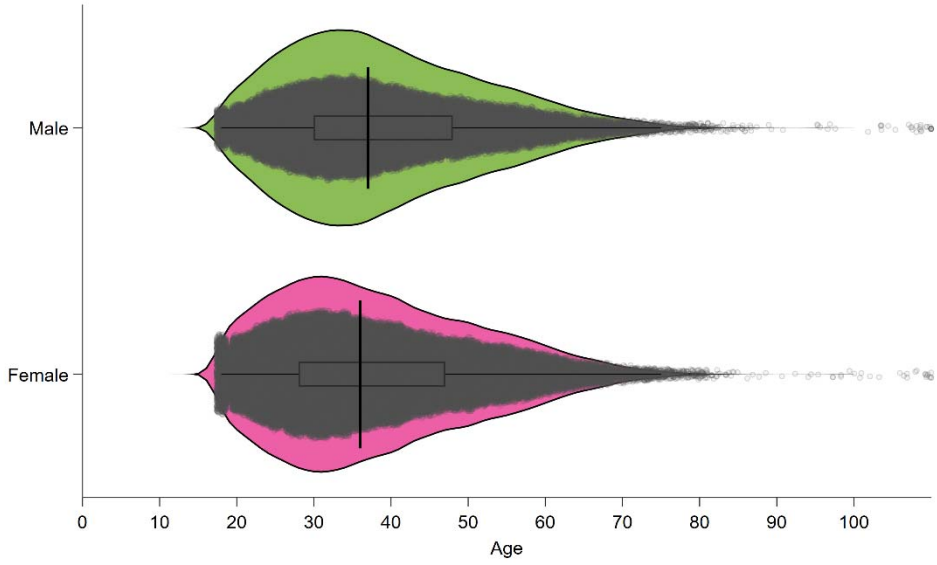

Fig. S1. Mobility by age and gender in Study 2.

Table S13. List of countries with at least 300 respondents

Country	ISO2	N	Country	ISO2	N
Brazil	BR	11,640	Ireland	IE	716
United States	US	11,604	Albania	AL	694
United Kingdom	GB	11,399	Latvia	LV	678
Germany	DE	10,610	Venezuela	VE	661
Sweden	SE	5,865	Hungary	HU	625
Switzerland	CH	4,209	Slovak Republic	SK	616
Belarus	BY	3,699	Japan	JP	599
Russia	RU	3,404	Belgium	BE	580
Mexico	MX	3,338	South Africa	ZA	566
Canada	CA	2,880	Portugal	PT	559
Turkey	TR	2,875	Dominican Republic	DO	557
France	FR	2,829	Chile	CL	551
Spain	ES	2,349	Malaysia	MY	539
Peru	PE	2,006	Poland	PL	530
Colombia	CO	1,873	Denmark	DK	511
Italy	IT	1,867	Singapore	SG	425
Indonesia	ID	1,618	China	CN	419
Ukraine	UA	1,453	Israel	IL	410
Netherlands	NL	1,434	Kenya	KE	400
Qatar	QA	1,283	Morocco	MA	385
Austria	AT	1,093	New Zealand	NZ	380
India	IN	1012	Greece	GR	356
Australia	AU	960	Bulgaria	BG	333
Argentina	AR	912	Thailand	TH	313
Vietnam	VN	864	Norway	NO	306
Romania	RO	819	Ecuador	EC	303
Finland	FI	797	South Korea	KR	303
Philippines	PH	770			

Table S14. Summary statistics of respondents' demographics and health

Variables	Mean	SD	Min	Max
Age	38.85	13.04	18	110
Gender				
Male	43.24			
Female	55.88			
Other	0.88			
Marital status				
Married/Co-Habiting	56.34			
Single/Divorced	43.66			
Years of schooling	16.36	4.67	0	25
Household size	2.93	1.72	0	30
Self-rated health	3.08	0.73	1	4
Number of comorbid conditions	1.16	0.45	1	6

Table S15. Summary statistics, reliability, and correlations for five personality traits from TIPI

Measures	Mean	SD	α	N	E	O	A	C
Neuroticism	4.45	1.45	.65	1				
Extraversion	4.14	1.56	.67	.13	1			
Openness	5.17	1.16	.40	.16	.29	1		
Agreeableness	4.89	1.16	.30	.27	.06	.14	1	
Conscientiousness	5.20	1.27	.54	.28	.11	.12	.15	1

Note. *N*=113,083. α = Cronbach's alpha. All correlations are statistically significant with $p < .001$.

Table S16. Summary statistics and correlations for mobility measures

Measures	Mean	SD	Min	Max	Stayed home	Avoid social gathering	Need to leave home
Stayed home (past)	80.53	24.57	0	100	1		
Avoid social gathering (past)	90.95	23.35	0	100	.40	1	
Need to leave home (future)	0.60	0.49	0	1	-0.11	-0.12	0.16
Reason*: psychological needs	0	1	-1.26	12.70	-0.24	-0.06	0.73
Reason*: basic necessity	0	1	-8.81	3.48	-0.16	-0.08	0.30
Reason*: medical necessity	0	1	-2.04	12.75	-0.11	-0.12	0.16

Note. *N*=113,083 and *67,646. All correlations are statistically significant with $p < .001$.

Table S17. Principal component analysis with Varimax rotation factor loadings of reasons for needing to leave home in the next five days

Variable	M	SD	Factor1	Factor2	Factor3	Uniqueness
Going to work	.229	.420	-.02	.43	.21	.77
Walking a pet	.084	.277	-.08	.48	.03	.76
Doing physical activity (e.g. exercising, jogging)	.217	.412	.29	**.65**	-.14	.48
Procuring food for yourself or family	.504	.500	.14	**.76**	.27	.32
Going to the pharmacy	.156	.363	-.01	.33	**.62**	.51
Going to the hospital / receiving medical treatments	.050	.217	.02	-.02	**.69**	.52
Taking care of dependents	.073	.260	.01	.23	**.50**	.69
Meeting friends or relatives	.049	.216	**.50**	.13	.14	.71
Getting tired of being inside of the house	.089	.285	**.70**	.27	-.06	.44
Getting bored	.040	.196	**.73**	.12	-.05	.44
Getting some adrenaline (from breaking the law)	.002	.039	.36	-.27	.29	.71
Exercising my freedom	.021	.143	**.66**	-.04	.14	.55

Factor loadings (absolute value) higher than .5 are in bold. *N* = 113,083.

Table S18. Results for Big 5 and gender interaction effects.

	Stayed home		Need to leave home	
Personality traits				
Neuroticism	0.019*	(0.00850)	-0.0080	(0.00789)
Extroversion	-0.029***	(0.00644)	0.014*	(0.00546)
Openness	0.034***	(0.00526)	-0.029***	(0.00458)
Agreeableness	0.00090	(0.00617)	0.0074	(0.00652)
Conscientiousness	0.011*	(0.00424)	-0.025***	(0.00473)
Gender				
Male	(ref.)		(ref.)	
Female	0.037*	(0.0150)	-0.11***	(0.0243)
Interaction				
Female*Neuroticism	-0.0036	(0.00702)	-0.0019	(0.00827)
Female*Extroversion	0.0066	(0.00549)	-0.011	(0.00705)
Female*Openness	0.0068	(0.00673)	0.0092	(0.00712)
Female*Agreeableness	0.019**	(0.00649)	-0.026*	(0.0110)
Female*Conscientiousness	0.0056	(0.00599)	0.0074	(0.00594)
Controls				
Age	-0.021***	(0.00279)	0.049***	(0.00411)
Age*Age	0.00021***	(0.0000338)	-0.00049***	(0.0000459)
Marital status				
Married / co-habiting	(ref.)		(ref.)	
Single / divorced	-0.036**	(0.0128)	0.0012	(0.0159)
Years of schooling	0.0089***	(0.00134)	-0.00049	(0.00139)
Household size				
One	(ref.)		(ref.)	
Two	0.013	(0.0151)	-0.064***	(0.0175)
Three	0.019	(0.0152)	-0.092***	(0.0246)
Four to five	0.025	(0.0189)	-0.14***	(0.0232)
Five+	0.017	(0.0195)	-0.15***	(0.0282)
Self-rated health	-0.015	(0.0141)	0.00096	(0.00904)
Comorbidities	0.025**	(0.00908)	-0.024**	(0.00919)
Day since first death	-0.014*	(0.00660)	0.0039	(0.00349)
ln(# confirmed cases+1)	0.20*	(0.0792)	0.021	(0.0245)
Population density	0.0016	(0.00222)	0.0014	(0.00105)
Constant	-0.86***	(0.177)	-0.87***	(0.0973)
Government response indicators	Yes		Yes	
Country fixed-effects	Yes		Yes	
Observations	104584		104584	
Number of clusters	126		126	
R^2	0.123		0.086	

Notes: OLS estimates. Standard errors (clustered at country level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. Reference categories are: *Male*, *Married / co-habiting,* and *One member in household*.