ESRI

*Working Paper No. 656*

*March 2020*

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*Pete Lunn, Cameron Belton, Ciarán Lavin, Féidhlim McGowan, Shane Timmons and Deirdre Robertson*

**Subsequently published as a Journal Article: 'Using behavioral science to help fight the coronavirus' Journal of Behavioral Public Administration, Vol. 3 No. 1, 2020**
**DOI: https://doi.org/10.30636/jbpa.31.147**

# Using Behavioural Science to Help Fight the Coronavirus

Pete Lunn, Cameron Belton, Ciarán Lavin, Féidhlim McGowan,
Shane Timmons and Deirdre Robertson

Behavioural Research Unit, ESRI

*Acknowledgements:* The authors thank Liam Delaney and Karl Purcell for pointing us to additional material and for insightful comments on an initial draft. We are also grateful to Alan Barrett and Helen Russell for helpful feedback and guidance.

## Summary

This paper summarises useful evidence from behavioural science for fighting the COVID-19 outbreak. It is based on an extensive literature search of relevant behavioural interventions and studies of crises. The findings aim to be useful not only to government and public authorities, but to organisations, workplaces and households. Seven issues are covered:

(1) Evidence on **handwashing** shows that education and information are not enough. Placing hand sanitisers and colourful signage in central locations (e.g. directly beyond doors, canteen entrances, the middle of entrance halls and lift lobbies) increases use substantially. All organisations and public buildings could adopt this cheap and effective practice. (2) By contrast, we lack direct evidence on reducing **face touching**. Articulating new norms of acceptable behaviour (as for sneezing and coughing) and keeping tissues within arm's reach could help. (3) **Isolation** is likely to cause some distress and mental health problems, requiring additional services. Preparedness, through activating social networks, making concrete isolation plans, and becoming familiar with the process, helps. These supports are important, as some people may try to avoid necessary isolation. (4) **Public-spirited behaviour** is most likely when there is clear and frequent communication, strong group identity, and social disapproval for those who don't comply. This has implications for language, leadership and day-to-day social interaction. (5) Authorities often overestimate the risk of panic, but **undesirable behaviours** to watch out for are panic buying of key supplies and xenophobic responses. Communicating the social unacceptability of both could be part of a collective strategy. (6) Evidence links **crisis communication** to behaviour change. As well as speed, honesty and credibility, effective communication involves empathy and promoting useful individual actions and decisions. Using multiple platforms and tailoring message to subgroups are beneficial too. (7) **Risk perceptions** are easily biased. Highlighting single cases or using emotive language will increase bias. Risk is probably best communicated through numbers, with ranges to describe uncertainty, emphasising that numbers in the middle are more likely. Stating a maximum, e.g. "up to X thousand", will bias public perception.

A final section discusses possibilities for combining these insights, the need for simplicity, the role of the media, and possibilities for rapid pretesting.

## Introduction

There is great uncertainty about the scale of the epidemic due to transmission of the coronavirus that causes the disease COVID-19. We cannot know how many people will become infected and how many of them may die.[1] We do know that multiple measures can be taken that are likely to reduce transmission of the virus and ultimately, therefore, to save lives.[2,3] Many of these measures involve good organisation of health services – resources for contact tracing[4,5], procedures for handling phone calls to GP practices, transportation for people who need to be tested, availability of isolation beds, etc.[6] Others are designed to change the decision making and behaviour of citizens – improving handwashing and hygiene[7], etiquette for sneezes and coughs, knowing when and how to self-isolate, etc.[8,9]

The present paper concerns this second set of measures, those designed to affect decision making and behaviour. Recent decades have seen increases in the quantity and quality of research in behavioural science. In the last ten years, this science has been increasingly applied to policy problems by governments and international organisations around the world.[10] Consequently, there is a body of applied scientific knowledge and evidence that can be called upon in the fight against COVID-19. This paper reviews relevant evidence and some of the lessons therein.

The aim is to distil the evidence into a paper to inform those trying to fight the disease. Some of the evidence is relevant to mass communication of public health information from governments and authorities. Other evidence concerns the design of local behavioural interventions to reduce transmission of the disease. An important point is that useful behavioural interventions can be put in place not only by relevant national and local authorities, but by individual organisations, workplaces and even households. Our everyday lives are the context in which transmission of the virus takes place and much of behavioural science concerns how context affects our decision making and behaviour. Given the nonlinear dynamics of infection, reduced transmission can ultimately lower the overall number who contract the disease and the number of cases at the peak of the epidemic, when health services will be most stretched.[11]

Some caveats are necessary. The paper has been produced much more rapidly and at shorter notice than would be standard for research of this type. Obviously, this is because time matters in fighting the virus, but it means that the team have had to trade thoroughness off against speed, at least to some extent. In negotiating this trade-off, we have striven to

prioritise accuracy. The main issue is that there are likely to be some important studies or ideas that are missing.

The paper is organised into seven sections: (1) Hand Washing; (2) Face Touching; (3) Entering and Coping with Isolation; (4) Encouraging Collective Action; (5) Avoiding Undesirable Behaviour; (6) Crisis Communication; (7) Risk Perception. Each section describes available evidence, with a final paragraph that draws conclusions. The final section summarises these and highlights some more general implications also.

## 1. Handwashing

Behaviour change interventions that target everyday activities must overcome a common and substantial barrier: habits. Habits are highly efficient, designed to free up our minds to concentrate on other matters. By definition, habits operate mostly outside conscious awareness and are hence hard to break through improved education and knowledge. For instance, even in acute healthcare environments, attempts to improve hand hygiene and other infection control behaviours through education and awareness have limited and short-term impacts.[12,13]

There is, however, a body of evidence about which interventions do work. On the downside, much of the research takes place in hospital and other healthcare settings, whereas the COVID-19 response requires behaviour change also in homes, workplaces, public buildings, etc. On the upside, evidence does suggest how to design good interventions.

A 2001 review of research in hospitals found that combining educational interventions with reminders and better facilities (e.g. automated sinks) can increase handwashing.[14] A 2012 follow-up also concluded that multiple behavioural levers are required, including social influence, convenience, prompts, and cues.[15] Later studies point to benefits from placing alcohol-based hand sanitiser (AHS) in highly visible locations.[16,17] Indeed, a crucial aspect of successful handwashing interventions is to capture attention. Placing an AHS stand in the middle (versus the side) of a hospital entrance lobby increased usage substantially.[18] More visible, proximate and convenient locations for AHS dispensers increases their use,[19] more so than increasing the number of dispensers.[20] Another study increased use by deploying flashing lights to draw attention to the AHS.[21]

While fewer interventions have been studied outside healthcare settings, some have been successful. A 2018 review of research in office workplaces found that simple provision of

hand hygiene products, accompanied by education on how to use them, usually resulted in significant improvements in hand hygiene compliance.[22] Modest increases in soap use in public toilets can be obtained via written signs.[23] Towel and soap dispensers that do not require user activation also help.[24] Messages linked to disgust tend to be effective,[25,26,27,28,29] while evidence does *not* support messages that communicate social norms ("4 out of 5 people wash their hands every time…").[30,31]

Evidence from multiple studies points to useful conclusions. Education and information are not sufficient to change habits; interventions need to attract attention and make compliance convenient. Thus, AHS is an important tool. Evidence supports a policy in which organisations of all types placed colourful AHS stands directly in front of entrances and centrally in lobbies, lift areas, canteens.

## 2. Face Touching

In contrast to handwashing, we can find no proper scientific studies that evaluate interventions designed to reduce the frequency with which people touch their face. Observational studies suggest that people touch their mouth, nose or eyes perhaps 10-20 times per hour.[32,33] Self-recording of face touching is not accurate[34] and sample sizes of studies are typically very small.

The issue of face touching raises the question of how to encourage a specific behaviour in the absence of direct evidence. Behavioural scientists have developed guides to behaviour change interventions that draw general lessons from across domains. The "Behaviour Change Wheel"[35] centres on a model of behaviour change consisting of three essential elements: capability, opportunity and motivation. Individuals have to be psychologically or physically able to undertake the behaviour, the environment that surrounds them needs to facilitate the behaviour, and their own mental processes need to energise and direct the behaviour. Authors of this approach have issued some material specific to the coronavirus.[36] The EAST framework[37] emphasises that behaviour change is more likely when the behaviour is made Easy, Attractive, Social and Timely.

What is common to these frameworks is recognition that education and information is not enough; we need to alter physical and social environments as well as understanding and mindset. With respect to face touching, a physical intervention might be to place tissues in prominent locations, e.g. immediately before the keyboard for office workers, on lunch and

coffee tables, so that people can use them and not their hands to scratch an itch. A social intervention might be for the public health authorities to encourage a specific change in social acceptability, perhaps that scratching with a sleeve is fine, just as it is now advised to sneeze or cough into the elbow or upper arm rather than the hand. The UK Behavioural Insights Team has made similar suggestions.[38]

## 3. Entering and Coping with Isolation

Part of the necessary response to the COVID-19 outbreak is to limit social contact, particularly with those who display symptoms or are at increased risk of having contracted the virus. While self-isolation can help to contain and control the spread of infectious diseases,[39] isolation has important negative psychological effects, which we describe here. Awareness of these consequences is important to help people prepare and, where possible, prevent them. The behavioural science literature also suggests that anticipation of these effects could affect compliance with self-isolation.

It is well-established in the psychology and public health literature that social isolation has detrimental consequences for wellbeing, with effects comparable to other well-known risk factors such as smoking.[40] Loneliness is also associated with increased risk for mental health problems, including depression and anxiety.[41,42]

A recent review of 24 studies, in which individuals were quarantined for durations ranging from several days to several weeks, sheds light on possible consequences.[43] While distress and irritability from lack of social contact, loss of freedom and boredom *during* quarantine might be expected, some studies indicate long-term effects,[44] including depressive symptoms[45] and substance dependence[46] up to three years after quarantine has ended. The review highlighted specific implications for healthcare workers, who can become concerned about failing to support co-workers during the outbreak,[47] can be stigmatised following quarantine,[48] and sometimes self-isolate beyond the quarantine period.[49]

The duration of isolation is important. Longer periods are associated with poorer mental health outcomes[50] and increased anger.[49] Extending the isolation period beyond initial suggestions can demoralise people and increase non-compliance.[51] Thus, clarity and certainty about timelines are both important.

The mental health effects of loneliness during isolation can be exacerbated by loss of routine, which is linked to multiple negative mental health consequences.[52] Protective behaviours

such as sleep[53] and exercise[54] routines can be disrupted and hindered during isolation. Children may be especially susceptible to such changes in routine.[55]

Planning for the effects of social isolation can help individuals to cope. Plans may be put in place to remotely engage with social networks, via phone and video calls, or social media. Activating social networks may be particularly important for those living alone. People can maintain aspects of routine that remain possible during isolation, such as keeping alarms set to usual times, maintaining working hours, and planning home-based exercise (for those well enough). Plans are easier to follow if they are time-specific and intentional, rather than general aspirations.[36,56] Creating plans in advance of isolation, discussing plans with others and incorporating familiar routines may help people to overcome anxiety. Familiarity and repeated "mere" exposure to choices is established to reduce uncertainty and promote positivity towards those choices.[57]

A danger is that perceived negative consequences of isolation could hinder voluntary engagement. When deciding whether to engage with proposed health solutions, people consider not only their susceptibility to the threat and its severity, but how effective they perceive the solution to be and the nature of the required behaviour.[58] For instance, some people actively avoid receiving important medical information when it might lead to an undesirable action, such as learning that they might need surgery.[59,60] People express unwillingness to isolate themselves when they harbour doubts about the chances of infecting others, but report greater willingness when they consider the possible effect on the most vulnerable in society.[61] Thus, if people anticipate and fear negative consequences of self-isolation, or fail to reflect on spreading the virus to those most at risk, they may downplay or not acknowledge symptoms of COVID-19, to avoid the possibility of isolation.

Overall, evidence suggests negative mental health consequences from isolation. The implication is that authorities need to supply and advertise additional mental health services, including support lines and advice, for people who undergo isolation. Helping people to create plans is likely to help. This includes encouraging people to inform social media networks that they are isolated, encouraging messages and calls, and maintaining some routine. Familiarising people with the process and ways to cope with it is likely to increase compliance. Highlighting the altruistic rationale for isolation may reduce stigma and increase compliance, as considered further in the next section.

## 4. Encouraging Collective Action

The behavioural response to COVID-19 is unavoidably collective. Each person's chance of contracting the virus depends not only on their own behaviour, but also on the behaviour of their fellow citizens. Initial data show that young people face a substantially lower risk of succumbing to COVID-19 than older people,[62] yet willingness to adapt their behaviour will, in turn, influence how many older people get the virus.[63]

Similar problems have been studied for many decades under multiple labels ("public good games", "social dilemmas", "collective action problems", "common pool resource games"). Whatever label one chooses, there are replicable empirical results that suggest ways to increase the likelihood that people do the right thing by their fellow citizens.

It was demonstrated some time ago that many, though not all, individuals will override self-interest and act in the collective interest.[64,65] Perhaps a majority of the population are what are referred to as "conditional co-operators",[66,67] who are willing to make sacrifices for the public good provided that others are too, but cease co-operation if too many other people don't bother. There is some evidence that such co-operative behaviour is more likely in response to emergencies.[68,69]

Large scientific literatures now reveal when public-spirited behaviour is more or less likely. We highlight three factors: communication, group identity and punishment. Importantly, while the relevant evidence was initially demonstrated in laboratory experiments, is has since been verified in multiple real-world applications.[70]

A consistent finding is that co-operation is improved, often substantially, by communication.[71] Co-operation is increased by clear statements, articulated by leaders and repeated by others, of a desired collective behaviour that is in the group interest. This can enhance trust, establish social norms and encourage individuals to commit to the behaviour.[72] Observation of effective communication when facing social dilemmas reveals that it is the articulation of how the behaviour is best for all, rather than persuasion to undertake the specific behaviour, that most supports co-operation.[73] This evidence, for instance, suggests that one of the most effective arguments to promote compliance with isolation is that self-isolation in response to symptoms is the best way for all of us to prevent infecting each other.

The more people feel part of a group or community response, the more likely they are to make a selfless contribution.[70] This finding is particularly true of responses to threats, which generate a stronger public response when framed in group rather than individual terms.[74]

Co-operation is more likely when there is transparency about individuals' contributions and punishment for those who do not pull their weight.[75] This punishment need not be material, but can simply consist of social disapproval,[76] although there is evidence that where punishment is itself unjust or antisocial, it can backfire.[77,78]

This evidence relating to collective action has implications for fighting COVID-19. Our situation is collective, not only at the international or national level, but within localities, workplaces and households. In each of these overlapping social groups, strong communication of a common strategy to fight the disease is likely to increase adherence to prescribed behaviours. Language and leadership matters. Where behaviour is about "we" and "us" rather than "I" or "you", more public-spirited responses are likely. Media reporting matters too. Faithfully reporting that people are trying to follow advice, assuming that they are, is as important as highlighting failures to follow it. Conditional co-operators need to know that others are co-operating. Nevertheless, where behaviour falls short, a reasonable degree of disapproval is helpful; polite but clear interventions when official advice is not followed are likely to improve behaviour. We are in this together.

## 5. Avoiding Undesirable Behaviour

Neglecting to wash hands, failing to cover coughs or sneezes, or avoiding self-isolation at the first genuine sign of symptoms, all constitute poor behaviour relative to ideal standards in response to the coronavirus epidemic. Nevertheless, these behaviours can be distinguished from more antisocial behaviours. Among such behaviours are panic responses, undue expressions of anger towards officials or health workers, xenophobic responses to people of a race or nationality perceived to be high-risk, or unsympathetic responses to those who contract the virus.

Encouragingly, studies suggest that mutual assistance is a more common response to a crisis than mass panic and social disorder.[79,80] The relative recent experience with swine flu (H1N1) is a case in point.[81,82] Nevertheless, severe social and economic disturbances can occur in response to disease outbreak.[83] Overreaction is not limited to the public, but can also affect professionals and workers in healthcare systems.[84,85]

Multiple studies have investigated responsible versus irresponsible media coverage, and its effects on public perceptions. The method is generally to analyse content for exaggeration or alarming language, or to relate media volume, content and tone to public opinion surveys. An initial analysis of the worldwide coverage of the coronavirus has raised concerns about unhelpful, alarming language, such as "killer virus".[86] However, a recent review of research into swine flu coverage concluded that while there was some evidence of overdramatization, the bigger issue was the focus on reporting the threat (number of diagnoses, etc.) at the expense of communicating how best to fight the disease.[87]

We can find surprisingly little high-quality evidence on the drivers of panic buying and or efforts to prevent it. Despite its name, panic buying is not always driven by strong emotions, but can be a natural response of risk-averse individuals to a threat of future unavailability or lack of access (e.g. due to isolation).[88] Evidence from studies of financial behaviour suggests that it is more likely when individuals observe others stocking up.[89] In effect, stockpiling amounts to antisocial behaviour in a large-scale "common pool resource" problem. We have to rely on encouraging responsible behaviour, especially in relation to hand sanitisers and other medical supplies. In line with the previous section, this requires articulating a clear strategy and expectation of behaviour that we all need to comply with.

An important concern is the possibility that specific social groups perceived to be associated with the virus might face discrimination or ostracization.[90] For instance, Asian-Americans experienced discrimination during the SARS epidemic.[91] In general, people who feel more vulnerable to disease express more negative reactions to out-groups[92] and priming people to think about disease increases ethnocentrism.[93] To combat this, strong messages from leaders might stress both the social unacceptability of any xenophobic behaviour and the importance of understanding that different people face the same threat and share a common goal.[94]

In summary, there is evidence from past crises that public authorities can overestimate the likelihood of panic and public disorder, including the role of the media in propagating it. There are nevertheless known risks of panic buying and xenophobic behaviour. Evidence suggests that clear leadership and statements about the unacceptability of such behaviour are required, as part of our collective response as a society, coupled with visible use of available punishments for people who transgress.

## 6. Crisis Communication

A scientific literature covers how people respond to crisis communication and aims to identify the best ways to communicate in a crisis. Although many studies are specific to single countries or incidents, useful principles emerge. These may be helpful not only for national communication but across the public health system, to balance the need to inform and motivate against the danger of inciting unnecessary fear.[95]

The word "unnecessary" is important here, because fear is to some extent a legitimate force that can positively influence attitudes, intentions and behaviours.[96] There is evidence that communication of threat is particularly effective when combined with communication about how to respond. There is an ongoing scientific debate about whether 'fear appeals' generate long-term behaviour change. However, the consensus is that they are more effective when perceptions of self-efficacy (belief that one's own actions make a difference) are high.[97,98]

Messages can be designed to elicit emotions other than fear. Evidence shows that 'empathy appeals' can have positive impacts on behaviour change.[99] In the context of smoking, social marketing that portrays realistic narratives involving loss or pain within personal relationships can be as or more persuasive than graphic 'fear appeals'. Similar empathetic framing may strengthen belief that a community working together *can* do something to mitigate the effects of a crisis.[100,101]

Different subgroups can respond differently to communication during a crisis, which can be important for more vulnerable groups[102] but also helpful for good crisis communication. Making communication sensitive to the demographics of the intended recipient helps people to feel that society is more prepared.[103] Messages specific to ethnic groups can also improve engagement.[104] For example, African American women were more likely to test for HIV after viewing a video featuring a presenter matching their gender, and more likely still when the context of the messages were framed in a culturally relevant way. [105]

Marketing researchers have noted that public health campaigns are more effective when they apply principles that are successfully used by private companies – be distinctive, consistent, engaging and relevant. For example, catchy phrases or mnemonics help children and families to retain important public health information.[106] The Australian 'Slip, Slop, Slap' sun

protection campaign is a prime example of the widespread, lasting impact on behaviour that campaigns which incorporate these principles can achieve.[107]

Social media has opened new avenues for communication[108] and offers potential for rapid information dissemination.[109] It can be harnessed to promote altruistic behaviour. Messages that convey a moral imperative for people to act and messages that evoke strong emotional reactions are more likely to be shared.[110] Campaigns that invoke an internally sourced 'intrinsic' motivation to help others generally last longer than ones that leverage extrinsic incentives to do 'good'.[111]

However, there is generally mixed evidence on the benefits of social media in crises. Following the 2015 MERS (Middle East Respiratory Syndrome) coronavirus outbreak in South Korea, those exposed to information on social media were more likely to experience fear and anger, but both emotions were positively associated with the extent of subsequent preventive behaviours.[112] In relation to the Zika and Ebola viruses, studies have suggested that use of social media messaging by authorities may not be beneficial for knowledge,[113] can reduce perceptions of credibility[114] and may increase focus on panic and uncertainty.[115]

The US federal agency, Centers for Disease Control and Prevention (CDC), has previously distilled evidence into six guiding principles for crisis communication.[116] These are: (1) Be first: provide information as soon as possible or, if not possible, explain how you are working to get it and when. (2) Be right: tell people what you know when you know it, tell them what you don't know, and tell them if you will know later. (3) Be credible: tell the truth. (4) Express empathy: acknowledge what people are feeling. (5) Promote action: give people relevant things to do. (6) Show respect: involve stakeholders in decision making processes and try to meet media deadlines.

Some messages pass through the media filter more easily than others. These principles closely map onto those tested in a content analysis of US media stories that concerned foodborne illnesses and natural disasters.[117] This found a strong tendency for news outlets to

focus on information and explanation, with little coverage of expressions of empathy, although the above evidence suggests empathy is important during crises.

The evidence provides some clear principles for communicating health crisis information. In addition to speed, honesty and credibility, it is important to stress the usefulness of individual actions and decisions. Empathy matters – people need reassurance that those in charge understand how they feel. Using multiple platforms and tailoring some key messages to subgroups is likely to be beneficial too, although social media has not generally proved effective for official communication during outbreaks.

## 7. Risk Perception

A primary role of government and authorities during an epidemic is to inform citizens about risk. From a behavioural perspective, this is difficult territory. The evidence below demonstrates that risk perceptions are easily biased. Downplaying risk may undermine efforts to change behaviour, but overstating it could increase economic and social costs. Moreover, different people have different tolerance for risk; there is no "right" response to a given level of risk.

While not unchallengeable, the assumption we make here is that authorities (and others) should communicate the risks surrounding COVID-19 to the public as faithfully as possible. The rationale for this assumption is threefold. First, to do otherwise is antidemocratic. People must rely on the authorities to give them an accurate picture on which to base decisions. Second, trust is a vital ingredient of public-spirited behaviour. Exaggeration or downplaying risk could damage trust, which needs to be maintained over the course of an epidemic. Third, if government is seen to manipulate perceptions of risk, it gives others licence to do likewise, including businesses and the media, for whom risk perceptions may have commercial consequences, good or bad. In short, at times like this, truth is a public good.

The issue is important because there is good evidence from meta-analyses to suggest that risk perception does drive behavioural responses, both in general[118] and in relation to health behaviours such as vaccination.[119] Moreover, following a change in behaviour, people tend to adjust their perception of risk downwards.[120] However, individuals struggle to perceive risks accurately and distort probability when making decisions,[121] with substantial differences

between individuals.[122] Nevertheless, many effects are known and can be taken into consideration when trying to communicate risk faithfully.

People judge the likelihood of an outcome partly by how easily it springs to mind.[123] This "availability heuristic" biases perceptions of lethal risks, increasing the perceived likelihood of evocative outcomes and those emphasised by the media.[124] Perceptions of risk and protective behaviours tend to track the volume of coverage on traditional and social media.[125] Risks are judged to be greater when they have more emotional impact – the "affect heuristic".[126,127] Fear tends to increase perception of risk, while anger can reduce it.[128] Availability and affect heuristics can operate together.[129] Overall, there is no established dynamic for how risks to the public are perceived over time; some provoke excessive response, others insufficient.[130]

A bias that may be particularly important for authorities during a crisis is "hindsight bias". Information regarding the coronavirus is evolving all the time, leading to constant revisions of assessments. Compared to their assessment beforehand, people generally believe that an outcome was always more likely once they know that it happened.[131,132] Over months, or even weeks, this may lead to a perception that the authorities "should have known" where events were heading, when in reality uncertainty was great. Being clear about the extent of uncertainty and reminding people of that uncertainty may be important for credibility.

Knowing these biases, one might strive to communicate numeric estimates of risk. People trust numbers more and most (but not all) people prefer them.[133,134] However, even numbers can be framed in ways that make risks appear larger or smaller.[135,136] This includes positive and negative framing (e.g. 2% mortality versus 98% survival),[137] leading some to argue that both should be used.[138]

An important issue is how to communicate uncertainty. The impact of COVID-19 is, and will remain, hard to assess. Hindsight bias is likely as the situation becomes clearer. Stating a cautious range is one solution. However, a trade-off exists: ranges imply honesty, but can undermine the perceived expertise of decision-makers.[139] In addition, many people think of the distribution underlying a range as uniform, like drawing lottery balls, rather than understanding that numbers near the middle are more likely.[140]

Given the above, evidence does not provide an uncontested "best practice" for communicating public health risks,[141,142] but there are lessons. These include not using specific or extreme cases, avoiding emotive language (beyond expressing empathy), sticking dispassionately to numbers. Communicating uncertainty via ranges is honest, but it should be emphasised that the middle is most likely. Stating ranges as maximums ("anything up to X") will exacerbate upward bias. While the aim here is primarily to inform authorities, these lessons apply equally to media reporting.

**General Discussion**

The evidence described and interpreted in this paper has been rapidly assembled to address seven areas where behavioural science can make a constructive contribution to the fight against COVID-19. The evidence varies in volume and strength and, therefore, in the definitiveness with which conclusions can be drawn. For instance, findings on placement of hand sanitisers straightforwardly point to practices that, if made sufficiently widespread, will be likely to slow transmission. Implications in other areas, such as effective crisis communication, are more nuanced and reached on the balance of probabilities. It is important to note, however, that the results relating to highly specific and localised behaviours, such as increased handwashing, are not generally stronger or more reliable than those surrounding more general behaviours, such as public-spirited actions. In fact, the findings that collective action is more effective when there is communication, group identity and punishment, are some of the strongest and most replicable findings in behavioural science.

The final paragraph of each section presented conclusions in each of the seven areas, which are not repeated in this final section. Instead, this discussion pulls together some general lessons that arise when evidence is considered across the different areas. Four issues are considered: the combination of behavioural effects, the need for simplicity, the role of the media, and possibilities for deploying rapid pre-testing.

The opportunity for combining behavioural interventions can be illustrated by the experience of one of the authors when attending a Dublin hospital a few days after the first case of COVID-19 was confirmed in Ireland. Inside the main revolving door was a large, red "stop" sign, modelled on the equivalent road sign. It was unmissable and marked the hand sanitiser. At the reception desk, before saying anything else, the receptionist politely asked everyone "have you used the hand sanitiser?" Most people confidently replied "yes", some hesitated

before unconvincingly forcing out a “yes”, a few apologised and went to use it. There were additional salient sanitisers placed in the most public spaces: by, and in, the lifts, and at entrances to each consultant clinic. This is how to use behavioural evidence to fight the virus. An intervention known to be effective was combined with a method to capture attention, enforcement of a social norm, and likely social disapproval for those who don’t co-operate because interventions were in the most public spaces in the building.

Organisations wishing to play their part in tackling COVID-19 can all do similarly. In addition, they can use language that stresses and reinforces the collective nature of action required from staff and visitors, communicate preparedness for the possibility of cases in their domain, provide tissues on workbenches and next to keyboards, and ensure continued communication with anyone unfortunate enough to face isolation. In combination, evidence implies that these behavioural interventions, and perhaps others, can substantially slow transmission.

There is one important additional behavioural principle to keep in mind. Across multiple areas of behavioural science, there are often benefits to be had from keeping things simple.[143] Even when strongly motivated, people cannot process and retain large volumes of information; mental bandwidth is limited. This is important for national communication, where a focus on just three or four crucial behaviours (hand washing, face touching, cough and sneeze etiquette, self-isolation) has probably been effective. The principle is inherent in the hospital intervention described above. Each intervention was simple and sequentially separated, likely to generate a result far more effective than a more complex poster or leaflet explaining the benefits of hand-washing.

Looking across the seven areas surveyed by this paper, the effectiveness of communication stands out as a crucial issue in generating desirable behaviour. Yet a large proportion of communication from public authorities, naturally, passes through the filter of the media. Several findings covered in the body of this paper apply. In particular, there is evidence that there is much more reporting on the latest levels of threat than on actions that people can and should take to reduce it, or on utterances of responsible individuals that may communicate empathy or credibility – factors that evidence suggests are important to subsequent behaviour. One can make a reasonable case that during a health crisis such as this, the role of the media should change somewhat, as it does during other periods, such as elections. There may be personal and societal benefits to giving more time than usual to advice, constructive

personal actions and direct communications between authorities and citizens. This can be done without affecting the ability of the media to fulfil its functions in faithfully reporting events and holding the powerful to account.

Finally, one growing and important aspect of the growth in applied behavioural science requires mention. A number of the studies cited here exemplify the possibilities for pre-testing behavioural interventions for effectiveness. Even when time is short and authorities are responding quickly, this may be possible.[144] Rapid online testing of comprehension and public responses to health materials can be undertaken to support the development of the best materials.

At the time of writing, unfortunately, it seems that this virus will afflict people around the world for the coming months and perhaps years. There will be multiple opportunities for behavioural science to contribute to the fight against it. We hope that this paper has made an initial contribution to that effort.

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