

Chan, Ho Fai; Skali, Ahmed; Savage, David; Stadelmann, David; Torgler, Benno

Working Paper

Risk attitudes and human mobility during the COVID-19 pandemic

CREMA Working Paper, No. 2020-06

Provided in Cooperation with:

CREMA - Center for Research in Economics, Management and the Arts, Zürich

Suggested Citation: Chan, Ho Fai; Skali, Ahmed; Savage, David; Stadelmann, David; Torgler, Benno (2020) : Risk attitudes and human mobility during the COVID-19 pandemic, CREMA Working Paper, No. 2020-06, Center for Research in Economics, Management and the Arts (CREMA), Zürich

This Version is available at:

<https://hdl.handle.net/10419/225548>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



Center for Research in Economics, Management and the Arts

Risk Attitudes and Human Mobility During the COVID-19 Pandemic

Working Paper No. 2020-06

Risk Attitudes and Human Mobility During the COVID-19 Pandemic

Ho Fai Chan^{1,2}, Ahmed Skali³, David Savage^{2,4}, David Stadelmann^{2,5,6,7}, Benno Torgler^{1,2,7}

¹School of Economics and Finance, Queensland University of Technology, Australia

²Centre for Behavioural Economics, Society and Technology (BEST), Australia

³Department of Economics, Deakin University, Australia

⁴Newcastle Business School, University of Newcastle, Australia

⁵University of Bayreuth, Germany

⁶IREF – Institute for Research in Economic and Fiscal Issues

⁷CREMA—Center for Research in Economics, Management, and the Arts, Switzerland

Abstract

Behavioural responses to pandemics are less shaped by actual mortality or hospitalization risks than they are by risk attitudes. We explore human mobility patterns as a measure of behavioural responses during the COVID-19 pandemic. Our results indicate a strong negative relationship between mobility reduction and risk-taking preferences. We find that the sharp decline in movement after the WHO (World Health Organization) declared COVID-19 to be a pandemic can be attributed to risk attitudes, especially for visits to places classified as retail and recreation, transit stations and workplaces. This suggests that individuals with risk-averse attitudes are more likely to adjust their behavioural activity in response to the declaration of a pandemic even prior to most official government lockdowns. We also find regions with higher risk aversion report a larger relative reduction in frequency of visits to places such as retail shops, grocery stores, parks, and public transport during the weekends compared to weekdays, whereas risk-loving regions are more likely to go to workplaces and less likely to stay at home during the weekends. There is also evidence to suggest that in areas with a larger share of older people in the population, risk-loving individuals are more likely to restrain themselves from taking public transport, engaging in non-essential retail shopping, going to workplaces, and staying home. Finally, we also find that the rate of behavioural adjustment, measured as the effect of mobility change after the first recorded death in the country, is sharper when the population have a larger risk pool population independent of government lockdowns.

In Thackeray's novel Henry Esmond, for instance, this dread informs the narrative. The heroine, Lady Castlewood, contracts the disease as an adult. Her husband had been a brave soldier in combat, but he was unable to face a malady that he could not fight and that threatened him not only with death, but also with disfigurement. Unwilling to put his pink complexion and his fair hair at risk, Lord Castlewood took to his heels and deserted his household for the duration of the outbreak. But he was not part of a mass exodus, even though Henry Esmond declares that smallpox was "that dreadful scourge of the world" and a "withering blight" and "pestilence" that "would enter a village and destroy half its inhabitants."

Snowden (2019, p. 101).

Introduction

The central features of a global modern society make us more vulnerable to the challenge of pandemic diseases and their global implications, as viral transmission can trigger large-scale responses (Snowden 2019)¹. Epidemics such as COVID-19 threaten our social fabric (Eichenberger et al. 2020), thus it is important to understand such occurrences from a risk behaviour perspective. Scholars have emphasized how social and behavioural sciences can offer important insights into how the COVID-19 pandemic may be understood and managed (Van Bavel et al. 2020). Risk behaviour has been predominately analysed in relation to the HIV/AIDS pandemic (Rhodes 1997, Johnson 1988). Studies have also tried to model the effects of risk perception on the spreading of an epidemic (Bagnoli et al. 2007), and have explored how different levels of awareness may help to prevent an outbreak (Abdulkareem et al. 2020). Other studies have explored the implications of risk attitudes in disasters (Eckel et al., 2009, Cameron and Shah 2015, Page et al. 2014) or extreme situations (Savage et al. 2020).

Risk taking attitudes and behaviour are important elements of human behaviour as they determine a range of decision-making strategies (Rieger et al. 2015) and contribute to navigation of the complexity, uncertainty, and dangerous world where risk looms large. For example, research has shown that risk aversion can result in the over weighting of risk factors and risk seeking can result in the under weighting of risk (Charness, Gneezy, & Imas, 2013; Kahneman & Tversky, 1992; Pratt, 1964; Rabin, 2000; Wakker, 2010). Advanced civilizations dating back to the Asipu in Mesopotamia in 3200 B.C. had risk management strategies in place to estimate profits/losses or successes/failures (Oppenheim 1977 discussed in Trimpop 1994). Another early example of risk analysis and risk management is the *Code of Hammurabi*² issued in 1950 B.C. (Trimpop 1994). Our cognitive apparatus has equipped us evolutionarily to

¹ In the Middle Ages, for example, monasteries were vulnerable to plagues. Their status as central hubs meant they acted as nodes in the grain trade; linking villages and settlements together, and attracting a substantial community of people who lived close by. In addition, monasteries served as a place of refuge (Snowden 2019, p. 42).

² The *Code of Hammurabi* is Babylonian code of law that is still well-preserved.

survive our daily activities (Slovic 2010), while enduring and recurring risks in the environment have required evolutionary adaptiveness as a core selective factor of survival (Wang et al. 2009). The implication is that we must remain safe to guarantee our survival. It is no coincidence that we are all well aware of the proverb “Better safe than sorry”.

Risk entails a complete probabilistic knowledge of something occurring, which allows a decision regarding what action to take. However, not only are we boundedly rational human beings (Simon 1991) subject to emotions (Simon 1983) such as fear, but the complexity of the environment and situation, the limited available information on contextual factors of other humans, or dynamic changes may not allow us to have a clear idea about the actual probability we face³. In addition, calculating the probability of risk is not the same as actually perceiving it, and humans use less accurate heuristics to make judgements that also include perception of risk. Our biases often disrupt our risk assessments in both positive and negative ways by limiting access to information (searches), limited cognitive understanding (noise), and through our own personal experiences. Thus, subjective perceptions or emotional responses may be triggered by human traits or other factors. For example, we adjudge risk differently based on the physical distance between ourselves and the danger, i.e. we feel safer if the danger is further away, and we are less likely to continuously monitor it over an extended duration (Rosenboim et al. 2012). This may work relatively well for traditional dangers like fires or floods, but the spread of a pandemic is invisible, and only media reports of those in hospital give any rough clue to its presence. As such it is likely that we fail to correctly use local transmission (infection) rates as a guide of its proximity or distance to us and the level of threat it poses. Risk as a feeling is less driven by actual probabilities and more by our instinctive and intuitive reaction to danger (Slovic 2010, p. 70). Risk taking has often been classified as a stable personality trait (Bromiley and Curley 1992), although situational or contextual factors can also matter (see, e.g., Ronay and von Hippel 2010, March 2010). An individual’s risk type and their perception of risk are highly correlated such that they interact to exacerbate the underlying risk type. That is: risk seekers are likely to have a worse perception of risk and not only are they willing to accept more gambles, but their estimations of the gambles are underweighted, leading to a greater adoption of risk than the individual intended (Slovic 1993). In addition, we humans are also subject to framing biases, reacting differently depending on the way in which

³ Some frontline professions more exposed to interaction with other people have a higher risk of being infected. Looking historically at plagues, professions such as street vendors, physicians, priests, gravediggers or washerwomen were more seriously at risk of acquiring or transmitting diseases when moving from place to place.

information is presented (e.g. positively or negatively, see Kahneman and Tversky, 1979)⁴. This framing can increase or decrease our willingness to take or avoid risk, especially where losses are concerned – the loss of life from contracting the virus is the ultimate loss. Thus, preferences are not set in stone and are open to change, especially after we experience losses; i.e. an individual may be more risk seeking following losses and risk averse following gains (Ackert, Charupat, Church, & Deaves, 2006; Page et al., 2014; Post, van den Assem, Baltussen, & Thaler, 2008; Thaler & Johnson, 1990).

Feelings elicited during a pandemic have an impact everyday activities (Västfjäll et al. 2008) and individuals are required to make trade-offs that are affected by their risk behaviour. Is it safe to go out shopping, to the park, to use public transportation etc.? What are the chances of getting infected? How do we need to respond? Risk attitudes matter as individuals are aware that going into public places increases the possibility of being infected; if there was to be an infection this would be subsequently regretted. Risk averse individuals may respond more to unfamiliar risks that are perceived as uncontrollable (Brug et al. 2009). During pandemics, states also may become more controlling – historically, social mobility restrictions or regulations are common in pandemics. For example, anti-plague regulations banned funerals, processions, sale of clothing, and gatherings in public assemblies, all of which reduced opportunities for trade, and imposed severe penalties when those rules were not followed. Community bonds might be destroyed if people lose the opportunity to, for example, grieve, pay final respects, or assemble (Snowden 2019). The level of social mobility in our current situation is interesting, as during this phase there is no real treatment or vaccination, which means that citizens need to rely on precautionary behaviour. As the reality of the COVID-19 outbreak emerged, we saw that states started to introduce social distancing and isolation measures to deal with the pandemic and the lack of a vaccine.

In this article we take a look at key social or human mobility factors related to retail and recreation, grocery stores and pharmacies, parks, transit stations, workplaces, and private residences. To measure risk, we use the Global Preference Survey (Falk et al. 2018), which analysed risk at the country level by combining experimental lottery choice sequences using a staircase method (choice between a fixed lottery in which individual could win x or zero and varying sure payments) and self-assessment based on the willingness to take risks (see Method section for more details). We then extended this data to obtain regional level information.

⁴ For example, a patient may opt for surgery with a 95% survival rate but not for a surgery with a 5% chance of death.

Exploring how risk affects social mobility at the regional level is interesting as risk behaviour can be seen as the product of an interplay between individuals, actions of others, and the community or social environment (Rhodes 1997). Risk is therefore deeply embedded in specific sociocultural backgrounds (Zinn 2008), with country and geographical differences in risk taking reported by scholars such as Falk et al. (2018) (e.g., higher risk taking values in Africa and the Middle East while Western European countries are relatively risk averse). In the context of a pandemic where a population is attempting social isolation or are in lockdown, we see that shopping behaviours change (drop) and large swathes of the workforce have lost their jobs, which means that the entire population has been directly affected by the pandemic if not the virus. It is therefore interesting to explore how citizens' responses to an epidemic are driven by risk attitudes or preferences at the community or regional level.

In particular, we are interested in how individual behaviour responses to global announcements – such as the COVID-19 outbreak classification as a pandemic⁵ by the WHO – can be shaped by risk attitudes. We suggest that people in risk-taking environments may be less likely respond and engage in behavioural change which reduces risk. We are also interested in comparing situations with higher or lower opportunity costs in human mobility. The opportunity costs of staying home are defined as the cost incurred by not enjoying the benefit of going out (benefits associated with the best alternative choice). For this, we explore differences between weekdays and the weekend. As many individuals are still working during the week even while being at home, there is more psychological pressure to be active during the weekend, which increases the opportunity costs of staying at home. Not going out requires more psychological costs to fight against previously formed habits, as it is difficult to abandon the way in which we are accustomed to act. We therefore hypothesize that regions with higher risk attitudes are less likely to follow precautionary strategies when opportunity costs are higher and are therefore are less likely to deviate from their outside activities during the weekend relative to the baseline. Lastly, we also examine whether people adjust their behaviour when living in a population with a larger proportion of elderly people at greater risk of more serious illness from contacting the virus. This adjustment is conditional on risk perception. We expect that regions with a higher share of over 65 individuals would show a greater reduction in mobility. In particular, risk taking regions may display stronger mobility deviations from their original baseline (stronger reduction).

⁵ <http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic>

Results

We examined the relationship between the changes in human mobility during the outbreak of Coronavirus disease (COVID-19) and risk preferences of individuals in 60 countries (with 772 regions from 34 countries with subnational regions data). Our main goal is to see if individuals with higher (lower) levels of willingness to take risks are less (more) likely to reduce their exposure to social interactions by going to public places between 15 Feb 2020 and 11 April 2020. The outcome variables measure the daily *changes* (in percentage) in location visits compared to the median value of the same day of the week in the 5-week baseline period, during 3 January and 6 February 2020. To see whether mobility changes are related to risk tolerance, we first regressed the risk-taking preference on each of the six mobility measures, namely, *Retail & Recreation*, *Grocery & Pharmacy*, *Parks*, *Transit Stations*, *Workplaces*, and *Residential*. In each regression, we controlled for whether the day is a weekend (i.e., Saturday and Sunday), an indicator distinguishing our sample time period by the day when the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic (11 March 2020), the number of confirmed cases (in logs), number of days since the first confirmed coronavirus related death in the country, percentage of population over 65, population density (per squared km of land area), and a set of indicators on government responses that covers recommending and requesting closure of school, workplace, public transport, cancellation of public events, and restriction on internal movement (Hale, Webster, Petherick, Phillips, & Kira, 2020). Consequently, our results regarding risk attitudes can be interpreted as independent of government lockdown measures. To this end, we employed a random-effects linear model to estimate the linear effect of risk-preference on mobility and linear interaction effects of risk and other covariates, namely, pandemic declaration, weekend, share of population over 65, and number of days since first confirmed death in the country.

As expected, we see an overall reduction in visits to all localities other than residential places during the sample period (see Fig. 1). There is an evident relationship between risk attitude and the change in mobility to certain locations. Particularly, risk-taking is positively associated with change in visitation to places classified as retail and recreation ($\beta=3.977$, s.e.=0.890, $CI_{95\%}=[2.233;5.721]$, $P<0.001$), grocery and pharmacy ($\beta=3.544$, s.e.=0.783, $CI_{95\%}=[2.010;5.078]$, $P<0.001$), parks ($\beta=5.831$, s.e.=1.546, $CI_{95\%}=[2.800;8.861]$, $P<0.001$), and transit stations ($\beta=2.007$, s.e.=1.025, $CI_{95\%}=[-0.001;4.015]$, $P=0.050$), which indicates that

an individual with higher risk-tolerance is more likely to visit these places (or less likely to reduce their frequency of visits). On the other hand, there is no apparent relationship between risk preference and change in mobility to workplaces ($\beta=0.811$, s.e.=0.644, $CI_{95\%}=[-0.452;2.074]$, $P=0.208$) and residential areas ($\beta=-0.471$, s.e.=0.306, $CI_{95\%}=[-1.071;0.129]$, $P=0.124$).

Most control variables report the expected effect on change in human mobility. Specifically, there is a reduction in outings and an increase in staying home as severity increases, such as after the WHO declared coronavirus outbreak a global pandemic, the first confirmed COVID-19 related death in the country, and most indicators of government response⁶ (see Supplementary Table S1). We note that while the number of confirmed cases decreases significantly with going to retail and recreational places ($\beta=-0.923$, s.e.=0.121, $CI_{95\%}=[-1.161;-0.685]$, $P<0.001$), transit stations ($\beta=-0.387$, s.e.=0.138, $CI_{95\%}=[-0.658;-0.117]$, $P=0.005$), and workplaces ($\beta=-0.619$, s.e.=0.093, $CI_{95\%}=[-0.801;-0.437]$, $P<0.001$), it increases with the frequency to visit grocery and pharmacy ($\beta=0.429$, s.e.=0.111, $CI_{95\%}=[0.211;0.647]$, $P<0.001$) and parks ($\beta=1.089$, s.e.=0.228, $CI_{95\%}=[0.642;1.536]$, $P<0.001$) and with no effect on staying home ($\beta=-0.013$, s.e.=0.047, $CI_{95\%}=[-0.105;0.080]$, $P=0.788$).

We also find that, on average, there is a greater reduction in visits to retail and recreational places ($\beta=-2.714$, s.e.=0.141, $CI_{95\%}=[-2.989;-2.438]$, $P<0.001$), grocery and pharmacy ($\beta=-2.656$, s.e.=0.147, $CI_{95\%}=[-2.944;-2.368]$, $P<0.001$), parks ($\beta=-2.749$, s.e.=0.427, $CI_{95\%}=[-3.587;-1.911]$, $P<0.001$), and transit stations ($\beta=-0.459$, s.e.=0.174, $CI_{95\%}=[-0.800;-0.119]$, $P=0.008$) on the weekends, in contrast to weekdays, while at the same time a reduction in visits to workplaces ($\beta=4.956$, s.e.=0.166, $CI_{95\%}=[4.630;5.282]$, $P<0.001$) and staying home ($\beta=-2.074$, s.e.=0.087, $CI_{95\%}=[-2.244;-1.903]$, $P<0.001$) is stronger in weekdays, compared to weekends. Decline in mobility to all localities is stronger for countries with a higher population density, however, the effect of the proportion of high-risk group (65+) in the population differs across locations. For instance, areas with a larger share of elderly are less likely to cut back on grocery and pharmacy visits ($\beta=0.145$, s.e.=0.049, $CI_{95\%}=[0.048;0.241]$, $P=0.003$) and going to the park ($\beta=0.822$, s.e.=0.109, $CI_{95\%}=[0.608;1.036]$, $P<0.001$) but exhibit a stronger reduction in to going to workplaces ($\beta=-$

⁶ The exception is recommendations to close schools, which reports the opposite effect on mobility to expectation.

0.427, s.e.=0.045, $CI_{95\%}=[-0.514;-0.339]$, $P<0.001$) and retail and recreational places ($\beta=-0.098$, s.e.=0.057, $CI_{95\%}=[-0.209;0.013]$, $P=0.082$).

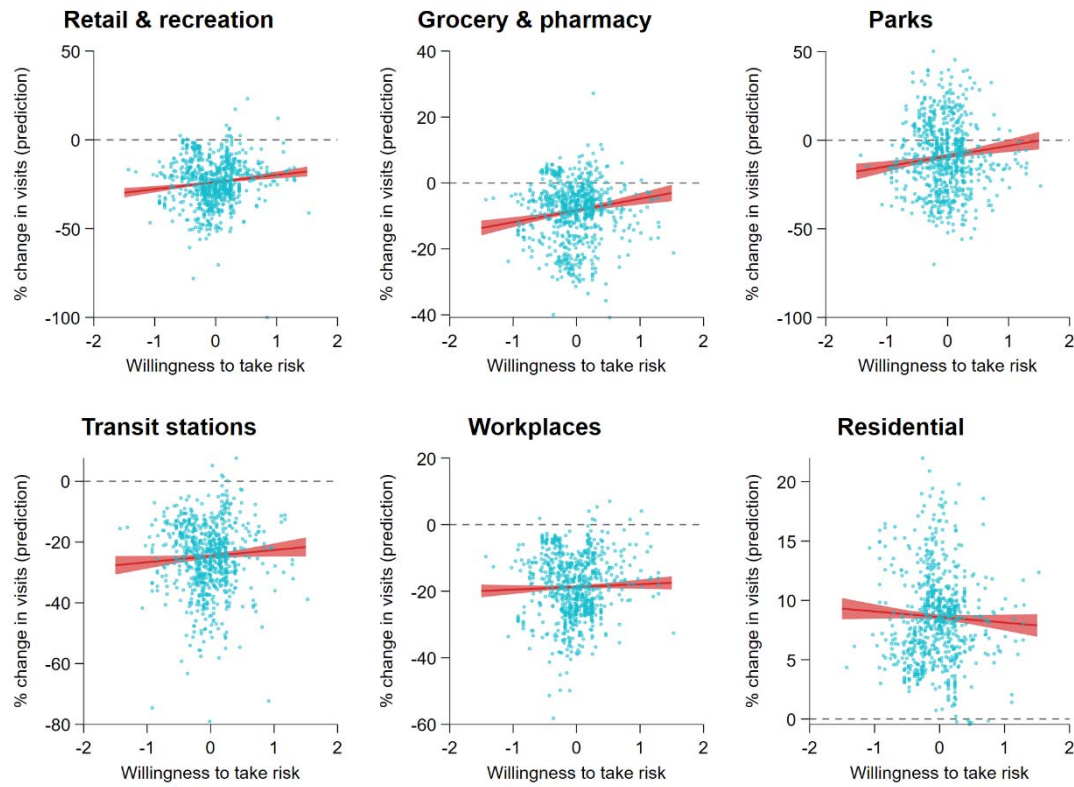


Fig. 1 | Risk attitude and human mobility during COVID-19. The six panels show the predicted percentage change in visit to locations classified as retail and recreation ($\beta=3.977$, s.e.=0.890, $CI_{95\%}=[2.233;5.721]$, $P<0.001$), grocery and pharmacy ($\beta=3.544$, s.e.=0.783, $CI_{95\%}=[2.010;5.078]$, $P<0.001$), parks ($\beta=5.831$, s.e.=1.546, $CI_{95\%}=[2.800;8.861]$, $P<0.001$), transit stations ($\beta=2.007$, s.e.=1.025, $CI_{95\%}=[-0.001;4.015]$, $P=0.050$), workplaces ($\beta=0.811$, s.e.=0.644, $CI_{95\%}=[-0.452;2.074]$, $P=0.208$), and residential ($\beta=-0.471$, s.e.=0.306, $CI_{95\%}=[-1.071;0.129]$, $P=0.124$), compared to the respective baseline values over individual risk preference. Estimates of the risk-mobility relation are obtained from random-effects linear regression (Table S1). Markers represent the average of daily change in visits to the six locations for each country and region during the entire sample period.

Does pandemic declaration increase the effect of risk-attitude? We examine the interaction between willingness to take risks and pandemic declaration to assess if the effect of risk-taking on mobility is evident. We find evidence suggesting the declaration is a strong moderator of the risk-mobility effect. It is relevant to note that the declaration of the pandemic precedes lockdown measures of most governments.

We see that the reduction in outdoor activities (or increase in staying home) can be observed before COVID-19 was declared a pandemic by the WHO, especially for visits to places classified as retail and recreation, transit stations, and workplaces (see Fig. 2). The magnitude of mobility change has indeed increased after the declaration. For example, there is a further 7.47 percentage point (pp) drop in visits to retail and recreation locations ($\beta=-7.471$, s.e.=0.774, 95% confidence interval (CI_{95%})=[-8.988;-5.954], $P<0.001$), 7.72pp drop in going to transit stations ($\beta=-7.721$, s.e.=0.658, CI_{95%}=[-9.011;-6.431], $P<0.001$), and 4.65pp drop in going to workplaces ($\beta=-4.646$, s.e.=0.589, CI_{95%}=[-5.801;-3.491], $P<0.001$), respectively, compared to the period before pandemic declaration (Fig. 2, Table S1). In contrast, we find an average of 2.08pp increase in staying in a residential area ($\beta=2.075$, s.e.=0.242, CI_{95%}=[1.600;2.550], $P<0.001$) after declaration. Interestingly, the pandemic declaration did not have a severe impact on going to the parks ($\beta=-1.446$, s.e.=0.910, CI_{95%}=[-3.229;0.337], $P=0.112$) while overall visits to grocery stores and pharmacies ($\beta=1.322$, s.e.=0.615, CI_{95%}=[0.117;2.527], $P=0.032$) had increased.

We find that, with respect to risk preferences, the changes to visitation patterns (compared to their respective baseline) are relatively greater for lower risk individuals following the pandemic declaration. Specifically, we find the reduction in visits to non-residential locations (or increase in staying home) prior to declaration does not significantly differ among regions with different risk attitude, except for workplaces, where frequency of visits negatively correlates with willingness to take risk ($\beta=-2.277$, s.e.=0.592, CI_{95%}=[-3.438;-1.116], $P<0.001$). However, interrogating the interaction terms between risk-taking and pandemic declaration revealed a more interesting behavioural pattern; that is, the additional reduction in out-of-home activities after the declaration is much more dramatic for less risk-tolerating individuals. We found a statistically significant interaction effect on each of the outcome variables (retail and recreation: $\beta=10.122$, s.e.=1.509, CI_{95%}=[7.164;13.079], $P<0.001$; grocery and pharmacy: $\beta=7.004$, s.e.=1.045, CI_{95%}=[4.957;9.052], $P<0.001$; parks: $\beta=7.404$, s.e.=2.171, CI_{95%}=[3.148;11.660], $P<0.001$; transit stations: $\beta=7.529$, s.e.=1.555, CI_{95%}=[4.482;10.576], $P<0.001$; workplaces: $\beta=5.839$, s.e.=1.021, CI_{95%}=[3.837;7.841], $P<0.001$; residential: $\beta=-1.279$, s.e.=0.510, CI_{95%}=[-2.279;-0.280], $P=0.012$; see Fig. 2). It is also important to note that the pre- and post-declaration change in visitation pattern differences are smaller for higher risk-tolerance areas and vice versa, indicating that higher risk-taking individuals are less likely to respond to the negative change in environmental status.

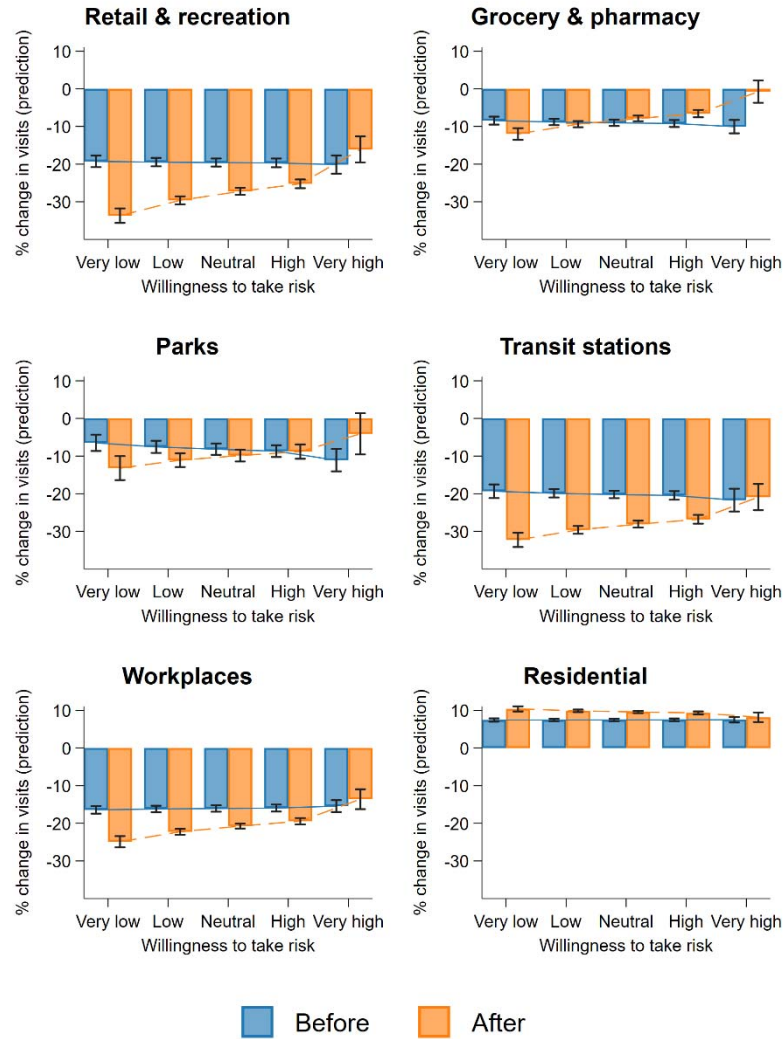


Fig. 2 | Change in visits to six location categories predicted by individual risk preference before and after pandemic declaration. The six panels show the predicted percentage change in visit to locations classified as retail and recreation, grocery and pharmacy, parks, transit stations, workplaces, and residential, compared to the respective baseline values, before and after WHO declared COVID-19 as a pandemic on 11 March 2020, over individual risk preference. Estimates are obtained from Table S2, for illustration, predicted changes are calculated over five points of the risk-taking variable (at the 1st, 25th, 50th, 75th, and 99th percentiles of the distribution), which we categorised into five levels of willingness to take risk: *very low*, *low*, *neutral*, *high*, and *very high*, respectively.

Mobility patterns weekdays vs. weekends. Next, we examine whether the tendency to change frequency of visits to different localities during weekdays and weekends is mediated by risk attitude. As Fig. 3 shows, our earlier results are confirmed. Compared to weekdays, individuals on average further reduce their visits to places classified as retail and recreation by 2.67pp ($\beta=-2.674$, s.e.=0.138, $CI_{95\%}=[-2.945;-2.403]$, $P<0.001$; see Fig. 3), grocery and pharmacy by 2.65pp ($\beta=-2.646$, s.e.=0.144, $CI_{95\%}=[-2.928;-2.365]$, $P<0.001$), parks 2.69pp ($\beta=-2.690$, s.e.=0.422, $CI_{95\%}=[-3.517;-1.862]$, $P<0.001$), and transit stations ($\beta=-0.457$, s.e.=0.171,

CI_{95%}=[-0.794;-0.121], $P=0.008$), compared to the baseline. In contrast, the reduction in going to workplaces is larger during weekdays ($\beta=4.970$, s.e.=0.165, CI_{95%}=[4.645;5.294], $P<0.001$), while individuals are more likely to stay home (places classified as residential) in general, the (percentage point) increase of staying home is higher during weekdays compared to weekends ($\beta=-2.088$, s.e.=0.086, CI_{95%}=[-2.257;-1.919], $P<0.001$). However, despite the signs of the coefficients of the interaction terms suggesting that regions with lower risk-tolerance have a larger reduction in mobility during weekends than in weekdays, compared to those who are more risk-tolerant, it was only statistically evident for retail and recreational places ($\beta=1.349$, s.e.=0.315, CI_{95%}=[0.732;1.967], $P<0.001$).

Nonetheless, we find that the mediation effect is more apparent after the declaration of pandemic, suggesting the effect manifests alongside severity. Specifically, we reran the analysis including the interaction between the risk preference-weekend mediation effect and pandemic declaration dummy (triple interaction term). We visualized the results in Fig. 4, showing the difference in average marginal effects of weekends (in contrast to weekdays) before and after the pandemic announcement, over levels of risk-taking (pre- and post-declaration average marginal effects of weekends is shown in Fig. S1 and predicted change in mobility in Fig. S2). We find that the tendency to reduce going out during the weekends compared to weekdays increases significantly with the levels of risk-tolerance for all non-residential and work locations, particularly in the post-declaration period (retail recreation: $\beta=4.529$, s.e.=0.715, CI_{95%}=[3.128;5.929], $P<0.001$; grocery pharmacy: $\beta=3.392$, s.e.=0.754, CI_{95%}=[1.914;4.871], $P<0.001$; parks: $\beta=2.916$, s.e.=1.389, CI_{95%}=[0.194;5.639], $P=0.036$; transit stations: $\beta=2.840$, s.e.=0.693, CI_{95%}=[1.482;4.198], $P<0.001$). It can also be seen that regions with higher risk-taking attitude have a larger pre-post-declaration relative weekends-weekdays difference in mobility for workplaces ($\beta=2.346$, s.e.=0.597, CI_{95%}=[1.176;3.517], $P<0.001$) and residential places ($\beta=-0.569$, s.e.=0.255, CI_{95%}=[-1.069;-0.070], $P=0.025$).

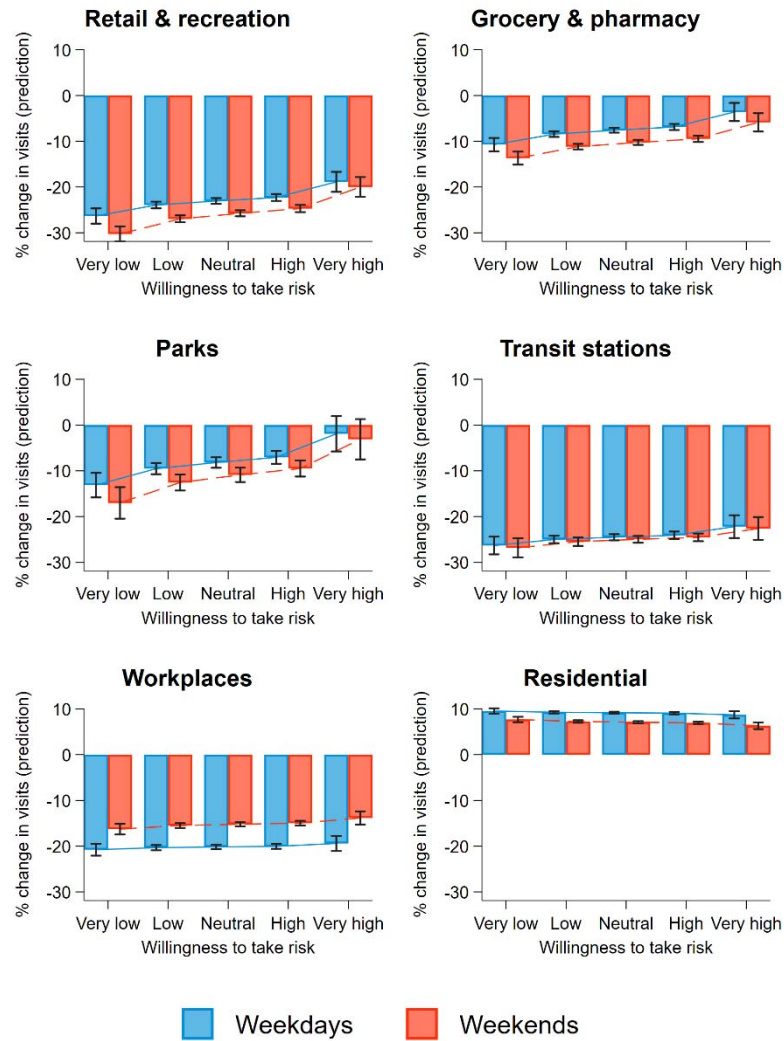


Fig. 3 | Visitation pattern by weekdays and weekends over individual risk preference. The six panels show the predicted percentage change in visits to locations classified as retail and recreation, grocery and pharmacy, parks, transit stations, workplaces, and residential, compared to the respective baseline values in weekdays and weekends, over individual risk-preference. The weekdays-weekends difference in change to visiting pattern is only significant on retail and recreation ($\beta=1.349$, $s.e.=0.315$, $CI_{95\%}=[0.732;1.967]$, $P<0.001$). Estimates are obtained from Table S3; for illustration, predicted changes are calculated over five points of the risk-taking variable (at the 1st, 25th, 50th, 75th, and 99th percentiles of the distribution), which we categorised into five levels of willingness to take risks: *very low*, *low*, *neutral*, *high*, and *very high*, respectively.

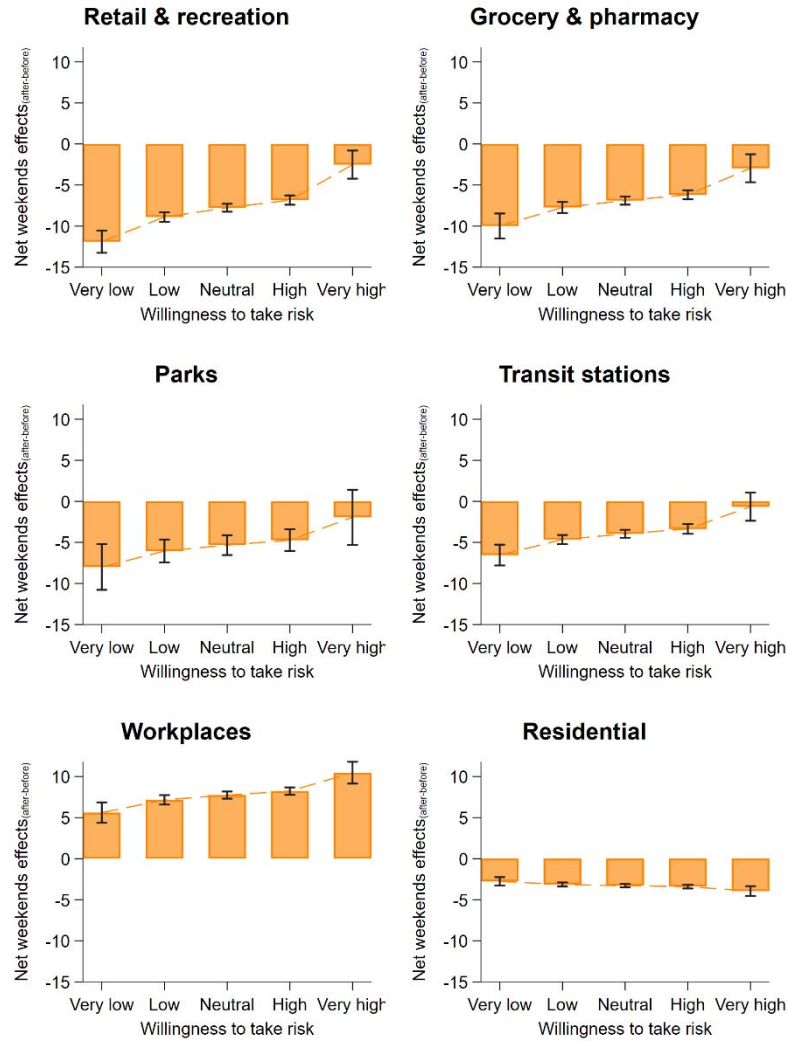


Fig. 4 | Mediation from risk preference to change in weekends and weekdays visiting pattern is stronger after pandemic declaration. The six panels show the difference in average marginal effects of weekends on visits to locations classified as retail and recreation, grocery and pharmacy, parks, transit stations, workplaces, and residential pre- and post-pandemic declaration periods, over risk-tolerance levels. Estimates are obtained from Table S3; for illustration, predicted changes are calculated over five points of the risk-taking variable (at the 1st, 25th, 50th, 75th, and 99th percentiles of the distribution), which we categorised into five levels of willingness to take risks: *very low*, *low*, *neutral*, *high*, and *very high*, respectively.

Perceived and actual risk. Next, we examine the relationship between mobility changes, risk preference, and proportion of elderly in the population to test if the relationship between mobility and risk is moderated by the share of population at higher risk of dying from COVID-19. We thus regressed change in mobility on willingness to take risk and share of population over 65 (see Fig. 5). We found that areas with a larger population at fatal risk (elderly) have larger cutback in going to retail and recreation places ($\beta=-0.143$, s.e.=0.060, $CI_{95\%}=[-0.260;-0.026]$, $P=0.016$), transit stations ($\beta=-0.146$, s.e.=0.078, $CI_{95\%}=[-0.299;0.007]$, $P=0.062$), and

workplaces ($\beta=-0.461$, s.e.=0.046, $CI_{95\%}=[-0.551;-0.371]$, $P<0.001$), with a small increase in staying home ($\beta=0.034$, s.e.=0.021, $CI_{95\%}=[-0.007;0.075]$, $P=0.107$), but surprisingly, they have a higher tendency to go to grocery and pharmacy ($\beta=0.133$, s.e.=0.052, $CI_{95\%}=[0.032;0.235]$, $P=0.010$) and parks ($\beta=0.777$, s.e.=0.111, $CI_{95\%}=[0.558;0.995]$, $P<0.001$). Nevertheless, the size of the coefficients suggest the magnitude of the effect is quite small (e.g., with 1pp increase in share of over 65s in population, mobility change for staying home increase by 0.03pp). We also found significant interaction effects on mobility of all localities: retail and recreation ($\beta=-0.688$, s.e.=0.115, $CI_{95\%}=[-0.913;-0.463]$, $P<0.001$); grocery and pharmacy ($\beta=-0.169$, s.e.=0.097, $CI_{95\%}=[-0.359;0.021]$, $P=0.081$); parks ($\beta=-0.502$, s.e.=0.182, $CI_{95\%}=[-0.859;-0.145]$, $P=0.006$); transit stations ($\beta=-0.704$, s.e.=0.134, $CI_{95\%}=[-0.966;-0.442]$, $P<0.001$); workplaces ($\beta=-0.524$, s.e.=0.077, $CI_{95\%}=[-0.674;-0.374]$, $P<0.001$); and residential ($\beta=0.219$, s.e.=0.035, $CI_{95\%}=[0.150;0.288]$, $P<0.001$). This suggests that, for example, risk-loving individuals in areas with a larger proportion of population at risk seems to have further curbed their movement compared to those residing in areas with less high-risk persons in the population.

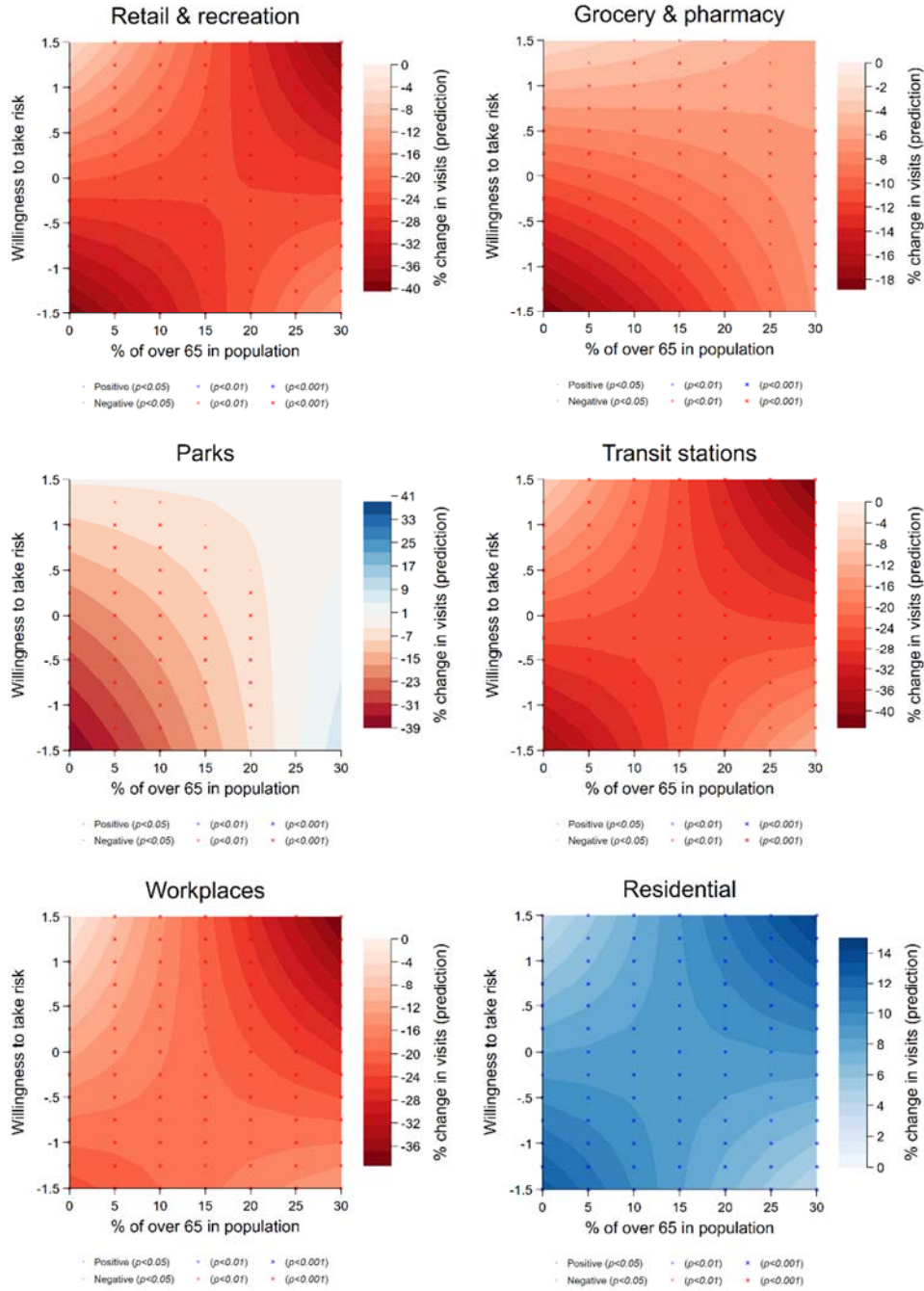


Fig. 5 | Change of mobility patterns based on risk preference and share of population. The six panels show the predicted change in visits to locations classified as retail and recreation, grocery and pharmacy, parks, transit stations, workplaces, and residential, over risk-tolerance levels and the proportion of over 65s in the population. Estimates are obtained from Table S4.

Furthermore, we found that the dynamics of mobility change since observing the first confirmed death in the country is highly dependent on risk-attitude and the share of population facing higher risk. The speed of such a mobility adjustment is represented in Fig. 6, depicting the average marginal effects of days since the first confirmed death, conditional on risk-attitude

and the proportion of over 65s in the population, estimated from regressions that include the triple interaction effect of the three variables. Taken together, results from Fig. 6 indicate that for areas where the population has a higher proportion of population with more serious risk and consequences from contracting the virus, *rate* of mobility reduction is higher. For example, when comparing the rates of mobility change since first confirmed death for areas with higher risk tolerance across the share of high-risk population, one can see that the mobility reduction in retail and recreation and workplace is larger for areas with more elderly people in the population. This effect is more prominent for individuals who are more willing to take risks. Likewise, we also observe a higher rate of mobility reduction in terms of transit stations and residential locations for more risk-averse people in areas with a greater proportion of over 65s. Furthermore, we find that the change in visits to grocery and pharmacy since the first report of a death does not seem to correspond with the proportion of high risk population – regardless of risk-preference – whereas regions with a larger pool of high risk people seem to increase their frequency of going to parks after the first recorded death.

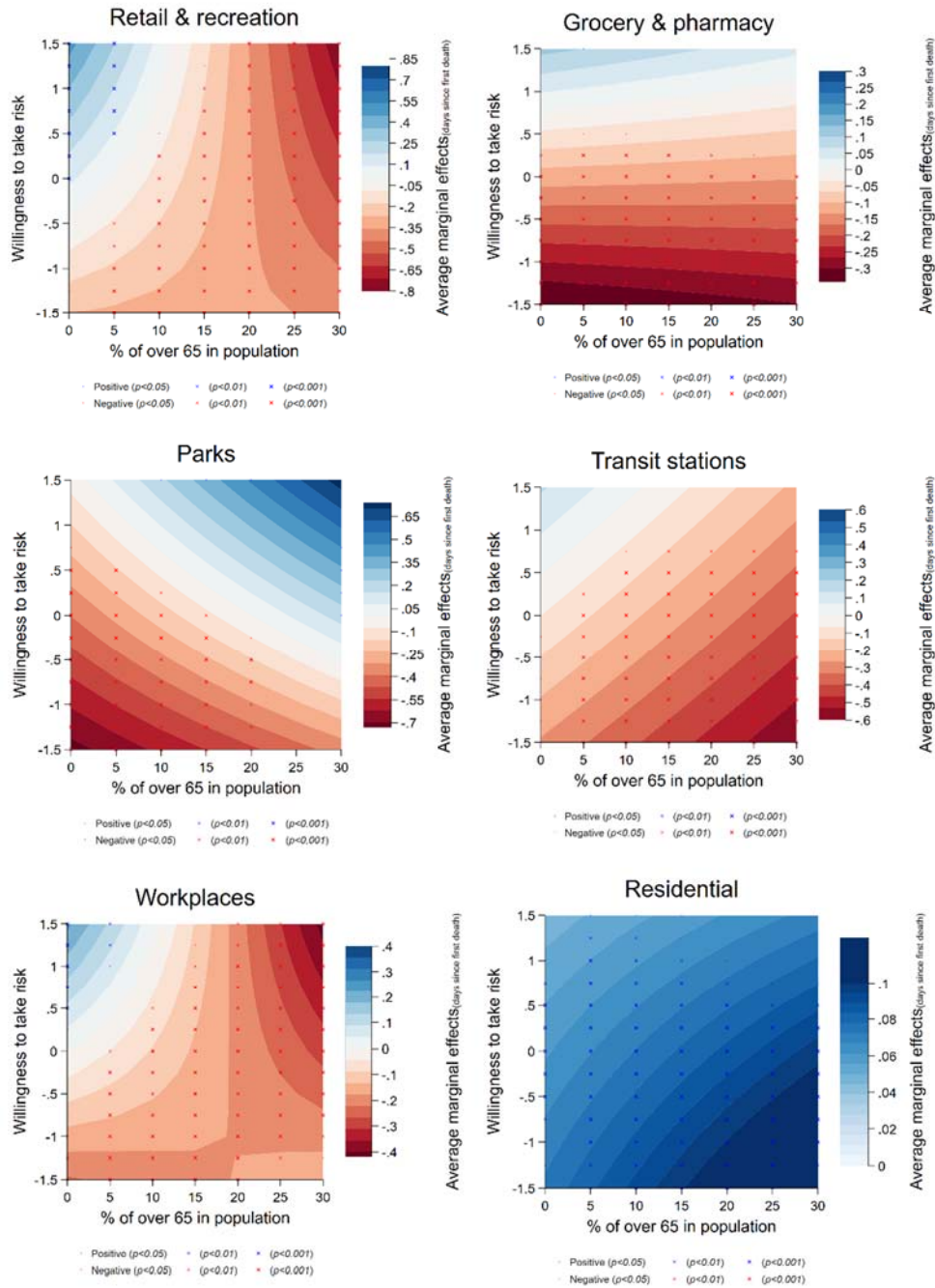


Fig. 6 | Dynamics of mobility change based on risk preference and share of population at risk. The six panels show the average marginal effects of days since first recorded death on visits to locations classified as retail and recreation, grocery and pharmacy, parks, transit stations, workplaces, and residential, over risk-tolerance levels and the proportion of over 65s in the population. Estimates are obtained from Table S5.

Discussion

As with Plato's cave, there are stark differences between how we perceive risk and the reality or the calculated level of risk, which can result in totally different behavioural outcomes. Risk attitudes clearly shape behavioural responses to pandemics. The actual health risks of the COVID-19 pandemic are (most likely) low for most groups apart from the elderly (Ioannidis 2020ab). In terms of mortality, the overall health consequences of Covid-19 could be similar to a pandemic influenza (Fauci et al. 2020). Nevertheless, perceptions of risk – rather than actual risk – influence real behavioural activity. Our results demonstrate the sharp shifts in behavioural activity and risk attitudes before and after declaration of COVID-19 as a pandemic, as well as shifts before and after the first related death was recorded. The first thing that becomes apparent is that behaviour and our willingness to take on risks have both shifted dramatically since the baseline period in mid-February. At this stage, only three deaths were recorded outside mainland China⁷ (one in Hong Kong, Japan and the Philippines) and life was proceeding as normal. There was no imminent perception of a threat of the worldwide pandemic to come, reflected in the baseline reporting of behaviour and the willingness to take risks. However, when we compare this to the first and second sample period, we observe mostly negative shifts in behaviour (excluding residential) but a mixed set of reactions to risk. Several categories saw a substantial double negative shift in visits including Retail & Recreation, Transit Stations and Workplaces; compared to the baseline, visiting behaviours had already started to drop off before the pandemic announcement, but dropped off again afterwards. During this first period we can see that social distancing and working from home was starting to make an impact, as people stopped travelling to and from work (especially through crowded transit stations) and also stopped engaging in non-essential retail shopping (therapy). After the pandemic was officially announced, we see a second wave of behavioural shifts as more people reduce their travel, shopping and more either lose their jobs or are in shutdown mode. However, we do observe an interesting shift in risk attitudes across these three categories as they all exhibit a slightly positive trend in the period before the announcement, but they all shift to a much stronger negative risk trend after the announcement. Given that 'flattening the curve' was the strategic focus for most governments, the social distancing message appears to have been received even prior to most lockdown measures. Conversely, Grocery & Pharmacy, Parks and Residential had much smaller shifts both before and after the announcements when

⁷ Figures taken from the Communicable Diseases Intelligence Report, Department of Health (Australia) [https://www1.health.gov.au/internet/main/publishing.nsf/Content/1D03BCB527F40C8BCA258503000302EB/\\$File/covid_19_australia_epi_report_3_reporting_week_ending_1900_aedt_15_feb_2020.pdf](https://www1.health.gov.au/internet/main/publishing.nsf/Content/1D03BCB527F40C8BCA258503000302EB/$File/covid_19_australia_epi_report_3_reporting_week_ending_1900_aedt_15_feb_2020.pdf)

compared to the baseline. However, the shifts in Grocery & Pharmacy and Parks – while much smaller than the other categories – appear to undergo a risk preference shift; that is, the first set of behavioural changes result in a positive sloping risk function that flipped into a negative sloped function after the pandemic announcement.

While seemingly at odds with expectations, one may want to consider what the announcement of the pandemic would have meant to most individuals. With a looming threat of lockdown and isolation, at this point individuals would have ramped up shopping to stock up for likely upcoming government lockdown. In addition, those with an affinity for the outdoors may have wanted to enjoy their parks and outdoor lifestyle as much as possible before it was banned. This is in line with the reported shifts in the number of visits, which while still negative overall, indicate that the change to number of visits is less negative than prior to the announcement. The odd one out is the Residential visits category; while small, we can still observe double increases in visitation numbers both pre and post the official pandemic announcement, and there is very little change in the function representing the willingness to take risks.

When interpreting these statistics, we need to bear in mind the ‘normal’ weekly habits of people; that is, work during the week and undertake other activities/pastimes on the weekends. In order to ensure we capture the shift in behaviour, we compare the weekday behaviours and risk attitudes to that of the weekends. Figure 2 demonstrates that there are a few differences between weekdays and weekends, as one would expect that on weekends there are slightly more activities taking place other than work. Furthermore, we see little variance in the slopes of weekdays and weekends risk attitudes. This analysis is extended to look at the propensity to change behaviour based on risk attitudes between the weekdays and weekends, before and after the official announcement of the pandemic. As demonstrated in Figure 3, there are large negative shifts across all categories except workplaces after the official declaration, but much smaller variations between weekdays and weekends before the declaration. This further supports the discussion above: that the behaviour had already started to change well before the declaration of a pandemic, with many individuals starting to increase their weekend activities. However, after the pandemic was announced, a raft of measures that tried to limit the spread of the virus resulted in a very large change in most economies due to closure of businesses and job losses. This fundamental change in economic activities and loss of work left very little to differentiate weekends from weekdays for a large number of people, which is reflected in the large negative changes in the comparisons. Prior to the announcement, we see

that the function on willingness to take risk is fairly flat or slightly downward sloping, but risk perceptions change significantly for all categories after the announcement. The most interesting changes are in Workplace and Residential, exhibiting a relatively large increase in the willingness to take high risks: this could be explained through people wanting to visit family and friends or the increased willingness to work despite the risk of infection.

In general, throughout our analysis we observe that less risk-tolerating regions more actively adjust their behavioural patterns in response to the pandemic. Risk seeking regions are less responsive to protective measures. Thus, the tendency towards being more careless or more cautious carries substantial behavioural implications that is also affected by different levels of opportunity costs, as evidenced by the weekend effect. Regional differences seem to matter, offering support for a “regional personality factor” in risk taking. As with individuals who allocate themselves to more risky professions there are regions that are likely more likely acting as “stunt persons”, “fire-fighter”, or “race-car driver regions”.

Risk takers therefore seem to demonstrate a lower preference for their own and communal safety. Such behavioural differences due to risk preferences may indicate different levels of homeostatic responses. Risk aversion seems to promote a stronger fluctuation around a target level. For example, if you are driving on a motorway and it starts to rain or snow, what do you do? Our result would imply that risk averse individuals may be more likely to slow down to reduce the likelihood of having an accident. Risk averse individuals have a higher need for risk compensation. Thus, the level of risk at which a person feels best is maintained homeostatically in relation to factors such as emotional or physiological experiences (Trimpop 1994).

Overall, the lack of adjustment among risk taking regions is interesting, as many settings that explore risk taking behavior are connected to the possibility of attracting social fame and praise, financial gains, or other potential positive outcomes. In our setting, the risks are strongly attached the loss of their own and other’s health or life without achieving major gains, although positive utility gains also arise from not restricting one’s usual activities. It seems like the risk takers are more “pathologically” stable during such environmentally challenging circumstances. It is almost as if risk taking regions are more determined to maintain settings as activity-oriented, while risk averse regions are more goal-oriented in achieving social distancing.

The current analysis is interesting, as a large number of studies exploring the implications of risk are based on cross-sectional samples or between-subject designs in laboratory settings. In this case, the danger is more prolonged, lasting over several weeks or months, compared with other risk situations such as driving a car. Automatic or response “scripts” become less relevant as individuals have the chance to think about their actions and adjust their behaviour accordingly. Strategic, tactical, or operational factors become more dominant while perceptual, emotional, and motivational factors remain active. In addition, individuals do not face a single “either-or” decision but are required to constantly evaluate their choices to go out or stay at home. Thus, cognitive reevaluation is a core feature in our setting, and is based on dynamic feedback loops. Risk loving regions are also less likely to adjust their behavior based on external stimulus such as the WHO announcement of classifying COVID-19 as a pandemic.

We also observe that risk averse regions with higher percentages of 65+ people more actively change their behaviour to increase social isolation. Future studies that collect data on individuals could try to disentangle perceptions (risk preferences) partly from actual risk as statistics provide detailed information on the actual age risk profile.

A core limitation is that we are only able to explore human behaviour at the regional and not individual level. Studies that use individual data could focus in more detail on individual differences such as age or gender or differences in affective reactions or perceived locus of control. Such a study would provide a better understanding of habit changes, as well as potentially reveal motivational reasons for behavioural changes or behavioural stickiness. To reduce levels of uncertainty or ambiguity, individuals will try to gain control over a situation or they will change their preferences to better fit the situation, and thus try to gain control in a secondary way (Trimpop 1994). Other psychological factors such as overconfidence may also matter. In addition, we do not have information about the actual level of social mobility in the baseline time period. If that information were available, one could argue that those who had the highest levels of mobility prior to the lock down have had the largest relative loss; we should therefore observe this group exhibiting the most risk seeking behaviour and breaking the lockdown rules. On the other hand, those who previously had the least amount of social mobility have in relative terms only suffered a small loss – and should be much less likely to break the lockdown rules. However, this may adjust over time, as individuals habituate to the changes and reset their reference points. This fits nicely into the suggestion that “a person who has not made peace with his losses is likely to accept gambles that would be unacceptable to

him otherwise” (Kahneman and Tversky, 1979: p. 287), which is consistent with risk preference changes in a disaster situation (Page et al. 2014).

Risk is a fascinating topic as we have two forces in place. Based on evolutionary theory, people are risk-inclined but also control-inclined. Risk taking is necessary to cope with environmental changes and the constant level of uncertainty and danger. On other hand, control of the environment is required to reduce risks that go beyond the desired levels or that may pose danger to one’s survival (Trimpop 1994).

The pandemic declaration caused a fundamental shift in behaviour, independently of government lockdown measures. Future studies could explore in more detail how information dissemination and media reporting are connected to behavioural responses and the level of risk taking within regions. Removal of the lockdown policies is likely to be undertaken cautiously and slowly rather than via one large change. It is unclear at this stage how changes – particularly among the risk averse regions – have already led to new habit formation that will not readjust to previously normal settings. Future studies will provide more insights into such a question.

Material and Methods

Mobility. We obtained the mobility measures on country and regional level from the COVID-19 Community Mobility Reports (Google, 2020), assessed on 17 April 2020⁸. The dataset consists of six location specific mobility measures for 131 countries between 15 February 2020 and 11 April 2020. For 49 out of the 131 countries, the mobility measures are also available at the regional level. For the United States, both state and county level is available, although we did not include county level in our analysis as risk preference is not available at the county level. The resulting number of sub-national regions included is 1,167. Our analysis was conducted at the smallest available geographic unit ($N=1,249$). Based on anonymized and aggregated data from Google users who have opted in to their Location History service, each mobility measure records the percent change in visits and length of stay to places classified as *Retail & Recreation*, *Grocery & Pharmacy*, *Parks*, *Transit Stations*, *Workplaces*, and *Residential* within the geographic area. The percent change is compared to the median value of the same day of the week between 3 January and 6 February 2020. For privacy reasons,

⁸ Before Google officially release of the mobility data file on 15 April 2020, an earlier version of the data was obtained from Chan et al (2020, <https://osf.io/rzd8k/>), based on values extracted from each PDF file of the Mobility Reports using WebPlotDigitizer (Rohatgi, 2019).

Google censored values if the traffic volume is not high enough to ensure anonymity. While the median number of censored values for each mobility measure is zero, about 45% ($n=569$) of regions have at least one censored value for any of the six mobility variables on any given day in the sample period. To ensure our results were not caused by the unbalanced sample due to censored values, we reran our results by excluding regions with various thresholds of daily values censored, finding that the results remain highly robust to all exclusions (see Supplementary Information).

Risk attitude. We obtain the measure of risk preference from the Global Preferences Survey (Falk et al., 2016; Falk et al., 2018), which is aggregated into the country ($n=76$) and regional ($n=1,126$) level. Risk preferences of the respondents were elicited through a qualitative question (self-rated perceived risk preference on a 11-point scale) and a set of quantitative questions using the staircase method, where respondents were asked to choose between varying sure payments and a fixed lottery, in which the individual could win x with some probability p or zero. The responses from the two questions were combined (with roughly equal weights) to produce the overall individual risk preference measure (Falk et al., 2016). For subnational regions where both mobility measures and risk preference measures are available at the region levels, we employed the regional aggregated values, otherwise country aggregated values were used (see Supplementary Information). The number of countries and regions with both risk preference and mobility measures are between 797 and 849 depending on the availability of mobility measures.

Covid-19 cases and deaths statistics and government response indicators. Country level statistics on the daily number of cases and deaths were sourced from the European Centre for Disease Prevention and Control (ECDC). Together with the set of indicators on government responses, these data were obtained from the Oxford COVID-19 Government Response Tracker (OxCGRT) (Hale et al., 2020), available for 149 countries. Out of the 13 response indicators available from the OxCGRT, we take five indicators on policies regarding social isolation, including school, workplace, and public transport closures, public events cancellation, and internal movement restrictions. Each indicator has three levels of response (no measures taken, recommendation, and implementation) recorded on ordinal scale. We dichotomously coded each response to be included in our regression analysis. OxCGRT also records if the policy is applied nationwide; for robustness checks, we recode the each response indicators as no measures taken if policy is targeted to a specific geographical region (see Supplementary Information).

Population. Population density (people per squared km of land area) and the share of population aged 65 and above were obtained from the World Development Indicators (World Bank, 2020) and are available at the country level.

Analyses. To examine the main question of how mobility patterns during the COVID-19 outbreak change according to risk attitude, we analysed the data using random-effects linear model. Standard errors are clustered on the smallest geographic unit in each regression.

Reference

- Abdulkareem, S. A., Augustijn, E. W., Filatova, T., Musial, K., & Mustafa, Y. T. (2020). Risk perception and behavioral change during epidemics: Comparing models of individual and collective learning. *PLoS ONE*, 15(1), e0226483.
- Ackert, L., Charupat, N., Church, B., & Deaves, R. (2006). An experimental examination of the house money effect in a multi-period setting. *Experimental Economics*, 9(1), 5–16.
- Bagnoli, F., Lio, P., & Sguanci, L. (2007). Risk perception in epidemic modeling. *Physical Review E*, 76(6), 061904.
- Bromiley, P., & Curley, S. P. (1992). Individual differences in risk taking. In J. F. Yates (Ed.), *Wiley series in human performance and cognition. Risk-taking behavior* (p. 87–132). John Wiley & Sons: New York.
- Brug, J., Aro, A. R., & Richardus, J. H. (2009). Risk perceptions and behaviour: Towards pandemic control of emerging infectious diseases. *International Journal of Behavioral Medicine*, 16, 3–6.
- Cameron, L., & Shah, M. (2015). Risk-taking behavior in the wake of natural disasters. *Journal of Human Resources*, 50(2), 484–515.
- Chan, H. F., Skali, A., & Torgler, B. (2020). A global dataset of human mobility for March 2020. Mimeo.
- Charness, G., Gneezy, U., & Imas, A. (2013). Experimental methods: Eliciting risk preferences. *Journal of Economic Behavior & Organization*, 87, 43–51.
- Eckel, C. C., El-Gamal, M. A., & Wilson, R. K. (2009). Risk loving after the storm: A Bayesian-Network study of Hurricane Katrina evacuees. *Journal of Economic Behavior & Organization*, 69(2), 110–124.
- Eichenberger, R., Hegselmann, R., Savage, D. A., Stadelmann, D., & Torgler, B. (2020). Certified coronavirus immunity as a resource and strategy to cope with pandemic costs, *Kyklos*, 1–11. doi: 10.1111/kykl.12227.
- Falk, A., Becker, A., Dohmen, T. J., Huffman, D., & Sunde, U. (2016). The preference survey module: A validated instrument for measuring risk, time, and social preferences. IZA Discussion Paper No. 9674.
- Falk, A., Becker, A., Dohmen, T., Enke, B., Huffman, D., & Sunde, U. (2018). Global evidence on economic preferences. *Quarterly Journal of Economics*, 133(4), 1645–1692.
- Fauci, A. S., Lane, H. C., & Redfield, R. R. (2020). Covid-19—navigating the uncharted. *New England Journal of Medicine*, 382(13), 1268–1269.
- Google. (2020). COVID-19 Mobility Reports, <https://www.google.com/covid19/mobility/>.
- Hale, T., Webster, S., Petherick, A., Phillips, T., & Kira, B. (2020). Oxford COVID-19 Government Response Tracker, Blavatnik School of Government.
- Ioannidis, J. P. (2020). Coronavirus disease 2019: the harms of exaggerated information and non-evidence-based measures. *European Journal of Clinical Investigation*, 50(4), e13222.
- Ioannidis, J. P., Axfors, C., & Contopoulos-Ioannidis, D. G. (2020). Population-level COVID-19 mortality risk for non-elderly individuals overall and for non-elderly individuals without underlying diseases in pandemic epicenters. *medRxiv*.

- Johnson, A. M. (1988). Social and behavioural aspects of the HIV epidemic—a review. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 151(1), 99–114.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–291.
- Kahneman, D., & Tversky, A. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5(4), 297–323.
- March, J. G. (2010). *The ambiguities of experience*. Cornell University Press.
- Oppenheim, L. (1977). *Ancient Mesopotamia*. University of Chicago Press.
- Page, L., Savage, D. A., & Torgler, B. (2014). Variation in risk seeking behaviour following large losses: A natural experiment. *European Economic Review*, 71, 121–131.
- Post, T., van den Assem, M., Baltussen, G., & Thaler, R. (2008). Deal or no deal? Decision making under risk in a large-payoff game show. *American Economic Review*, 34, 38–71.
- Pratt, J. W. (1964). Risk aversion in the small and in the large. *Econometrica*, 32(1-2), 122–136.
- Rabin, M. (2000). Risk aversion and expected-utility theory: A calibration theorem. *Econometrica*, 68(5), 1281–1292.
- Rhodes, T. (1997). Risk theory in epidemic times: sex, drugs and the social organisation of ‘risk behaviour’. *Sociology of Health & Illness*, 19(2), 208–227.
- Rieger, M. O., Wang, M., & Hens, T. (2015). Risk preferences around the world. *Management Science*, 61(3), 637–648.
- Rohatgi, A. (2019). WebPlotDigitizer, <https://automeris.io/WebPlotDigitizer/citation.html>.
- Ronay, R., & Hippel, W. V. (2010). The presence of an attractive woman elevates testosterone and physical risk taking in young men. *Social Psychological and Personality Science*, 1(1), 57–64.
- Rosenboim, M., Ben-Zion, U., Shahrabani, S., & Shavit, T. (2012). Emotions, risk perceptions and precautionary behavior under the threat of terror attacks: A field study among Israeli college students. *Journal of Behavioral Decision Making*, 25, 248–256.
- Savage, D., Chan, H. F., Moy, N., Schaffner, M., & Torgler, B. (2020). Personality and individual characteristics as indicators of lifetime climbing success among Everest mountaineers. *Personality and Individual Differences*, 162, 110044.
- Simon, H. (1983). *Reason in Human Affairs*. Stanford University Press.
- Simon, H. (1991). Bounded rationality and organizational learning. *Organization Science*, 2(1), 125–134.
- Slovic, P. (1993). Perceived risk, trust, and democracy. *Risk Analysis*, 13(6), 675–682.
- Slovic, P. (2010). *The Feeling of Risk: New Perspectives on Risk Perception*. Routledge.
- Snowden, F. M. (2019). *Epidemics and Society: From the Black Death to the Present*. Yale University Press.
- Thaler, R. H., & Johnson, E. J. (1990). Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. *Management Science*, 36(6), 643–660.
- Trimpop, R. M. (1994). *The psychology of risk taking behavior*. Elsevier.

Västfjäll, D., Peters, E., & Slovic, P. (2008). Affect, risk perception and future optimism after the tsunami disaster. *Judgment and Decision Making*, 3(1), 64–72.

Van Bavel, J. J., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., Crockett, M. J., Crum, A. J., Douglas, K. M., Druckman, J. N., Drury, J., Dube, O., Ellemers, N., Finkel, E. J., Fowler, J. H., Gelfand, M., Han, S., Haslam, S. A., Jetten, J., Kitayama, S., Mobbs, D., Napper, L. E., Packer, D. J., Pennycook, G., Peters, E., Petty, R. E., Rand, D. G., Reicher, S. D., Schnall, S., Shariff, A., Skitka, L. J., Smith, S. S., Sunstein, C. R., Tabri, N., Tucker, J. A., van der Linden, S., Van Lange, P. A. M., Weeden, K. A., Wohl, M. J. A., Zaki, J., Zion, S., & Willer, R. (in press). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behavior*.

Wakker, P. (2010). *Prospect Theory: For Risk and Ambiguity*. Cambridge University Press: Cambridge.

Wang, X. T., Kruger, D. J., & Wilke, A. (2009). Life history variables and risk-taking propensity. *Evolution and Human Behavior*, 30(2), 77–84.

Zinn, J. O. (2008). Heading into the unknown: Everyday strategies for managing risk and uncertainty. *Health, Risk & Society*, 10(5), 439–450.

Supplementary Information for:
Risk Attitudes and Human Mobility During the COVID-19 Pandemic

Supplementary Results

Robustness Checks.

This section presents the checks for robustness of our results, which are shown in Table S8 to S13 for the six set of regressions conducted in the main text, respectively. The first two checks concern including regions with censored mobility value in the sample of the analysis. We impose two restriction on sample inclusion 1) regions with at least one censored value for the outcome mobility measures are excluded from the corresponding regression and 2) a more restrictive criteria with regions at least one censored value for any of the outcome mobility measures are excluded from the analysis. The first criteria excluded number of regions ranging 26 (Workplace) to 191 (Residential), depending on the outcome mobility measure used while the second criteria reduce the number of regions to 522. The third checks if estimates are sensitive to whether government response are general by recoding indicators as no measures taken if the movement restrictions (or recommendation of restrictions) is not applied countrywide. In general, our main findings are robust to all three checks.

For the overall risk-mobility relationship (comparing estimates from Table S8 to Table S1), imposing sample exclusions increases the strength of the relationship for all mobility measures except for transit station under the first exclusion rule (first exclusion rule: retail & recreation: $\beta=3.326$, s.e.=0.923, $CI_{95\%}=[1.518;5.134]$, $P<0.001$; grocery & pharmacy: $\beta=3.352$, s.e.=0.818, $CI_{95\%}=[1.749;4.956]$, $P<0.001$; parks: $\beta=7.940$, s.e.=1.556, $CI_{95\%}=[4.891;10.989]$, $P<0.001$; transit stations: $\beta=1.455$, s.e.=1.049, $CI_{95\%}=[-0.601;3.512]$, $P=0.165$; workplaces: $\beta=0.642$, s.e.=0.656, $CI_{95\%}=[-0.645;1.929]$, $P=0.328$; residential: $\beta=-0.711$, s.e.=0.352, $CI_{95\%}=[-1.401;-0.022]$, $P=0.043$; second exclusion rule: retail & recreation: $\beta=5.020$, s.e.=0.907, $CI_{95\%}=[3.242;6.798]$, $P<0.001$; grocery & pharmacy: $\beta=4.090$, s.e.=0.846, $CI_{95\%}=[2.431;5.748]$, $P<0.001$; parks: $\beta=8.914$, s.e.=1.667, $CI_{95\%}=[5.646;12.181]$, $P<0.001$; transit stations: $\beta=3.569$, s.e.=1.163, $CI_{95\%}=[1.290;5.848]$, $P=0.002$; workplaces: $\beta=1.303$, s.e.=0.772, $CI_{95\%}=[-0.210;2.817]$, $P=0.091$; residential: $\beta=-0.724$, s.e.=0.343, $CI_{95\%}=[-1.395;-0.052]$, $P=0.035$). Transforming the government response indicators slight reduce the size of the coefficients while leaving the statistical significance unchanged (retail & recreation: $\beta=3.323$, s.e.=0.857, $CI_{95\%}=[1.643;5.003]$, $P<0.001$; grocery & pharmacy: $\beta=3.134$, s.e.=0.730, $CI_{95\%}=[1.704;4.564]$, $P<0.001$; parks: $\beta=5.388$, s.e.=1.487, $CI_{95\%}=[2.474;8.303]$, $P<0.001$; transit stations: $\beta=1.463$, s.e.=1.019, $CI_{95\%}=[-0.534;3.460]$, $P=0.151$; workplaces: $\beta=0.251$, s.e.=0.615, $CI_{95\%}=[-0.953;1.456]$, $P=0.683$; residential: $\beta=-0.303$, s.e.=0.300, $CI_{95\%}=[-0.891;0.286]$, $P=0.313$). The coefficient estimates for our main control variables

(pandemic declaration, weekends, days after first confirmed death) are also close to those found in the main results.

For the declaration moderator effect on the risk-mobility relationship, the results (coefficients of the declaration x risk preference term) remain highly robust except for residential, where statistical significance is dropped when regions with censored values were removed (first exclusion rule: Retail & recreation: $\beta=7.378$, $s.e.=1.442$, $CI_{95\%}=[4.551;10.205]$, $P<0.001$; Grocery & pharmacy: $\beta=5.933$, $s.e.=1.044$, $CI_{95\%}=[3.887;7.980]$, $P<0.001$; Parks: $\beta=6.538$, $s.e.=2.150$, $CI_{95\%}=[2.324;10.752]$, $P=0.002$; Transit stations: $\beta=6.362$, $s.e.=1.588$, $CI_{95\%}=[3.250;9.475]$, $P<0.001$; Workplaces: $\beta=5.354$, $s.e.=1.023$, $CI_{95\%}=[3.350;7.359]$, $P<0.001$; Residential: $\beta=-0.790$, $s.e.=0.582$, $CI_{95\%}=[-1.930;0.351]$, $P=0.175$; second exclusion rule: Retail & recreation: $\beta=6.061$, $s.e.=1.606$, $CI_{95\%}=[2.913;9.208]$, $P<0.001$; Grocery & pharmacy: $\beta=4.758$, $s.e.=1.217$, $CI_{95\%}=[2.373;7.142]$, $P<0.001$; Parks: $\beta=6.561$, $s.e.=2.430$, $CI_{95\%}=[1.798;11.324]$, $P=0.007$; Transit stations: $\beta=4.853$, $s.e.=1.745$, $CI_{95\%}=[1.432;8.274]$, $P=0.005$; Workplaces: $\beta=3.062$, $s.e.=1.167$, $CI_{95\%}=[0.774;5.350]$, $P=0.009$; Residential: $\beta=-0.573$, $s.e.=0.596$, $CI_{95\%}=[-1.741;0.595]$, $P=0.336$; government response indicators transformed: Retail & recreation: $\beta=8.409$, $s.e.=1.331$, $CI_{95\%}=[5.801;11.017]$, $P<0.001$; Grocery & pharmacy: $\beta=5.860$, $s.e.=0.927$, $CI_{95\%}=[4.042;7.677]$, $P<0.001$; Parks: $\beta=6.524$, $s.e.=2.156$, $CI_{95\%}=[2.299;10.749]$, $P=0.002$; Transit stations: $\beta=6.264$, $s.e.=1.399$, $CI_{95\%}=[3.523;9.005]$, $P<0.001$; Workplaces: $\beta=4.208$, $s.e.=0.870$, $CI_{95\%}=[2.504;5.913]$, $P<0.001$; Residential: $\beta=-1.008$, $s.e.=0.472$, $CI_{95\%}=[-1.933;-0.083]$, $P=0.033$).

For the weekend x risk-taking interaction term, the coefficients for retail and recreation remain statistically significant in all three checks (first exclusion rule: $\beta=1.071$, $s.e.=0.319$, $CI_{95\%}=[0.446;1.697]$, $P<0.001$; second exclusion rule: $\beta=1.534$, $s.e.=0.358$, $CI_{95\%}=[0.833;2.236]$, $P<0.001$; government response indicators transformed: $\beta=1.291$, $s.e.=0.321$, $CI_{95\%}=[0.662;1.919]$, $P<0.001$). Imposing sample exclusions pick up some overall interaction effects for going to parks (first exclusion rule: $\beta=2.119$, $s.e.=0.836$, $CI_{95\%}=[0.480;3.759]$, $P=0.011$; second exclusion rule: $\beta=2.630$, $s.e.=0.988$, $CI_{95\%}=[0.693;4.567]$, $P=0.008$), workplaces (second exclusion rule: $\beta=0.938$, $s.e.=0.457$, $CI_{95\%}=[0.043;1.833]$, $P=0.040$), and staying home (first exclusion rule: $\beta=-0.472$, $s.e.=0.222$, $CI_{95\%}=[-0.907;-0.036]$, $P=0.034$; second exclusion rule: $\beta=-0.591$, $s.e.=0.237$, $CI_{95\%}=[-1.056;-0.126]$, $P=0.013$). This suggests that the tendency to further reduce mobility on the weekends than during the week for low risk-tolerance regions (as compared to high risk-tolerance regions) is possible before pandemic declaration. Moreover, we see that the results with triple

interactions between risk preference, weekend, and pandemic declaration resembles to that in the main text, albeit for regions with very high risk preference, the pre- and post-declaration difference in the weekend reduction in mobility is less precisely estimated, in particular for retail and recreation, grocery and pharmacy, and parks.

Lastly, we also find quite stable estimates in terms of the risk preference-risk pool interaction terms, especially for retail & recreation (first exclusion rule: $\beta=-0.616$, s.e.=0.112, $CI_{95\%}=[-0.836;-0.396]$, $P<0.001$; second exclusion rule: $\beta=-0.413$, s.e.=0.121, $CI_{95\%}=[-0.650;-0.177]$, $P<0.001$; government response indicators transformed: $\beta=-0.714$, s.e.=0.136, $CI_{95\%}=[-0.980;-0.448]$, $P<0.001$), transit stations (first exclusion rule: $\beta=-0.652$, s.e.=0.129, $CI_{95\%}=[-0.905;-0.400]$, $P<0.001$; second exclusion rule: $\beta=-0.514$, s.e.=0.150, $CI_{95\%}=[-0.809;-0.219]$, $P<0.001$; government response indicators transformed: $\beta=-0.801$, s.e.=0.190, $CI_{95\%}=[-1.173;-0.428]$, $P<0.001$), workplaces (first exclusion rule: $\beta=-0.530$, s.e.=0.076, $CI_{95\%}=[-0.679;-0.380]$, $P<0.001$; second exclusion rule: $\beta=-0.368$, s.e.=0.100, $CI_{95\%}=[-0.563;-0.172]$, $P<0.001$; government response indicators transformed: $\beta=-0.464$, s.e.=0.085, $CI_{95\%}=[-0.632;-0.297]$, $P<0.001$), and residential (first exclusion rule: $\beta=0.169$, s.e.=0.047, $CI_{95\%}=[0.076;0.262]$, $P<0.001$; second exclusion rule: $\beta=0.117$, s.e.=0.047, $CI_{95\%}=[0.025;0.210]$, $P=0.013$; government response indicators transformed: $\beta=0.219$, s.e.=0.043, $CI_{95\%}=[0.134;0.303]$, $P<0.001$) places. While results for going to parks remain significant for checks on recoding the response variables (risk x % of 65+ in population interaction terms: $\beta=-0.593$, s.e.=0.188, $CI_{95\%}=[-0.961;-0.224]$, $P=0.002$), the effect cannot be observed when sample exclusions applied (first exclusion rule: $\beta=-0.271$, s.e.=0.193, $CI_{95\%}=[-0.650;0.107]$, $P=0.160$; second exclusion rule: $\beta=0.190$, s.e.=0.221, $CI_{95\%}=[-0.244;0.625]$, $P=0.390$). Similar to the main result, the effect on grocery and pharmacy is also not precisely estimated in all three checks.

Supplementary Figures

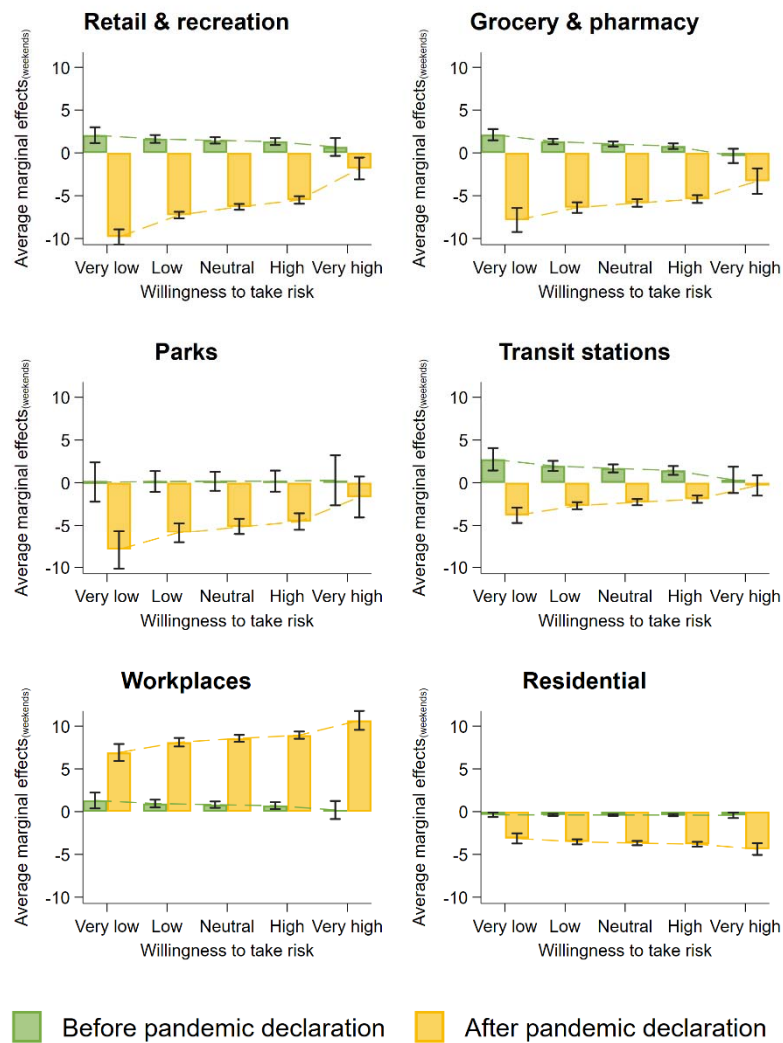


Fig. S1 | Average marginal effects of weekends on mobility changes over risk attitudes, before and after pandemic declaration.

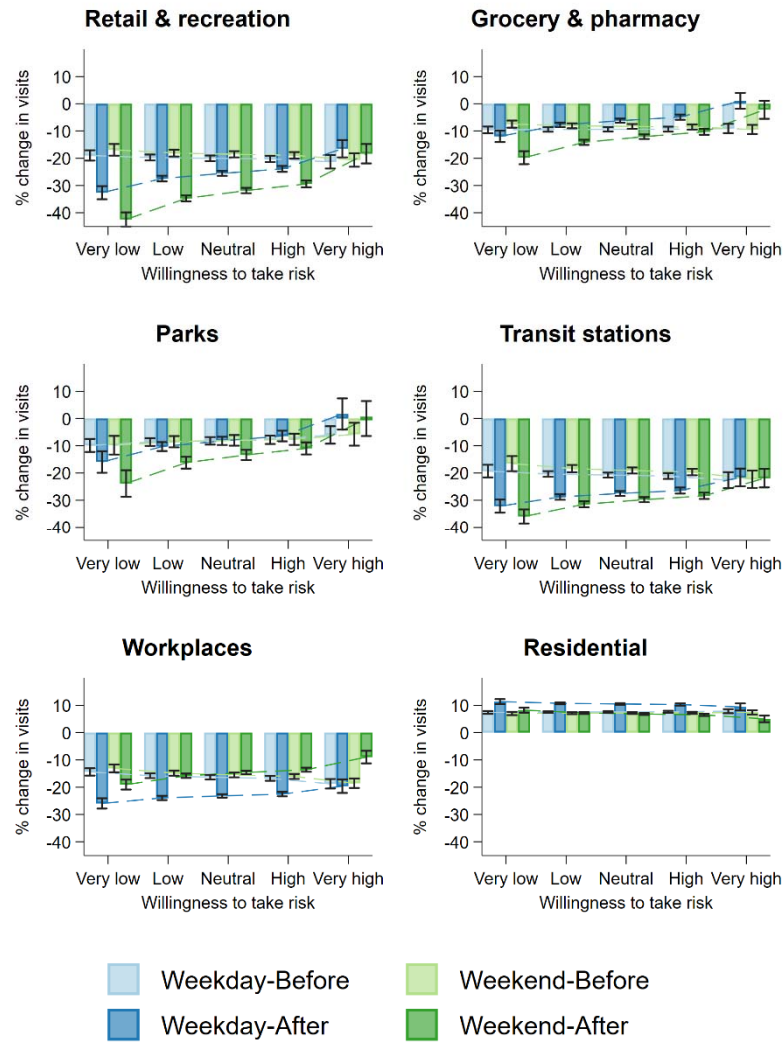


Fig. S2 | Predicted change in mobility on weekdays and weekends and before and after pandemic declaration, over risk attitudes.

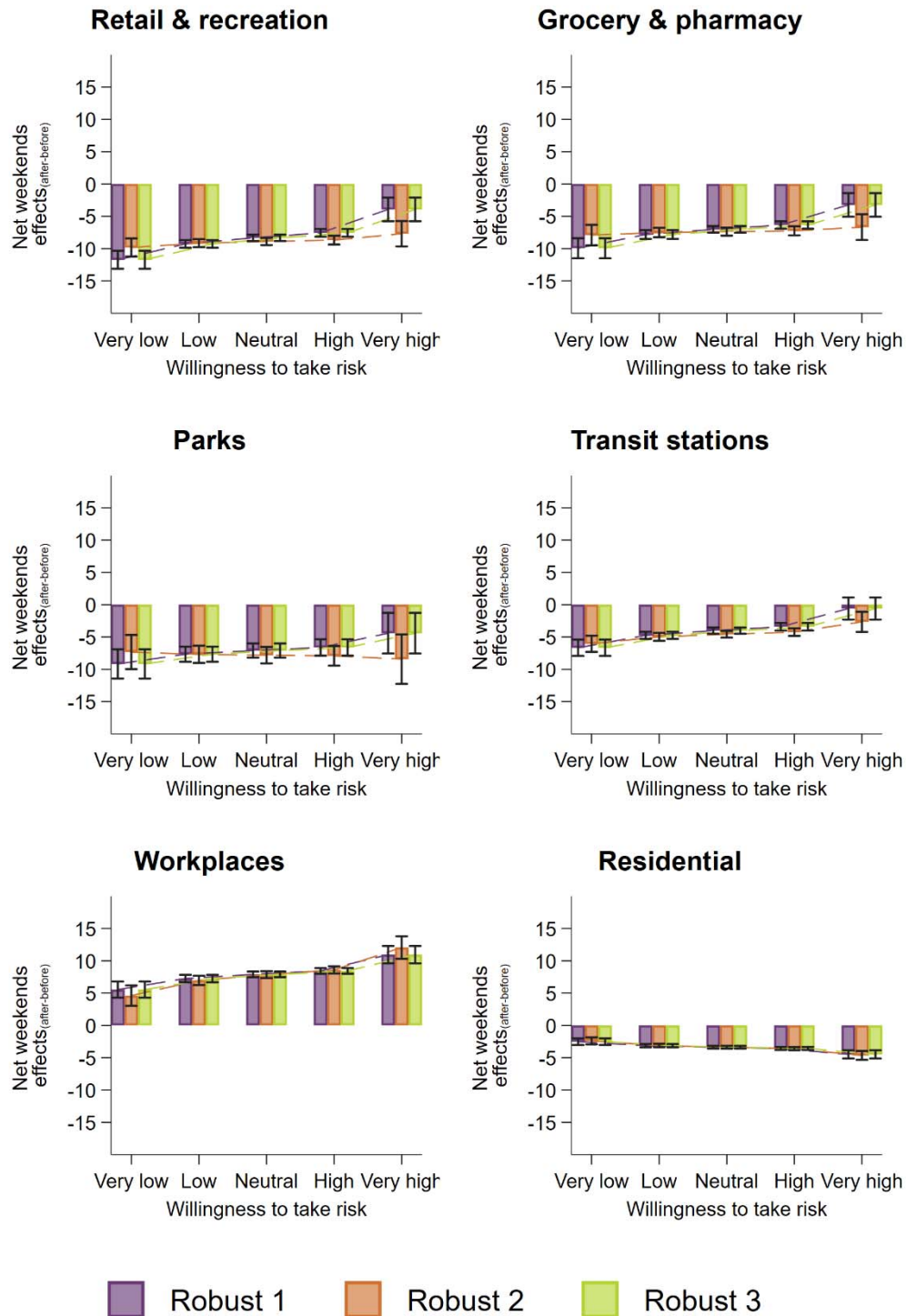


Fig. S3 | Robustness checks on mediation from risk preference to change in weekends and weekdays visiting pattern before and after pandemic declaration. Robust 1 = regions with at least one censored values on the outcome mobility measures excluded. Robust 2 = regions with at least one censored values on any mobility measures excluded. Robust 3 = government response indicators recoded as no measures taken if policy is not applied countrywide.

Supplementary Tables

Table S1 | Risk attitude and human mobility and during COVID-19

	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	3.98*** (0.890)	3.54*** (0.783)	5.83*** (1.546)	2.01† (1.025)	0.81 (0.644)	-0.47 (0.306)
Pandemic declaration	-7.74*** (0.753)	1.11† (0.602)	-1.80* (0.874)	-8.04*** (0.633)	-4.82*** (0.585)	2.13*** (0.236)
Weekends	-2.71*** (0.141)	-2.66*** (0.147)	-2.75*** (0.427)	-0.46** (0.174)	4.96*** (0.166)	-2.07*** (0.0871)
Days after first death	-0.15*** (0.0130)	-0.12*** (0.0125)	-0.14*** (0.0233)	-0.21*** (0.0154)	-0.084*** (0.0104)	0.074*** (0.00494)
$\ln(\# \text{ confirmed cases}+1)$	-0.92*** (0.121)	0.43*** (0.111)	1.09*** (0.228)	-0.39** (0.138)	-0.62*** (0.0927)	-0.013 (0.0471)
% population ages 65 and above	-0.098† (0.0567)	0.14** (0.0493)	0.82*** (0.109)	-0.087 (0.0739)	-0.43*** (0.0448)	0.015 (0.0199)
Population density (per sq. km)	-0.012*** (0.00280)	-0.012*** (0.00270)	-0.017* (0.00729)	-0.018*** (0.00363)	-0.016*** (0.00283)	0.0074*** (0.00127)
School						
<i>Recommend closing</i>	8.92*** (0.658)	-1.07† (0.585)	2.76* (1.259)	4.03*** (0.709)	7.06*** (0.642)	-2.18*** (0.260)
<i>Require closing</i>	-5.84*** (0.699)	-6.02*** (0.613)	-10.0*** (1.312)	-6.19*** (0.732)	-7.40*** (0.661)	2.76*** (0.263)
Workplace closing						
<i>Recommend closing</i>	-2.15* (0.989)	3.80*** (0.864)	4.62*** (1.387)	-2.94** (0.995)	0.84 (0.901)	0.54 (0.359)
<i>Require closing</i>	-18.5*** (1.151)	-5.02*** (1.073)	-1.65 (1.760)	-15.0*** (1.193)	-12.0*** (0.927)	4.72*** (0.440)
Public events						
<i>Recommend cancelling</i>	5.11*** (0.793)	7.42*** (0.646)	-5.36*** (1.217)	-2.41** (0.926)	0.091 (0.796)	0.91** (0.327)
<i>Require cancelling</i>	-4.64*** (0.813)	2.33** (0.760)	-5.70*** (1.228)	-4.24*** (0.796)	-3.47*** (0.688)	1.93*** (0.283)
Public transport						
<i>Recommend closing</i>	-9.53*** (1.675)	-12.7*** (1.509)	-24.7*** (3.353)	-10.1*** (1.616)	-9.72*** (1.148)	5.73*** (0.627)
<i>Require closing</i>	5.33*** (1.141)	-2.81** (1.042)	-10.0*** (1.788)	-1.30 (1.213)	-1.94* (0.954)	1.36** (0.432)
Internal movement						
<i>Recommend movement restriction</i>	-6.97*** (0.808)	-5.32*** (0.780)	0.40 (1.275)	-5.16*** (0.788)	-4.03*** (0.622)	0.73* (0.304)
<i>Restrict movement</i>	-21.6*** (1.028)	-21.9*** (0.946)	-13.8*** (1.565)	-19.9*** (0.980)	-17.7*** (0.763)	6.77*** (0.367)
Constant	10.6*** (0.912)	2.22** (0.746)	-5.39*** (1.435)	8.64*** (1.127)	11.9*** (0.614)	-1.00*** (0.289)
Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2_{between}	0.823	0.558	0.344	0.819	0.779	0.799
R^2_{within}	0.456	0.355	0.221	0.367	0.559	0.543
R^2_{overall}	0.772	0.514	0.314	0.747	0.746	0.757

Notes: Results corresponds to Figure 1 in the main text. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken* for all government response indicators.

Table S2 | Change in visits to six location categories predicted by individual risk preference before and after pandemic declaration.

	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	-1.33 (0.972)	-0.12 (0.576)	1.95 (1.227)	-1.98 (1.232)	-2.28*** (0.592)	0.18 (0.261)
Pandemic declaration	-7.47*** (0.774)	1.32* (0.615)	-1.45 (0.910)	-7.72*** (0.658)	-4.65*** (0.589)	2.08*** (0.242)
Pandemic declaration *Risk-taking	10.1*** (1.509)	7.00*** (1.045)	7.40*** (2.171)	7.53*** (1.555)	5.84*** (1.021)	-1.28* (0.510)
Weekends	-2.71*** (0.140)	-2.65*** (0.146)	-2.73*** (0.427)	-0.45* (0.174)	4.96*** (0.166)	-2.08*** (0.0872)
Days after first death	-0.15*** (0.0128)	-0.12*** (0.0124)	-0.14*** (0.0231)	-0.21*** (0.0151)	-0.087*** (0.0104)	0.074*** (0.00492)
$\ln(\# \text{ confirmed cases}+1)$	-0.83*** (0.114)	0.49*** (0.107)	1.15*** (0.225)	-0.33* (0.133)	-0.56*** (0.0892)	-0.021 (0.0463)
School						
<i>Recommend closing</i>	10.4*** (0.693)	-0.050 (0.576)	3.80** (1.270)	5.18*** (0.738)	7.91*** (0.635)	-2.37*** (0.271)
<i>Require closing</i>	-5.38*** (0.674)	-5.68*** (0.600)	-9.66*** (1.287)	-5.80*** (0.717)	-7.12*** (0.646)	2.68*** (0.257)
Workplace closing						
<i>Recommend closing</i>	-2.51** (0.964)	3.58*** (0.845)	4.53*** (1.370)	-3.11** (0.975)	0.62 (0.883)	0.56 (0.356)
<i>Require closing</i>	-19.5*** (1.147)	-5.67*** (1.067)	-2.37 (1.749)	-15.7*** (1.186)	-12.5*** (0.927)	4.84*** (0.438)
Public events						
<i>Recommend cancelling</i>	4.75*** (0.792)	7.15*** (0.639)	-5.71*** (1.198)	-2.74** (0.917)	-0.14 (0.797)	0.97** (0.326)
<i>Require cancelling</i>	-5.39*** (0.820)	1.82* (0.767)	-6.23*** (1.231)	-4.80*** (0.793)	-3.91*** (0.703)	2.02*** (0.288)
Public transport						
<i>Recommend closing</i>	-8.15*** (1.653)	-11.8*** (1.494)	-23.6*** (3.347)	-9.05*** (1.595)	-8.99*** (1.142)	5.52*** (0.620)
<i>Require closing</i>	5.11*** (1.115)	-2.97** (1.032)	-10.1*** (1.769)	-1.37 (1.187)	-2.07* (0.946)	1.39** (0.433)
Internal movement						
<i>Recommend movement restriction</i>	-5.94*** (0.787)	-4.64*** (0.775)	1.00 (1.253)	-4.51*** (0.761)	-3.46*** (0.628)	0.62* (0.302)
<i>Restrict movement</i>	-21.4*** (1.025)	-21.7*** (0.942)	-13.7*** (1.567)	-19.8*** (0.978)	-17.6*** (0.762)	6.75*** (0.368)
% population ages 65 and above	-0.13* (0.0570)	0.13* (0.0492)	0.80*** (0.109)	-0.10 (0.0746)	-0.44*** (0.0451)	0.019 (0.0200)
Population density (per sq. km)	-0.013*** (0.00286)	-0.012*** (0.00276)	-0.017* (0.00735)	-0.018*** (0.00368)	-0.016*** (0.00289)	0.0074*** (0.00128)
Constant	10.6*** (0.910)	2.25** (0.738)	-5.46*** (1.433)	8.58*** (1.123)	12.0*** (0.615)	-1.00*** (0.289)
Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2_{between}	0.827	0.562	0.347	0.821	0.780	0.799
R^2_{within}	0.469	0.362	0.223	0.375	0.568	0.546
R^2_{overall}	0.777	0.518	0.316	0.750	0.748	0.758

Notes: Results corresponds to Figure 2 in the main text. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken* for all government response indicators.

Table S3 | Visitation pattern by weekdays and weekends over individual risk preference.

	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	3.60*** (0.895)	3.44*** (0.805)	5.41*** (1.507)	2.00† (1.035)	0.66 (0.690)	-0.40 (0.323)
Weekends	-2.67*** (0.138)	-2.65*** (0.144)	-2.69*** (0.422)	-0.46** (0.171)	4.97*** (0.165)	-2.09*** (0.0862)
Weekends*Risk-taking	1.35*** (0.315)	0.33 (0.393)	1.31 (0.839)	0.042 (0.466)	0.52 (0.363)	-0.26 (0.197)
Pandemic declaration	-7.85*** (0.757)	1.11† (0.602)	-1.80* (0.874)	-8.05*** (0.634)	-4.83*** (0.586)	2.13*** (0.236)
Days after first death	-0.14*** (0.0128)	-0.12*** (0.0125)	-0.14*** (0.0233)	-0.21*** (0.0153)	-0.084*** (0.0104)	0.074*** (0.00494)
$\ln(\# \text{ confirmed cases}+1)$	-0.93*** (0.121)	0.43*** (0.111)	1.09*** (0.228)	-0.39** (0.138)	-0.62*** (0.0927)	-0.013 (0.0471)
School						
<i>Recommend closing</i>	8.90*** (0.653)	-1.08† (0.586)	2.76* (1.258)	4.03*** (0.709)	7.06*** (0.642)	-2.19*** (0.260)
<i>Require closing</i>	-5.84*** (0.698)	-6.01*** (0.613)	-10.0*** (1.311)	-6.19*** (0.732)	-7.39*** (0.661)	2.75*** (0.263)
Workplace						
<i>Recommend closing</i>	-2.18* (0.988)	3.80*** (0.865)	4.61*** (1.388)	-2.94** (0.995)	0.83 (0.900)	0.54 (0.359)
<i>Require closing</i>	-18.6*** (1.151)	-5.02*** (1.073)	-1.65 (1.760)	-15.0*** (1.193)	-12.0*** (0.926)	4.71*** (0.440)
Public events						
<i>Recommend cancelling</i>	5.11*** (0.786)	7.43*** (0.646)	-5.34*** (1.218)	-2.41** (0.926)	0.100 (0.795)	0.90** (0.327)
<i>Require cancelling</i>	-4.69*** (0.811)	2.33** (0.760)	-5.71*** (1.229)	-4.25*** (0.796)	-3.48*** (0.689)	1.93*** (0.283)
Public transport						
<i>Recommend closing</i>	-9.51*** (1.671)	-12.7*** (1.510)	-24.7*** (3.355)	-10.1*** (1.616)	-9.71*** (1.147)	5.74*** (0.627)
<i>Require closing</i>	5.32*** (1.142)	-2.81** (1.042)	-10.0*** (1.788)	-1.30 (1.213)	-1.93* (0.955)	1.36** (0.432)
Internal movement						
<i>Recommend movement restriction</i>	-6.99*** (0.807)	-5.32*** (0.781)	0.39 (1.276)	-5.16*** (0.787)	-4.04*** (0.622)	0.73* (0.304)
<i>Restrict movement</i>	-21.6*** (1.027)	-21.9*** (0.946)	-13.8*** (1.565)	-19.9*** (0.980)	-17.7*** (0.763)	6.77*** (0.367)
% population ages 65 and above	-0.094† (0.0560)	0.14** (0.0493)	0.82*** (0.109)	-0.087 (0.0739)	-0.43*** (0.0448)	0.015 (0.0199)
Population density (per sq. km)	-0.012*** (0.00278)	-0.012*** (0.00270)	-0.017* (0.00729)	-0.018*** (0.00363)	-0.016*** (0.00283)	0.0073*** (0.00127)
Constant	10.4*** (0.894)	2.21** (0.746)	-5.41*** (1.435)	8.63*** (1.126)	11.9*** (0.614)	-1.00*** (0.290)
Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2_{between}	0.823	0.558	0.344	0.819	0.779	0.799
R^2_{within}	0.461	0.355	0.220	0.367	0.560	0.543
R^2_{overall}	0.774	0.514	0.314	0.747	0.746	0.757

Notes: Results corresponds to Figure 3 in the main text. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. Reference categories are: *Before WHO declares COVID-19 as pandemic, Weekdays and No measures taken for all government response indicators.*

Table S4 | Mediation from risk preference to change in weekends and weekdays visiting pattern pre- and post-pandemic declaration.

	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	-1.13 (0.946)	0.25 (0.592)	1.85 (1.191)	-1.62 (1.204)	-2.10*** (0.635)	0.22 (0.271)
Weekends	1.46*** (0.190)	1.02*** (0.145)	0.17 (0.568)	1.67*** (0.237)	0.81*** (0.189)	-0.39*** (0.0570)
Weekends*Risk-taking	-0.67 (0.448)	-1.20*** (0.338)	0.096 (1.160)	-1.16† (0.663)	-0.54 (0.453)	-0.031 (0.132)
Pandemic declaration	-5.43*** (0.765)	3.23*** (0.600)	0.074 (0.890)	-6.68*** (0.642)	-6.80*** (0.586)	2.91*** (0.245)
Pandemic declaration *Risk-taking	8.91*** (1.458)	6.04*** (1.019)	6.65** (2.160)	6.72*** (1.511)	5.16*** (1.037)	-1.16* (0.529)
Weekends*Pandemic declaration	-7.72*** (0.246)	-6.85*** (0.257)	-5.30*** (0.617)	-3.92*** (0.249)	7.77*** (0.221)	-3.29*** (0.107)
Weekends*Pandemic declaration*Risk-taking	4.53*** (0.715)	3.39*** (0.754)	2.92* (1.389)	2.84*** (0.693)	2.35*** (0.597)	-0.57* (0.255)
Days after first death	-0.14*** (0.0126)	-0.12*** (0.0124)	-0.14*** (0.0231)	-0.21*** (0.0151)	-0.093*** (0.0103)	0.077*** (0.00493)
<i>ln</i> (# confirmed cases+1)	-0.84*** (0.114)	0.49*** (0.108)	1.15*** (0.226)	-0.33* (0.134)	-0.57*** (0.0882)	-0.023 (0.0461)
School						
<i>Recommend closing</i>	11.0*** (0.679)	0.44 (0.568)	4.15*** (1.261)	5.46*** (0.739)	7.40*** (0.651)	-2.11*** (0.276)
<i>Require closing</i>	-5.67*** (0.684)	-5.96*** (0.615)	-9.86*** (1.293)	-5.96*** (0.724)	-6.80*** (0.628)	2.58*** (0.253)
Workplace						
<i>Recommend closing</i>	-2.71** (0.972)	3.43*** (0.853)	4.40** (1.371)	-3.21** (0.980)	0.80 (0.869)	0.48 (0.350)
<i>Require closing</i>	-19.5*** (1.152)	-5.65*** (1.074)	-2.31 (1.756)	-15.7*** (1.189)	-12.5*** (0.920)	4.84*** (0.435)
Public events						
<i>Recommend cancelling</i>	4.48*** (0.805)	6.92*** (0.636)	-5.90*** (1.198)	-2.87** (0.921)	0.15 (0.774)	0.84** (0.318)
<i>Require cancelling</i>	-5.14*** (0.814)	2.10** (0.766)	-6.07*** (1.231)	-4.67*** (0.794)	-4.25*** (0.712)	2.12*** (0.292)
Public transport						
<i>Recommend closing</i>	-8.16*** (1.653)	-11.8*** (1.494)	-23.6*** (3.356)	-9.09*** (1.596)	-8.93*** (1.143)	5.52*** (0.623)
<i>Require closing</i>	5.04*** (1.113)	-3.01** (1.031)	-10.2*** (1.765)	-1.39 (1.185)	-2.02* (0.948)	1.45*** (0.433)
Internal movement						
<i>Recommend movement restriction</i>	-5.80*** (0.789)	-4.51*** (0.771)	1.13 (1.254)	-4.42*** (0.762)	-3.61*** (0.628)	0.68* (0.302)
<i>Restrict movement</i>	-21.5*** (1.025)	-21.8*** (0.945)	-13.8*** (1.571)	-19.9*** (0.978)	-17.5*** (0.763)	6.71*** (0.368)
% population ages 65 and above	-0.12* (0.0557)	0.12* (0.0488)	0.80*** (0.109)	-0.10 (0.0740)	-0.44*** (0.0456)	0.018 (0.0203)
Population density (per sq. km)	-0.012*** (0.00283)	-0.012*** (0.00275)	-0.017* (0.00737)	-0.018*** (0.00367)	-0.017*** (0.00292)	0.0075*** (0.00130)
Constant	9.12*** (0.881)	1.07 (0.731)	-6.44*** (1.443)	7.85*** (1.105)	13.3*** (0.621)	-1.50*** (0.294)
Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2_{between}	0.831	0.569	0.349	0.822	0.785	0.805
R^2_{within}	0.478	0.360	0.220	0.378	0.564	0.545
R^2_{overall}	0.783	0.524	0.316	0.752	0.752	0.762

Notes: Results corresponds to Figure 4 in the main text and Supplementary Figures S1 and S2. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken* for all government response indicators.

Table S5 | Change of mobility patterns based on risk preference and share of population.

	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	12.1*** (1.683)	5.54*** (1.469)	11.8*** (2.117)	10.6*** (2.006)	6.94*** (1.155)	-3.07*** (0.563)
% Population ages 65 and above	-0.14* (0.0596)	0.13* (0.0518)	0.78*** (0.111)	-0.15† (0.0782)	-0.46*** (0.0461)	0.034 (0.0209)
Risk-taking*% Population ages 65 and above	-0.69*** (0.115)	-0.17† (0.0969)	-0.50** (0.182)	-0.70*** (0.134)	-0.52*** (0.0765)	0.22*** (0.0353)
Weekends	-2.72*** (0.141)	-2.66*** (0.147)	-2.75*** (0.427)	-0.47** (0.174)	4.95*** (0.166)	-2.07*** (0.0872)
Pandemic declaration	-7.56*** (0.757)	1.16† (0.605)	-1.67† (0.870)	-7.87*** (0.640)	-4.63*** (0.587)	2.06*** (0.238)
Days after first death	-0.16*** (0.0137)	-0.12*** (0.0129)	-0.15*** (0.0241)	-0.22*** (0.0159)	-0.095*** (0.0110)	0.078*** (0.00506)
$\ln(\# \text{ confirmed cases}+1)$	-0.90*** (0.121)	0.44*** (0.111)	1.10*** (0.228)	-0.37** (0.137)	-0.59*** (0.0924)	-0.022 (0.0467)
School						
<i>Recommend closing</i>	8.84*** (0.660)	-1.11† (0.588)	2.73* (1.261)	3.97*** (0.711)	6.92*** (0.650)	-2.15*** (0.262)
<i>Require closing</i>	-5.80*** (0.702)	-6.00*** (0.614)	-9.99*** (1.314)	-6.15*** (0.732)	-7.35*** (0.663)	2.74*** (0.264)
Workplace						
<i>Recommend closing</i>	-2.13* (0.990)	3.81*** (0.865)	4.64*** (1.386)	-2.92** (0.996)	0.86 (0.905)	0.53 (0.359)
<i>Require closing</i>	-18.5*** (1.153)	-5.00*** (1.074)	-1.60 (1.761)	-15.0*** (1.194)	-11.9*** (0.930)	4.69*** (0.440)
Public events						
<i>Recommend cancelling</i>	4.99*** (0.800)	7.38*** (0.649)	-5.46*** (1.218)	-2.52** (0.930)	-0.077 (0.810)	0.97** (0.331)
<i>Require cancelling</i>	-4.62*** (0.814)	2.33** (0.759)	-5.69*** (1.229)	-4.23*** (0.796)	-3.46*** (0.690)	1.93*** (0.283)
Public transport						
<i>Recommend closing</i>	-9.56*** (1.674)	-12.8*** (1.509)	-24.7*** (3.352)	-10.2*** (1.616)	-9.78*** (1.145)	5.75*** (0.626)
<i>Require closing</i>	5.31*** (1.139)	-2.82** (1.042)	-10.0*** (1.788)	-1.32 (1.212)	-1.98* (0.952)	1.37** (0.431)
Internal movement						
<i>Recommend movement restriction</i>	-7.05*** (0.805)	-5.35*** (0.778)	0.35 (1.271)	-5.23*** (0.786)	-4.15*** (0.615)	0.77* (0.302)
<i>Restrict movement</i>	-21.6*** (1.030)	-21.9*** (0.946)	-13.8*** (1.567)	-19.9*** (0.982)	-17.7*** (0.764)	6.78*** (0.367)
Population density (per sq. km)	-0.012*** (0.00296)	-0.012*** (0.00273)	-0.017* (0.00740)	-0.018*** (0.00371)	-0.016*** (0.00294)	0.0073*** (0.00132)
Constant	10.5*** (0.911)	2.21** (0.748)	-5.22*** (1.442)	8.82*** (1.147)	11.9*** (0.624)	-1.05*** (0.295)
Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2_{between}	0.823	0.558	0.344	0.819	0.779	0.799
R^2_{within}	0.473	0.357	0.227	0.376	0.576	0.555
R^2_{overall}	0.774	0.514	0.315	0.748	0.748	0.758

Notes: Results corresponds to Figure 5 in the main text. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken* for all government response indicators.

Table S6 | Dynamic of mobility change based on risk preference and share of population at risk.

	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	4.07** (1.481)	2.14† (1.097)	8.24*** (2.215)	5.48** (2.018)	2.69** (0.991)	-2.72*** (0.466)
Population ages 65 and above (% of total population)	0.13* (0.0524)	0.17*** (0.0451)	0.66*** (0.0989)	0.050 (0.0688)	-0.34*** (0.0433)	0.021 (0.0188)
Risk-taking*% Population 65+	-0.57*** (0.134)	-0.17† (0.0912)	-0.52* (0.203)	-0.73*** (0.166)	-0.44*** (0.0765)	0.24*** (0.0378)
Days after first death	0.11*** (0.0314)	-0.12*** (0.0307)	-0.39*** (0.0666)	-0.066† (0.0387)	0.0032 (0.0215)	0.060*** (0.0120)
Risk-taking*Days after first death	0.25*** (0.0601)	0.15*** (0.0448)	0.23* (0.0946)	0.14† (0.0746)	0.15*** (0.0446)	-0.0090 (0.0235)
% Population 65+*Days after first death	-0.023*** (0.00229)	-0.00047 (0.00207)	0.019*** (0.00499)	-0.011*** (0.00259)	-0.0096*** (0.00158)	0.0012 (0.000872)
Risk-taking*% Population 65+*Days after first death	-0.013** (0.00487)	-0.0012 (0.00354)	0.0046 (0.00957)	-0.00045 (0.00568)	-0.0081* (0.00337)	-0.00032 (0.00190)
Weekend	-2.80*** (0.139)	-2.66*** (0.147)	-2.69*** (0.429)	-0.48** (0.174)	4.92*** (0.166)	-2.07*** (0.0876)
Pandemic declaration	-6.49*** (0.735)	1.23* (0.586)	-2.52** (0.840)	-7.30*** (0.636)	-4.05*** (0.570)	1.99*** (0.235)
ln(# confirmed cases+1)	-0.34** (0.113)	0.49*** (0.104)	0.80*** (0.212)	-0.11 (0.128)	-0.32*** (0.0909)	-0.043 (0.0447)
School						
<i>Recommend closing</i>	11.8*** (0.830)	-0.61 (0.709)	1.29 (1.530)	6.20*** (0.853)	8.16*** (0.737)	-2.40*** (0.335)
<i>Require closing</i>	-6.58*** (0.693)	-5.94*** (0.609)	-9.10*** (1.314)	-6.53*** (0.725)	-7.60*** (0.644)	2.77*** (0.260)
Workplace						
<i>Recommend closing</i>	-2.44** (0.933)	3.75*** (0.845)	4.63*** (1.389)	-3.01** (0.954)	0.71 (0.879)	0.53 (0.353)
<i>Require closing</i>	-18.7*** (1.147)	-5.46*** (1.090)	-2.34 (1.784)	-15.5*** (1.194)	-11.9*** (0.944)	4.77*** (0.438)
Public events						
<i>Recommend cancelling</i>	4.26*** (0.766)	7.04*** (0.636)	-5.45*** (1.198)	-3.14*** (0.911)	-0.44 (0.797)	1.05** (0.327)
<i>Require cancelling</i>	-5.92*** (0.784)	2.09** (0.752)	-5.07*** (1.190)	-5.08*** (0.748)	-3.99*** (0.670)	2.02*** (0.280)
Public transport						
<i>Recommend closing</i>	-9.61*** (1.585)	-12.0*** (1.530)	-23.1*** (3.477)	-9.52*** (1.571)	-9.96*** (1.122)	5.62*** (0.617)
<i>Require closing</i>	1.41 (1.200)	-2.99** (1.140)	-7.12*** (2.027)	-3.11* (1.351)	-3.57*** (0.979)	1.58*** (0.468)
Internal movement						
<i>Recommend movement restriction</i>	-5.67*** (0.761)	-4.98*** (0.754)	0.22 (1.244)	-4.38*** (0.738)	-3.56*** (0.598)	0.68* (0.293)
<i>Restrict movement</i>	-20.1*** (1.006)	-21.8*** (0.964)	-15.1*** (1.654)	-19.2*** (0.985)	-17.3*** (0.758)	6.67*** (0.380)
Population density (per sq. km)	-0.0046 (0.00302)	-0.0096*** (0.00265)	-0.019* (0.00773)	-0.014*** (0.00376)	-0.013*** (0.00288)	0.0068*** (0.00130)
Constant	2.50*** (0.684)	1.00 (0.614)	-1.91 (1.188)	3.84*** (1.002)	8.36*** (0.505)	-0.66** (0.247)
Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2_{between}	0.832	0.560	0.351	0.823	0.782	0.799
R^2_{within}	0.414	0.368	0.210	0.355	0.552	0.556
R^2_{overall}	0.771	0.518	0.309	0.746	0.747	0.759

Notes: Results corresponds to Figure 6 in the main text. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken* for all government response indicators.

Table S7 | Country data availability for mobility (Google), risk preferences (GPS), and government response (OxCGRT)

Country	Google	GPS	OxCGRT	Country	Google	GPS	OxCGRT
Afghanistan	Yes	Yes	Yes	Lebanon	Yes	No	Yes
Algeria	No	Yes	Yes	Lesotho	No	No	Yes
Andorra	No	No	Yes	Libya	Yes	No	Yes
Angola	Yes	No	Yes	Liechtenstein	Yes	No	No
Antigua and Barbuda	Yes	No	No	Lithuania	Yes	Yes	No
Argentina	Yes	Yes	Yes	Luxembourg	Yes	No	Yes
Aruba	Yes	No	Yes	Madagascar	No	No	Yes
Australia	Yes	Yes	Yes	Malawi	No	Yes	Yes
Austria	Yes	Yes	Yes	Malaysia	Yes	No	Yes
Azerbaijan	No	No	Yes	Mali	Yes	No	Yes
Bahrain	Yes	No	Yes	Malta	Yes	No	No
Bangladesh	Yes	Yes	Yes	Mauritania	No	No	Yes
Barbados	Yes	No	Yes	Mauritius	Yes	No	Yes
Belarus	Yes	No	No	Mexico	Yes	Yes	Yes
Belgium	Yes	No	Yes	Moldova	Yes	Yes	Yes
Belize	Yes	No	Yes	Mongolia	Yes	No	Yes
Benin	Yes	No	No	Morocco	No	Yes	No
Bermuda	No	No	Yes	Mozambique	Yes	No	Yes
Bolivia	Yes	Yes	Yes	Myanmar (Burma)	Yes	No	Yes
Bosnia and Herzegovina	Yes	Yes	Yes	Namibia	Yes	No	Yes
Botswana	Yes	Yes	Yes	Nepal	Yes	No	No
Brazil	Yes	Yes	Yes	Netherlands	Yes	Yes	Yes
Brunei	No	No	Yes	New Zealand	Yes	No	Yes
Bulgaria	Yes	No	Yes	Nicaragua	Yes	Yes	Yes
Burkina Faso	Yes	No	Yes	Niger	Yes	No	Yes
Burundi	No	No	Yes	Nigeria	Yes	Yes	Yes
Cambodia	Yes	Yes	No	North Macedonia	Yes	No	No
Cameroon	Yes	Yes	Yes	Norway	Yes	No	Yes
Canada	Yes	Yes	Yes	Oman	Yes	No	Yes
Cape Verde	Yes	No	Yes	Pakistan	Yes	Yes	Yes
Chad	No	No	Yes	Palestine	No	No	Yes
Chile	Yes	Yes	Yes	Panama	Yes	No	Yes
China	No	Yes	Yes	Papua New Guinea	Yes	No	Yes
Colombia	Yes	Yes	Yes	Paraguay	Yes	No	Yes
Costa Rica	Yes	Yes	Yes	Peru	Yes	Yes	Yes
Croatia	Yes	Yes	Yes	Philippines	Yes	Yes	Yes
Cuba	No	No	Yes	Poland	Yes	Yes	Yes
Cyprus	No	No	Yes	Portugal	Yes	Yes	Yes
Czechia	Yes	Yes	Yes	Puerto Rico	Yes	No	Yes
Côte d'Ivoire	Yes	No	No	Qatar	Yes	No	Yes
Democratic Republic of Congo	No	No	Yes	Romania	Yes	Yes	Yes
Denmark	Yes	No	Yes	Russia	No	Yes	No

Djibouti	No	No	Yes	Rwanda	Yes	Yes	Yes
Dominican Republic	Yes	No	Yes	Réunion	Yes	No	No
Ecuador	Yes	No	Yes	San Marino	No	No	Yes
Egypt	Yes	Yes	Yes	Saudi Arabia	Yes	Yes	Yes
El Salvador	Yes	No	Yes	Senegal	Yes	No	No
Estonia	Yes	Yes	Yes	Serbia	No	Yes	No
Eswatini	No	No	Yes	Seychelles	No	No	Yes
Fiji	Yes	No	No	Sierra Leone	No	No	Yes
Finland	Yes	Yes	Yes	Singapore	Yes	No	Yes
France	Yes	Yes	Yes	Slovakia	Yes	No	Yes
Gabon	Yes	No	Yes	Slovenia	Yes	No	Yes
Gambia	No	No	Yes	South Africa	Yes	Yes	Yes
Georgia	Yes	Yes	No	South Korea	Yes	Yes	Yes
Germany	Yes	Yes	Yes	South Sudan	No	No	Yes
Ghana	Yes	Yes	Yes	Spain	Yes	Yes	Yes
Greece	Yes	Yes	Yes	Sri Lanka	Yes	Yes	Yes
Greenland	No	No	Yes	Sudan	No	No	Yes
Guam	No	No	Yes	Suriname	No	Yes	No
Guatemala	Yes	Yes	Yes	Sweden	Yes	Yes	Yes
Guinea-Bissau	Yes	No	No	Switzerland	Yes	Yes	Yes
Guyana	No	No	Yes	Syria	No	No	Yes
Haiti	Yes	Yes	No	Taiwan	Yes	No	Yes
Honduras	Yes	No	Yes	Tajikistan	Yes	No	No
Hong Kong	Yes	No	Yes	Tanzania	Yes	Yes	Yes
Hungary	Yes	Yes	Yes	Thailand	Yes	Yes	Yes
India	Yes	Yes	Yes	The Bahamas	Yes	No	No
Indonesia	Yes	Yes	Yes	Togo	Yes	No	No
Iran	No	Yes	Yes	Trinidad and Tobago	Yes	No	Yes
Iraq	Yes	Yes	Yes	Tunisia	No	No	Yes
Ireland	Yes	No	Yes	Turkey	Yes	Yes	Yes
Israel	Yes	Yes	Yes	Uganda	Yes	Yes	Yes
Italy	Yes	Yes	Yes	Ukraine	No	Yes	No
Jamaica	Yes	No	Yes	United Arab Emirates	Yes	Yes	Yes
Japan	Yes	Yes	Yes	United Kingdom	Yes	Yes	Yes
Jordan	Yes	Yes	Yes	United States	Yes	Yes	Yes
Kazakhstan	Yes	Yes	Yes	Uruguay	Yes	No	Yes
Kenya	Yes	Yes	Yes	Uzbekistan	No	No	Yes
Kosovo	No	No	Yes	Venezuela	Yes	Yes	Yes
Kuwait	Yes	No	Yes	Vietnam	Yes	Yes	Yes
Kyrgyzstan	Yes	No	Yes	Yemen	Yes	No	No
Laos	Yes	No	Yes	Zambia	Yes	No	Yes
Latvia	Yes	No	No	Zimbabwe	Yes	Yes	Yes

Note: GPS = Global Preference Survey. OxCGRT = Oxford COVID-19 Government Response Tracker.

Table S8 | Robustness checks on overall risk-mobility relationship.

Robust 1	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	3.33*** (0.923)	3.35*** (0.818)	7.94*** (1.556)	1.46 (1.049)	0.64 (0.656)	-0.71* (0.352)
Pandemic declaration	-8.31*** (0.786)	1.08† (0.612)	-2.21* (0.903)	-8.22*** (0.640)	-4.90*** (0.586)	2.39*** (0.269)
Weekends	-3.11*** (0.139)	-2.76*** (0.151)	-3.27*** (0.433)	-0.40* (0.177)	4.94*** (0.169)	-2.07*** (0.0988)
Days after first death	-0.16*** (0.0123)	-0.13*** (0.0124)	-0.18*** (0.0222)	-0.21*** (0.0154)	-0.091*** (0.0104)	0.081*** (0.00574)
% Population 65+	0.10 (0.0629)	0.20*** (0.0512)	0.82*** (0.110)	-0.031 (0.0776)	-0.38*** (0.0463)	0.0034 (0.0230)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	40283	40623	35709	39501	42807	30803
Number of clusters	719	724	636	704	763	547
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R ² -between	0.840	0.575	0.385	0.825	0.780	0.792
R ² -within	0.473	0.391	0.283	0.320	0.540	0.513
R ² -overall	0.793	0.536	0.355	0.754	0.747	0.748
Robust 2	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	5.02*** (0.907)	4.09*** (0.846)	8.91*** (1.667)	3.57** (1.163)	1.30† (0.772)	-0.72* (0.343)
Pandemic declaration	-9.79*** (0.914)	-0.11 (0.701)	-2.68** (0.976)	-8.51*** (0.760)	-6.12*** (0.673)	2.42*** (0.271)
Weekends	-3.13*** (0.153)	-2.55*** (0.178)	-2.80*** (0.468)	-0.91*** (0.206)	4.38*** (0.215)	-2.07*** (0.102)
Days after first death	-0.17*** (0.0141)	-0.16*** (0.0139)	-0.19*** (0.0256)	-0.27*** (0.0164)	-0.12*** (0.0133)	0.085*** (0.00593)
% Population 65+	0.085 (0.0654)	0.21*** (0.0589)	0.89*** (0.117)	0.065 (0.0915)	-0.24*** (0.0646)	-0.0043 (0.0244)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29393	29393	29393	29393	29393	29393
Number of clusters	522	522	522	522	522	522
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R ² -between	0.830	0.555	0.372	0.826	0.770	0.796
R ² -within	0.555	0.467	0.307	0.367	0.546	0.539
R ² -overall	0.788	0.532	0.353	0.754	0.736	0.756
Robust 3	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	3.32*** (0.857)	3.13*** (0.730)	5.39*** (1.487)	1.46 (1.019)	0.25 (0.615)	-0.30 (0.300)
Pandemic declaration	-6.18*** (0.491)	2.51*** (0.400)	-0.65 (0.696)	-6.56*** (0.447)	-3.47*** (0.408)	1.63*** (0.160)
Weekends	-3.10*** (0.138)	-2.99*** (0.145)	-3.05*** (0.425)	-0.74*** (0.172)	4.68*** (0.162)	-1.97*** (0.0860)
Days after first death	-0.10*** (0.0117)	-0.087*** (0.0115)	-0.080*** (0.0234)	-0.18*** (0.0139)	-0.056*** (0.00842)	0.060*** (0.00463)
% Population 65+	-0.078 (0.0488)	0.14** (0.0438)	0.86*** (0.0963)	-0.066 (0.0647)	-0.40*** (0.0367)	0.023 (0.0158)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R ² -between	0.853	0.602	0.376	0.840	0.804	0.821
R ² -within	0.547	0.457	0.292	0.430	0.612	0.583
R ² -overall	0.816	0.577	0.357	0.779	0.780	0.785

Notes: **Robust 1** = regions with at least one censored values on the outcome mobility measures excluded. **Robust 2** = regions with at least one censored values on any mobility measures excluded. **Robust 3** = government response indicators recoded as no measures taken if policy is not applied countrywide. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. We controlled for number of confirmed cases (in logs), population density, and the set of government response indicators in each regression. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken*.

Table S9 | Robustness checks on moderation effect of pandemic declaration on risk-mobility relationship.

Robust 1	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	-0.48 (0.887)	0.29 (0.591)	4.51*** (1.174)	-1.85 (1.235)	-2.17*** (0.592)	-0.30 (0.302)
Pandemic declaration	-7.98*** (0.810)	1.34* (0.628)	-1.86* (0.937)	-7.94*** (0.662)	-4.72*** (0.591)	2.33*** (0.282)
Pandemic declaration*Risk-taking	7.38*** (1.442)	5.93*** (1.044)	6.54** (2.150)	6.36*** (1.588)	5.35*** (1.023)	-0.79 (0.582)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	40283	40623	35709	39501	42807	30803
Number of clusters	719	724	636	704	763	547
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R ² -between	0.842	0.578	0.387	0.826	0.782	0.792
R ² -within	0.481	0.395	0.284	0.327	0.548	0.515
R ² -overall	0.796	0.539	0.357	0.756	0.749	0.748
Robust 2	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	1.82† (0.926)	1.57* (0.618)	5.45*** (1.281)	1.01 (1.428)	-0.32 (0.695)	-0.42 (0.305)
Pandemic declaration	-9.30*** (0.952)	0.27 (0.739)	-2.17* (1.032)	-8.13*** (0.794)	-5.87*** (0.700)	2.37*** (0.286)
Pandemic declaration*Risk-taking	6.06*** (1.606)	4.76*** (1.217)	6.56** (2.430)	4.85** (1.745)	3.06** (1.167)	-0.57 (0.596)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29393	29393	29393	29393	29393	29393
Number of clusters	522	522	522	522	522	522
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R ² -between	0.831	0.557	0.374	0.827	0.770	0.796
R ² -within	0.561	0.469	0.307	0.371	0.549	0.540
R ² -overall	0.790	0.534	0.354	0.755	0.737	0.756
Robust 3	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	-1.05 (0.853)	0.089 (0.526)	1.99† (1.195)	-1.84 (1.151)	-1.96*** (0.503)	0.20 (0.227)
Pandemic declaration	-5.98*** (0.513)	2.66*** (0.412)	-0.35 (0.732)	-6.31*** (0.472)	-3.36*** (0.408)	1.59*** (0.165)
Pandemic declaration*Risk-taking	8.41*** (1.331)	5.86*** (0.927)	6.52*** (2.156)	6.26*** (1.399)	4.21*** (0.870)	-1.01* (0.472)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R ² -between	0.855	0.605	0.378	0.841	0.805	0.821
R ² -within	0.558	0.463	0.294	0.436	0.619	0.586
R ² -overall	0.819	0.579	0.359	0.781	0.781	0.785

Notes: **Robust 1** = regions with at least one censored values on the outcome mobility measures excluded. **Robust 2** = regions with at least one censored values on any mobility measures excluded. **Robust 3** = government response indicators recoded as no measures taken if policy is not applied countrywide. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. We controlled for weekend dummy, share of population over 65, day since first confirmed death, number of confirmed cases (in logs), population density, and the set of government response indicators in each regression. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken*.

Table S10 | Robustness checks on weekends-weekdays mobility change with mediation from risk attitude.

Robust 1	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	3.00** (0.939)	3.26*** (0.842)	7.30*** (1.522)	1.43 (1.059)	0.47 (0.705)	-0.57 (0.374)
Weekends	-3.06*** (0.138)	-2.74*** (0.146)	-3.17*** (0.428)	-0.40* (0.175)	4.96*** (0.168)	-2.10*** (0.0980)
Weekends*Risk-taking	1.07*** (0.319)	0.30 (0.402)	2.12* (0.836)	0.075 (0.482)	0.56 (0.365)	-0.47* (0.222)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	40283	40623	35709	39501	42807	30803
Number of clusters	719	724	636	704	763	547
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 -between	0.840	0.575	0.385	0.825	0.780	0.792
R^2 -within	0.473	0.391	0.283	0.320	0.540	0.513
R^2 -overall	0.793	0.536	0.355	0.754	0.747	0.748
Robust 2	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	4.56*** (0.930)	4.03*** (0.887)	8.12*** (1.631)	3.36** (1.179)	1.02 (0.841)	-0.55 (0.367)
Weekends	-3.04*** (0.150)	-2.53*** (0.173)	-2.63*** (0.462)	-0.87*** (0.204)	4.44*** (0.217)	-2.10*** (0.101)
Weekends*Risk-taking	1.53*** (0.358)	0.21 (0.455)	2.63** (0.988)	0.68 (0.491)	0.94* (0.457)	-0.59* (0.237)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29393	29393	29393	29393	29393	29393
Number of clusters	522	522	522	522	522	522
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 -between	0.830	0.555	0.372	0.826	0.770	0.796
R^2 -within	0.554	0.467	0.307	0.367	0.546	0.539
R^2 -overall	0.788	0.532	0.353	0.754	0.736	0.756
Robust 3	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	2.61* (1.104)	2.49** (0.823)	5.05** (1.546)	1.42 (1.433)	0.15 (0.760)	-0.31 (0.383)
Weekends	-3.38*** (0.148)	-3.07*** (0.153)	-2.96*** (0.423)	-0.91*** (0.170)	4.54*** (0.155)	-1.92*** (0.0843)
Weekends*Risk-taking	0.96** (0.339)	0.13 (0.400)	1.03 (0.843)	-0.20 (0.451)	0.25 (0.349)	-0.15 (0.186)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 -between	0.838	0.576	0.347	0.817	0.774	0.789
R^2 -within	0.496	0.470	0.312	0.328	0.595	0.517
R^2 -overall	0.784	0.549	0.342	0.717	0.743	0.733

Notes: **Robust 1** = regions with at least one censored values on the outcome mobility measures excluded. **Robust 2** = regions with at least one censored values on any mobility measures excluded. **Robust 3** = government response indicators recoded as no measures taken if policy is not applied countrywide. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. We controlled for pandemic declaration dummy, day since first confirmed death, share of population over 65, number of confirmed cases (in logs), population density, and the set of government response indicators in each regression. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken*.

Table S11 | Robustness checks on the moderating effect of pandemic declaration on weekends-weekdays mobility change based on risk preference.

Robust 1	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	-0.31 (0.886)	0.64 (0.607)	4.07*** (1.153)	-1.47 (1.199)	-1.94** (0.640)	-0.32 (0.314)
Weekends	1.39*** (0.194)	1.00*** (0.146)	0.63 (0.579)	1.75*** (0.237)	0.73*** (0.190)	-0.28*** (0.0596)
Weekends*Risk-taking	-0.60 (0.471)	-1.16*** (0.345)	1.22 (1.119)	-1.20† (0.666)	-0.64 (0.454)	0.013 (0.120)
Pandemic declaration	-5.64*** (0.795)	3.32*** (0.611)	0.099 (0.899)	-6.84*** (0.647)	-6.93*** (0.587)	3.25*** (0.289)
Pandemic declaration*Risk-taking	6.35*** (1.407)	5.02*** (1.023)	6.01** (2.146)	5.53*** (1.549)	4.56*** (1.039)	-0.50 (0.615)
Weekends*Pandemic declaration	-8.29*** (0.252)	-6.98*** (0.262)	-7.06*** (0.564)	-3.98*** (0.248)	7.93*** (0.217)	-3.38*** (0.109)
Weekends*Pandemic declaration*Risk-taking	3.73*** (0.747)	3.21*** (0.785)	2.27† (1.203)	2.90*** (0.687)	2.58*** (0.598)	-0.94*** (0.262)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	40283	40623	35709	39501	42807	30803
Number of clusters	719	724	636	704	763	547
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 -between	0.846	0.585	0.390	0.827	0.787	0.798
R^2 -within	0.485	0.393	0.281	0.329	0.543	0.511
R^2 -overall	0.801	0.544	0.358	0.758	0.753	0.752
Robust 2	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	1.36 (0.936)	1.50* (0.648)	4.36*** (1.261)	0.97 (1.396)	0.0058 (0.765)	-0.43 (0.316)
Weekends	1.76*** (0.201)	1.44*** (0.164)	1.59* (0.650)	1.60*** (0.273)	0.22 (0.245)	-0.29*** (0.0609)
Weekends*Risk-taking	1.27** (0.475)	0.11 (0.389)	3.21* (1.372)	0.027 (0.633)	-0.87 (0.543)	-0.028 (0.125)
Pandemic declaration	-6.83*** (0.929)	2.31** (0.710)	-0.022 (0.992)	-6.88*** (0.768)	-8.03*** (0.696)	3.29*** (0.293)
Pandemic declaration*Risk-taking	5.88*** (1.591)	4.65*** (1.210)	6.89** (2.440)	4.43** (1.713)	1.98 (1.218)	-0.25 (0.633)
Weekends*Pandemic declaration	-8.88*** (0.287)	-7.36*** (0.314)	-7.81*** (0.657)	-4.55*** (0.267)	7.90*** (0.271)	-3.39*** (0.113)
Weekends*Pandemic declaration*Risk-taking	1.02 (0.775)	0.59 (0.819)	-0.52 (1.451)	1.62* (0.636)	3.56*** (0.770)	-1.08*** (0.279)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29393	29393	29393	29393	29393	29393
Number of clusters	522	522	522	522	522	522
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 -between	0.836	0.564	0.378	0.828	0.775	0.802
R^2 -within	0.565	0.467	0.304	0.373	0.544	0.536
R^2 -overall	0.795	0.540	0.356	0.757	0.741	0.760
Robust 3	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	1.21 (1.111)	1.28† (0.670)	3.26* (1.278)	0.47 (1.520)	-0.11 (0.773)	-0.34 (0.375)
Weekends	1.26*** (0.191)	0.92*** (0.145)	-0.11 (0.564)	1.50*** (0.231)	0.65*** (0.184)	-0.43*** (0.0522)
Weekends*Risk-taking	-0.98* (0.445)	-1.36*** (0.335)	-0.43 (1.146)	-1.47* (0.659)	-0.98* (0.461)	-0.019 (0.134)
Pandemic declaration	-8.64*** (0.541)	1.64*** (0.433)	-4.57*** (0.795)	-10.6*** (0.589)	-11.4*** (0.465)	4.74*** (0.227)
Pandemic declaration*Risk-taking	2.81* (1.313)	2.42** (0.894)	3.49 (2.140)	1.88 (1.387)	0.63 (0.915)	0.081 (0.502)
Weekends*Pandemic declaration	-8.72*** (0.234)	-7.47*** (0.247)	-5.31*** (0.597)	-4.50*** (0.247)	7.28*** (0.234)	-2.89*** (0.115)
Weekends*Pandemic declaration*Risk-taking	3.85*** (0.673)	2.99*** (0.713)	3.09* (1.330)	2.58*** (0.668)	2.32*** (0.617)	-0.25 (0.245)
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 -between	0.843	0.585	0.349	0.818	0.779	0.793
R^2 -within	0.505	0.473	0.312	0.334	0.588	0.513
R^2 -overall	0.790	0.557	0.343	0.721	0.746	0.734

Notes: **Robust 1** = regions with at least one censored values on the outcome mobility measures excluded. **Robust 2** = regions with at least one censored values on any mobility measures excluded. **Robust 3** = government response indicators recoded as no measures taken if policy is not applied countrywide. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. We controlled for the day since first confirmed death, share of population over 65, number of confirmed cases (in logs), population density, and the set of government response indicators in each regression. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken*.

Table S12 | Robustness checks on risk preference and share of population at risk interaction effect on mobility.

Robust 1	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	10.8*** (1.666)	5.95*** (1.567)	11.1*** (2.161)	9.48*** (1.917)	6.82*** (1.151)	-2.57*** (0.679)
% Population 65+	0.038 (0.0673)	0.18** (0.0547)	0.79*** (0.113)	-0.088 (0.0813)	-0.42*** (0.0477)	0.023 (0.0247)
Risk-taking*% Population 65+	-0.62*** (0.112)	-0.22* (0.102)	-0.27 (0.193)	-0.65*** (0.129)	-0.53*** (0.0764)	0.17*** (0.0474)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	40283	40623	35709	39501	42807	30803
Number of clusters	719	724	636	704	763	547
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 -between	0.840	0.575	0.385	0.825	0.781	0.792
R^2 -within	0.485	0.395	0.285	0.331	0.560	0.520
R^2 -overall	0.795	0.536	0.356	0.755	0.749	0.748
Robust 2	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	9.67*** (1.581)	3.44* (1.572)	6.77** (2.399)	9.35*** (2.034)	5.42*** (1.379)	-2.04** (0.697)
% Population 65+	0.032 (0.0698)	0.22*** (0.0608)	0.91*** (0.120)	-0.0013 (0.0971)	-0.29*** (0.0669)	0.011 (0.0260)
Risk-taking*% Population 65+	-0.41*** (0.121)	0.058 (0.108)	0.19 (0.221)	-0.51*** (0.150)	-0.37*** (0.0999)	0.12* (0.0473)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29393	29393	29393	29393	29393	29393
Number of clusters	522	522	522	522	522	522
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 -between	0.830	0.555	0.372	0.826	0.770	0.796
R^2 -within	0.562	0.466	0.307	0.373	0.554	0.542
R^2 -overall	0.788	0.532	0.353	0.754	0.737	0.756
Robust 3	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	11.3*** (2.224)	4.41** (1.574)	12.4*** (2.354)	11.1*** (3.043)	5.64*** (1.402)	-2.94*** (0.725)
% Population 65+	-0.025 (0.0636)	0.23*** (0.0492)	0.93*** (0.0940)	-0.028 (0.0882)	-0.33*** (0.0437)	-0.0020 (0.0206)
Risk-taking*% Population 65+	-0.71*** (0.136)	-0.16 (0.102)	-0.59** (0.188)	-0.80*** (0.190)	-0.46*** (0.0854)	0.22*** (0.0430)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 -between	0.838	0.576	0.347	0.817	0.774	0.789
R^2 -within	0.494	0.471	0.318	0.333	0.602	0.522
R^2 -overall	0.781	0.549	0.343	0.718	0.743	0.733

Notes: **Robust 1** = regions with at least one censored values on the outcome mobility measures excluded. **Robust 2** = regions with at least one censored values on any mobility measures excluded. **Robust 3** = government response indicators recoded as no measures taken if policy is not applied countrywide. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. We controlled for weekend dummy, pandemic declaration dummy, days since first confirmed death, number of confirmed cases (in logs), population density, and the set of government response indicators in each regression. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken*.

Table S13 | Robustness checks on dynamics of mobility change based on risk preference and share of population at risk.

Robust 1	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	3.49** (1.295)	2.85* (1.115)	6.47** (2.225)	5.61** (1.963)	2.95** (0.980)	-2.65*** (0.660)
% Population 65+	0.21*** (0.0574)	0.19*** (0.0491)	0.69*** (0.0995)	0.047 (0.0713)	-0.33*** (0.0445)	0.016 (0.0231)
Risk-taking*% Population 65+	-0.39*** (0.114)	-0.15† (0.0889)	-0.14 (0.199)	-0.66*** (0.156)	-0.44*** (0.0755)	0.20*** (0.0502)
Days after first death	0.018 (0.0313)	-0.17*** (0.0306)	-0.40*** (0.0655)	-0.096* (0.0396)	-0.017 (0.0217)	0.071*** (0.0132)
Risk-taking*Days after first death	0.20*** (0.0524)	0.13** (0.0452)	0.25** (0.0923)	0.14† (0.0774)	0.15*** (0.0444)	0.0098 (0.0263)
% Population 65+*Days after first death	-0.015*** (0.00228)	0.0027 (0.00209)	0.016** (0.00498)	-0.0094*** (0.00266)	-0.0082*** (0.00160)	0.00079 (0.000982)
Risk-taking*% Population 65+*Days after first death	-0.011* (0.00441)	-0.0016 (0.00348)	-0.0017 (0.00924)	-0.0021 (0.00596)	-0.0079* (0.00337)	-0.0011 (0.00234)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	40283	40623	35709	39501	42807	30803
Number of clusters	719	724	636	704	763	547
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R ² -between	0.844	0.576	0.390	0.827	0.783	0.792
R ² -within	0.434	0.410	0.272	0.302	0.535	0.517
R ² -overall	0.793	0.540	0.353	0.754	0.748	0.748
Robust 2	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	4.05*** (1.045)	1.73 (1.133)	4.35† (2.511)	6.19** (2.334)	3.93** (1.211)	-2.63*** (0.718)
% Population 65+	0.18** (0.0593)	0.22*** (0.0558)	0.78*** (0.112)	0.096 (0.0890)	-0.25*** (0.0639)	0.0083 (0.0249)
Risk-taking*% Population 65+	-0.23* (0.113)	0.080 (0.0977)	0.22 (0.225)	-0.51** (0.197)	-0.35*** (0.0969)	0.19*** (0.0537)
Days after first death	0.00018 (0.0353)	-0.19*** (0.0329)	-0.51*** (0.0677)	-0.15*** (0.0425)	-0.094*** (0.0273)	0.075*** (0.0136)
Risk-taking*Days after first death	0.19** (0.0607)	0.089† (0.0509)	0.24* (0.107)	0.090 (0.0812)	0.054 (0.0490)	0.035 (0.0273)
% Population 65+*Days after first death	-0.015*** (0.00262)	0.0025 (0.00225)	0.025*** (0.00522)	-0.0090** (0.00295)	-0.0028 (0.00198)	0.00051 (0.00100)
Risk-taking*% Population 65+*Days after first death	-0.012* (0.00536)	-0.00049 (0.00396)	0.0030 (0.0108)	-0.0013 (0.00666)	-0.0013 (0.00402)	-0.0032 (0.00232)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29393	29393	29393	29393	29393	29393
Number of clusters	522	522	522	522	522	522
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R ² -between	0.834	0.555	0.381	0.828	0.770	0.796
R ² -within	0.525	0.474	0.284	0.349	0.552	0.538
R ² -overall	0.787	0.534	0.349	0.754	0.737	0.756
Robust 3	Retail & recreation	Grocery & pharmacy	Parks	Transit stations	Workplaces	Residential
Risk-taking	8.17*** (2.115)	2.93† (1.718)	10.4*** (2.639)	10.4** (3.674)	4.04** (1.534)	-3.26*** (0.894)
% Population 65+	-0.047 (0.0635)	0.083 (0.0611)	0.57*** (0.114)	-0.16 (0.101)	-0.42*** (0.0500)	0.041 (0.0265)
Risk-taking*% Population 65+	-0.57*** (0.148)	-0.086 (0.115)	-0.48* (0.216)	-0.81*** (0.237)	-0.36*** (0.0957)	0.21*** (0.0559)
Days after first death	-0.25*** (0.0295)	-0.35*** (0.0258)	-0.73*** (0.0587)	-0.45*** (0.0349)	-0.23*** (0.0185)	0.16*** (0.0115)
Risk-taking*Days after first death	0.16* (0.0639)	0.12* (0.0504)	0.23* (0.103)	0.092 (0.0734)	0.11** (0.0397)	-0.0032 (0.0236)
% Population 65+*Days after first death	0.0038† (0.00217)	0.019*** (0.00177)	0.046*** (0.00423)	0.014*** (0.00234)	0.011*** (0.00140)	-0.0067*** (0.000809)
Risk-taking*% Population 65+*Days after first death	-0.0063 (0.00463)	0.0033 (0.00372)	0.0089 (0.00982)	0.0035 (0.00536)	-0.00070 (0.00315)	-0.0020 (0.00190)
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Observations	43379	42942	38696	41079	43904	38854
Number of clusters	788	777	730	748	789	738
Prob. > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 -between	0.839	0.590	0.374	0.820	0.778	0.795
R^2 -within	0.490	0.426	0.227	0.319	0.585	0.491
R^2 -overall	0.781	0.540	0.317	0.710	0.741	0.725

Notes: **Robust 1** = regions with at least one censored values on the outcome mobility measures excluded. **Robust 2** = regions with at least one censored values on any mobility measures excluded. **Robust 3** = government response indicators recoded as no measures taken if policy is not applied countrywide. Random-effects GLS regression estimates. Standard errors (clustered at regional level) in parentheses. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. We controlled for weekend dummy, pandemic declaration dummy, number of confirmed cases (in logs), population density, and the set of government response indicators in each regression. Reference categories are: *Before WHO declares COVID-19 as pandemic*, *Weekdays* and *No measures taken*.