



## *Brief-Report Covid-19*

# Understanding face mask use to prevent coronavirus and other illnesses: Development of a multidimensional face mask perceptions scale

Matt C. Howard\* 

Mitchell College of Business, The University of South Alabama, Mobile, Alabama, USA

Face masks are an avenue to curb the spread of coronavirus, but few people in Western societies wear face masks. Social scientists have rarely studied face mask wearing, leaving little guidance for methods to encourage these behaviours. In the current article, we provide an approach to address this issue by developing the 32-item and 8-dimension Face Mask Perceptions Scale (FMPS). We begin by developing an over-representative item list in a qualitative study, wherein participants' responses are used to develop items to ensure content relevance. This item list is then reduced via exploratory factor analysis in a second study, and the eight dimensions of the scale are supported. We also support the validity of the FMPS, as the scale significantly relates to both face mask wearing and health perceptions. We lastly confirm the factor structure of the FMPS in a third study via confirmatory factor analysis. From these efforts, we identify an avenue that social scientists can aid in preventing coronavirus and illness more broadly – by studying face mask perceptions and behaviours.

### Statement of Contribution

#### **What is already known on this subject?**

- Face masks are an avenue to curb the spread of coronavirus.
- Few in Western societies wear face masks.
- Little is known on how to encourage face mask wearing.

#### **What does this study add?**

- We create and support the Face Mask Perceptions Scale (FMPS).
- We identify that eight primary face mask perceptions exist.
- The study of these eight perceptions can lead to effective interventions for face mask wearing.

The number of worldwide coronavirus cases has now exceeded 7,000,000, and over 400,000 known individuals have died from coronavirus (BBC, 2020a). The global scientific community is fervently pursuing medical advancements to treat coronavirus,

\*Correspondence should be addressed to Matt C. Howard, Mitchell College of Business, University of South Alabama, 581 I USA Drive S., Rm. 337, Mobile, AL 36688, USA (email: [mhoward@southalabama.edu](mailto:mhoward@southalabama.edu)).

but many researchers point out that preventative measures also reduce the spread of illness (Chen *et al.*, 2020; Long *et al.*, 2019; Wang *et al.*, 2020). Among these preventative measures are hand washing, social distancing, and – the focus of the current article – face mask wearing.

Face masks are cloth coverings worn on the face with the intention to prevent illness. While face masks partially protect the wearer, they are more effective at ensuring that the wearer does not spread their germs (CDC, 2020). Even while the number of coronavirus cases and deaths dramatically increase, those in Western populations appear reluctant to wear face masks (BBC, 2020b; Friedman, 2020). A recent study supported that <35% of those in Canada, France, Germany, and the United Kingdom wear face masks to protect themselves from coronavirus, whereas more than 75% in China, India, Japan, and Vietnam do so (Bricker, 2020). The cause of this resistance is still largely unknown. Social scientists frequently study other health behaviours, such as hand washing, smoking cessation, and exercise (Ogden, 2012); however, very few have investigated face mask wearing. This dearth of research is particularly damaging in the current worldwide landscape, as public health officials have little knowledge regarding effective interventions to encourage face mask wearing. If an avenue was identified to develop such interventions, public health officials argue that the spread of coronavirus could be greatly reduced and millions of lives could be saved (BBC, 2020b; CDC, 2020).

The current article provides a starting avenue to study face mask perceptions, which could lead to the development of interventions to alter face mask wearing. We undergo a three-study process to develop the Face Mask Perceptions Scale (FMPS), which is a 32-item and 8-dimension measure to gauge justifications for not wearing face masks. We demonstrate that the FMPS produces superb psychometric properties, appropriate validity evidence, and significant relations with face mask wearing. In our discussion, we also link the current results with prior frameworks and theories associated with intervention development. We argue that the current results can be broadly framed in the COM-B model (Michie *et al.*, 2011), but future researchers should also apply more specific theories (Arden & Chilcot, 2020; Bish & Michie, 2010; Teasdale *et al.*, 2012) to develop interventions and encourage face mask wearing via perceptual change.

The FMPS can encourage researchers to integrate face mask wearing with studies on protective behaviours – especially those focusing on the importance of perceptions as done in the current article. Notably, a significant base of research has investigated hand washing, and authors have developed complex theoretical frameworks and associated interventions regarding hand washing (Aunger *et al.*, 2010; Lam *et al.*, 2004; Nicholson *et al.*, 2014). For instance, Judah *et al.* (2009) studied the efficacy of fourteen different messages to target seven psychological mechanisms (including perceptions) and promote hand washing in public restrooms. The authors demonstrated the varied effectiveness of these messages, implied importance of the psychological mechanisms, and influence of gender on the efficacy of the messages. Such findings can provide an approach to study face mask wearing, wherein the eight dimensions identified in the current article can be incorporated into associated frameworks and the FMPS can be used as an indicator of intervention effectiveness. Thus, we assert that it is key for future research to utilize these prior findings regarding protective behaviours – and hand washing specifically – to better understand and promote face mask wearing.

Together, the current article provides many benefits for research and practice. First, we identify an avenue that social scientists can aid in preventing coronavirus – studying face mask perceptions. Second, we identify the most common face mask perceptions as well as those with the strongest relation to face mask use, which allows future researchers to target these barriers via interventions to encourage face mask wearing. Third, we show that face mask perceptions are complex. People do not simply have positive or negative perceptions of face masks, but they instead have several different – possibly conflicting – perceptions that influence their behaviours. Fourth, by assessing face mask perceptions in an eight-dimensional rather than unidimensional manner, we highlight that face mask perceptions and any associated interventions are not a ‘one size fits all’ approach, as people have varying justifications for not wearing face masks.

### **Scale development studies**

For all studies, Appendix S1 includes the associated datasets, and Appendix S2 includes the complete reporting of methods, analyses, and results.

## **STUDY 1 – QUALITATIVE ITEM GENERATION**

Study 1 was conducted to generate items for the FMPS using Mechanical Turk (MTurk) on 26 April 2020. Researchers have supported that results from MTurk samples are reliable and valid when sufficient precautions are taken, and we followed prior guidelines for ensuring adequate data quality when using MTurk (Buhrmester *et al.*, 2018; Mellis & Bickel, 2020; Robinson *et al.*, 2019). For all studies, we restricted participants to only those with more than 50 MTurk assignment completions at a 95% approval rate or better. For Studies 2 and 3, we included multiple attention checks and utilized time-separate research designs. Via these efforts, we believe that our analyses included only those providing appropriate survey responses.

In Study 1, two open-ended questions were administered to 205 participants in return US\$0.05. The first question queried participants’ personal perceptions regarding face masks, whereas the second question queried participants’ public perceptions. The questions read as follows: ‘Face-masks are often recommended to reduce the spread of viruses, but many people don’t wear face masks in public. In the box below, please list as many reasons as possible that [you/ people in general] do not wear a face mask when you go out in public. Please write at least three reasons’. (bolded and underlined in original questions).

The primary author thematically categorized and qualitatively analysed responses following recommendations for item generation and scale pretesting (DeVellis, 2016; Howard, 2018; Presser & Blair, 1994). Thirteen categories were identified (Table 1). To ensure that an adequate scope of face mask perceptions was assessed in the FMPS while being reasonably concise, we developed items for categories with more than a 10% frequency in participants’ qualitative responses for either personal or public perceptions. This resulted in the inclusion of eight categories: comfort, efficacy doubts, access, compensation, inconvenience, appearance, attention, and independence. Because we intended to develop a concise measure (~30 items), we initially developed six to eight items per category (55 total) to be subsequently reduced to four items per category in the following study. These initial items were developed from participants’ responses to ensure content relevance. All initial items can be seen in Appendix S3.

**Table 1.** Qualitative reasoning results

	Category Description	Why I do not wear facemasks	Why other people do not wear facemasks
1) Comfort	Facemasks are irritating and/or hamper breathing.	123 (60%)	83 (40%)
2) Efficacy Doubts	Facemasks do not prevent illness and/or person is immune to illness.	84 (41%)	131 (49%)
3) Access	Facemasks are difficult to make or purchase.	74 (36%)	110 (54%)
4) Compensation	Facemasks are not needed when other safety precautions are taken.	46 (22%)	8 (4%)
5) Inconvenience	Facemasks are inconvenient to wear.	33 (16%)	36 (18%)
6) Appearance	Facemasks have an undesirable appearance.	32 (16%)	39 (19%)
7) Attention	Facemasks cause negative social attention.	27 (13%)	30 (15%)
8) Other/ General/ Irrelevant	Other, general, or irrelevant comments.	21 (10%)	17 (8%)
9) Public Approval	Facemasks should not be worn without government or societal approval.	13 (6%)	14 (7%)
10) Social Barriers	Facemasks cause social interactions to be more difficult	8 (4%)	5 (2%)
11) Independence	Facemasks infringe upon freedom and independence	6 (3%)	22 (11%)
12) Uncaring about Others	Facemasks are not worn because people do not care about others	0 (0%)	17 (8%)

## STUDY 2 – EXPLORATORY FACTOR ANALYSIS AND VALIDITY TESTING

In Study 2, we subject our initial item list to exploratory factor analysis (EFA) to support the eight-dimension factor structure and reduce the initial item list to a more concise measure. Reducing the item list results in the FMPS, and we then assess its construct validity.

### Method

#### Participants

Participants ( $n = 745$ ,  $M_{\text{age}} = 36.76$ ,  $SD_{\text{age}} = 12.59$ , 45% female, 85% Western English-Speaking Countries) were recruited from MTurk and were provided US\$1.25. We included nine attention checks and removed participants' responses if they failed any. All statistics, including the reported sample size above, reflect the sample after removing these participants' responses.

#### Procedure

Participants enrolled into Study 2 via MTurk on 28 April 2020. They provided their informed consent and completed the first survey online (Time 1). One day later, they were emailed and completed the second survey (Time 2). Two days after the second survey, they were emailed and completed the third survey (Time 3).

#### Measures

Please refer to Appendix S2 for descriptions of all scales. At Time 1, we administered measures of *Face Mask Usage*, *Presence of Government Order to Wear Facemasks*, *Age*, and *Gender*. At Time 2, we administered the initial *Face Mask Perception Items*. At Time 3, we administered measures of *Coronavirus Seriousness Perceptions*, *Socializing in Public Behaviours*, *Health Safety Perceptions*, *General Face Mask Perceptions*, *Personal Health Perceptions*, *Doctor Visitation Perceptions*, and *Current Face Mask Usage*.

### Results

We analysed our item list via EFA using the recommendations of prior authors (Costello & Osborne, 2005; Fabrigar *et al.*, 1999; Howard, 2016). We applied a principal axis factoring method with direct oblimin rotation, as we expected our factors to be correlated. Our initial EFA supported an eight-factor solution (Appendix S4), but some items did not produce satisfactory results. We removed eight problematic items in a stepwise process, resulting in an intermediate list of 47 items. While these items produced adequate psychometric properties, our intent was to develop a more concise measure. We continued removing items with the lowest primary factor loading in a stepwise manner until four items remained for each factor. Our final factor structure can be found in Appendix S4. An eight-factor solution was again observed, and each item produced satisfactory factor loadings. We label these 32 final items as the FMPS (Appendix A).

We assessed the relation of the FMPS with other relevant variables (Table 2). Three variables reflected face mask wearing. None of the eight dimensions significantly

**Table 2.** Correlations and internal reliabilities

	Mean	SD	1	2	3	4	5	6	7	8
1) Comfort	4.13	1.70	.91, .91							
2) Efficacy Doubts	3.02	1.47	.35**	.85, .86						
3) Access	3.09	1.60	.23**	.22**	.86, .86					
4) Compensation	4.86	1.57	.27**	.24**	.25**	.86, .86				
5) Inconvenience	3.33	1.53	.50**	.43**	.35**	.36**	.83, .83			
6) Appearance	2.83	1.76	.46**	.42**	.27**	.27**	.58**	.97, .97		
7) Attention	2.82	1.65	.40**	.33**	.28**	.24**	.46**	.54**	.94, .94	
8) Independence	3.37	1.64	.36**	.43**	.25**	.47**	.48**	.44**	.48**	.89, .89
9) Gender	36.76	12.59	.10*	.07	.09	.04	-.02	-.00	-.08	-.13**
10) Age	.45	.50	.03	-.00	-.06	-.05	-.01	.02	-.12*	-.02
11) Gov't Order	.46	.50	-.07	-.07	-.12*	-.08	-.18**	-.10*	-.00	-.01
12) Older FM Use	.18	.39	-.02	-.03	-.02	.02	-.09	-.07	-.04	.01
13) Recent FM Use	.76	.43	-.06	-.28**	-.14**	-.19**	-.25**	-.19**	-.08	-.17**
14) CVirus Percept.	2.71	1.59	.16**	.44**	.03	.14**	.26**	.26**	.21**	.41**
15) Public Behaviours	1.93	1.11	.12*	.32**	.13*	.03	.23**	.24**	.20**	.31**
16) Safety Percept.	6.42	.81	-.10	-.37**	-.04	.01	-.24**	-.26**	-.16**	-.26**
17) GFM Percept.	5.23	1.43	-.24**	-.53**	-.08	-.17**	-.33**	-.34**	-.13*	-.25**
18) Health Percept.	4.51	1.17	.00	-.22**	.01	-.03	-.11*	-.13*	-.03	-.10
19) Doctor Percept.	3.55	1.66	-.20**	-.21**	-.13*	-.08	-.20**	-.16**	-.13*	-.16*
20) Current FM Use <sup>a</sup>	.79	.41	-.01	-.20**	-.14*	-.18**	-.22**	-.17**	.03	-.14*

Correlations above the first dotted line represent intercorrelations between the Face Mask Perceptions Scale (FMPS) dimensions (Time 2). Correlations between the two dotted lines represent the correlations between the FMPS and demographic variables (Time 1). Correlations below the second dotted line represent intercorrelations between the FMPS and Time 3 variables (Time 3). First number on diagonal is Cronbach's alphas, whereas the second number is McDonald's omegas. Gov't Order = Government Order for Face Mask Use; Older FM Use = Face Mask Use Prior to Six Months Ago; Recent FM Use = Face Mask Use within Past Six Months; CVirus Percept. = Perceptions of Coronavirus Dangers being Exaggerated; Public Behaviours = Socializing in Public Behaviours; Safety Perceptions = Positive Perceptions of Health Safety Behaviours; GFM Perceptions = General Positive Perceptions of Face Mask Usage; Health Perceptions = Positive Perceptions of Personal Health; Doctor Perceptions = Positive Perceptions of Doctor Visitation; Current FM Use = Face Mask Use within Prior Three Days.

Sample Sizes: Time 1,  $n = 745$ ; Time 2,  $n = 475$ ; Time 3,  $n = 393$ .

<sup>a</sup>Only calculated for participants indicating that they left their home within the past three days ( $n = 249$ ).

$p < .05$ ; \*\* $p < .01$ .

correlated to face mask wearing before the prior six months ( $p > .05$ ), but six of the eight dimensions significantly correlated to face mask wearing within the prior six months as well as the course of the study ( $p < .05$ ). The two dimensions that did not significantly relate to these two variables were comfort and attention. Further, six variables reflected general health perceptions and behaviours. Efficacy doubts had the strongest average correlation with each of these variables (average  $|r| = .35$ , all  $p < .01$ ). Inconvenience (average  $|r| = .23$ , all  $p < .05$ ) and appearance (average  $|r| = .23$ , all  $p < .05$ ) also significantly correlated to each of these variables, whereas attention (average  $|r| = .14$ , five  $p < .05$ ) and independence (average  $|r| = .25$ , five  $p < .05$ ) significantly correlated to most. Lastly, comfort (average  $|r| = .14$ , four  $p < .05$ ), access (average  $|r| = .07$ , two  $p < .05$ ) and compensation (average  $|r| = .08$ , two  $p < .05$ ) each had smaller and fewer significant relationships with these variables. Together, most of the FMPS dimensions significantly predicted recent face mask usage, but more variation was seen among the dimensions regarding their relation to general health perceptions and behaviours.

### STUDY 3 – CONFIRMATORY FACTOR ANALYSIS

We confirm the factor structure of the FMPS via confirmatory factor analysis (CFA).

#### Method

##### Participants

Participants ( $n = 327$ ,  $M_{\text{age}} = 36.46$ ,  $SD_{\text{age}} = 11.52$ , 43% female, 66% Western English-Speaking Countries) were recruited from MTurk and were provided US\$0.40. We included five attention checks and removed participants' responses if they failed any. All statistics, including the reported sample size above, reflect the sample after removing these participants' responses.

##### Procedure

Participants enrolled into Study 3 via MTurk on May 3, 2020. They provided their informed consent and completed the first survey online (Time 1). One day later, they were emailed and completed the second survey (Time 2).

##### Measures

At Time 1, we measured *age* and *gender*. At Time 2, we administered the *FMPS*.

#### Results

We followed the recommendations of prior authors to perform our CFA (Brown, 2015; Harrington, 2009). Although our eight face mask perception dimensions are measured via a single scale, we do not consider these dimensions to form a unitary construct. Instead, we conceptualize these dimensions as independent perceptions, and therefore, we modelled these dimensions as eight covaried latent factors – each with four indicators. No second-order factors were included.

Initially, our model fit indices (CFI = .86, IFI = .86, RMSEA = .09, SRMR = .07,  $\chi^2/\text{df} = 3.41$ ) fell short of recommended cut-offs (CFI  $\geq 0.95$ , IFI  $\geq 0.95$ , RMSEA  $\leq 0.08$ ,

SRMR  $\leq$  0.05,  $\chi^2/df \leq$  2.00). Five pairs of items had particularly strong modification indices ( $>10$ ) and loaded onto the same factor. When analysing the content of these pairs, each was near synonyms. We then covaried the error terms of these item pairs because they each loaded on common factors and their association could be clearly justified, which is a process recommended by prior authors (Brown, 2015; Harrington, 2009). The revised model fit indices each met or closely approached recommended cut-offs (CFI = 0.95, IFI = 0.95, RMSEA = 0.05, SRMR = 0.07,  $\chi^2/df = 1.86$ ). Each item strongly loaded onto its respective latent factor ( $\geq .48$ ), and full reporting of these factor loadings is included in Appendix S4.

## GENERAL DISCUSSION

Despite dramatic rises in coronavirus, those in Western societies appear reluctant to wear face masks (BBC, 2020a, 2020b). Our goal was to develop the FMPS to identify justifications for not wearing face masks. Via a three-study process, we developed a measure with satisfactory psychometric and validity evidence. We supported an eight-dimension structure via EFA and CFA, showing that face mask perceptions are complex. People may have many justifications for not wearing face masks, which poses several implications for research and practice.

Most broadly, the current results can be situated within the COM-B model to understand their association with behavioural change and relevant interventions (Michie *et al.*, 2011). The COM-B model synthesizes extant models of behavioural change and provides an organizing framework to identify and interlink behavioural sources, intervention functions, and policy categories. It identifies six behavioural sources, nine intervention functions, and seven policy categories. Face mask perceptions are a type of reflective motivation source, which involves evaluation and cognition in developing behavioural attitudes; reflective motivation sources are most closely associated with the intervention functions of education, persuasion, incentivization, and coercion; and these intervention functions are associated with each of the policy categories except environmental/social planning. Because several face mask perceptions significantly related to face mask wearing in the current study, future authors should utilize the COM-B model to develop face mask interventions associated with education, persuasion, incentivization, and coercion – the relevant intervention functions to reflective motivation sources (and the FMPS).

In developing these interventions, researchers should integrate frameworks associated with reflective motivation sources and these four intervention functions (Arden & Chilcot, 2020; Bish & Michie, 2010; Teasdale *et al.*, 2012). Notably, Bish, and Michie (2010) systematically reviewed determinants of prevention behaviours during a pandemic in response to H1N1 (swine flu). They discovered that predictors of protective behaviours differ based on whether the behaviour is preventive or avoidant, and they identified predictors of face mask wearing in the scope of preventive behaviours. These included demographic characteristics (gender, age, and marital status) and attitudes (perceived severity, perceived susceptibility, social pressure, and perceived efficacy) – the latter being a reflective motivation source. Only one of these antecedents, perceived efficacy, represents a perception identified in the current article, and thereby their model can be expanded by incorporating the other perceptions. Also, face mask perceptions may serve as mediators between certain antecedents and face mask wearing, as many of their antecedents (e.g., demographics, social pressure) are known to influence

perceptions (Wilson *et al.*, 1988). Identifying specific perceptions (and not others) as mediators may not only increase the sophistication of face mask research, but it would also identify which face mask perceptions may be susceptible to influences and useful to target via interventions. Lastly, Bish and Michie (2010) showed that some antecedents predicted other preventative behaviours but not face mask wearing. This finding suggests that not all relations of preventative behaviours can generalize to face mask wearing, emphasizing the need to replicate results regarding one type of preventative behaviour across each of the other types of preventative behaviours.

Similar assertions could be made for Teasdale *et al.*'s (2012) findings. These authors supported that, as predicted by protective motivation theory, threats and coping appraisals predict protective behaviours. Their experimental manipulations of threat and coping appraisals included the intervention functions of education, persuasion, incentivization, and/or coercion – aligning with the proposed associations of reflective motivation sources in the COM-B model. Future research could extend their findings to face masks by incorporating face mask perceptions as mediators of threats' and coping appraisals' effects on face mask wearing behaviours.

Additionally, interventions to encourage face mask wearing are not a 'one size fits all' approach. Instead, researchers should consider specific perceptions in developing interventions, and the most common perceptions may not be the most important to target. While comfort, for example, was among the most common perceptions reported by participants, it did not have significant relationships with face mask wearing. Other perceptions, such as efficacy concerns, may be more fruitful to address. Furthermore, face mask perceptions may be associated with differing theoretical frameworks. For instance, the perception of efficacy doubts may be relevant to theory associated with message framing and even fake news (e.g., prospect theory, parallel response theory; Effron & Raj, 2020; Gallagher & Updegraff, 2012; Murphy *et al.*, 2019), as perceptions regarding the efficacy of face masks may be largely developed via communicated information and misinformation. Other face mask perceptions, such as comfort, may be less relevant to these theoretical approaches, as perceptions of comfort may be more developed through embodied experiences than communicated information. These differences emphasize the need for future researchers to apply multiple theoretical frameworks to understand face mask perceptions and behaviours.

Future research should also replicate the current results and address our limitations. Although face mask perceptions likely differ between Eastern and Western populations, we did not perform any tests of measurement invariance (Van de Schoot *et al.*, 2012). The FMPS may not be appropriate for use with Eastern populations, and future research should assess this possibility. We also did not assess test–retest reliability, which would provide insights into the stability of face mask perceptions. Likewise, we did not explore participant reactions to items via think-aloud methods to identify problematic wording and cognitive burdens<sup>1</sup> (DeVellis, 2016; Howard, 2018; Presser & Blair, 1994), and such an assessment would provide insights into the ease (or difficulty) of completing the FMPS.

## **Conflicts of interest**

All authors declare no conflict of interest.

---

<sup>1</sup> We would like to thank the reviewer for identifying this future research direction.

## References

- Arden, M. A., & Chilcot, J. (2020). Health psychology and the coronavirus (COVID-19) global pandemic: A call for research. *British Journal of Health Psychology*, *25*, 231–232. <https://doi.org/10.1111/bjhp.12414>
- Aunger, R., Schmidt, W. P., Ranpura, A., Coombes, Y., Maina, P. M., Matiko, C. N., & Curtis, V. (2010). Three kinds of psychological determinants for hand-washing behaviour in Kenya. *Social Science & Medicine*, *70*, 383–391.
- BBC (2020a). *Coronavirus pandemic: Tracking the global outbreak*. BBC News. Retrieved from <https://www.bbc.com/news/world-51235105>
- BBC (2020b). *Coronavirus: Why is there a US backlash to masks?* BBC News. Retrieved from <https://www.bbc.com/news/world-us-canada-52540015>
- Bish, A., & Michie, S. (2010). Demographic and attitudinal determinants of protective behaviours during a pandemic: A review. *British Journal of Health Psychology*, *15*, 797–824.
- Bricker, D. (2020). *More people say they're wearing masks to protect themselves from COVID-19 since March*. Ipsos. Retrieved from <https://www.ipsos.com/en/more-people-say-theyre-wearing-masks-protect-themselves-covid-19-march>
- Brown, T. A. (2015). *Confirmatory factor analysis for applied research*. Guilford Publications.
- Buhrmester, M. D., Talafair, S., & Gosling, S. D. (2018). An evaluation of Amazon's Mechanical Turk, its rapid rise, and its effective use. *Perspectives on Psychological Science*, *13*, 149–154.
- CDC (2020). *Use of cloth face coverings to help slow the spread of COVID-19*. Centers for Disease Control and Prevention. Retrieved from <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/diy-cloth-face-coverings.html>
- Chen, S., Yang, J., Yang, W., Wang, C., & Bärnighausen, T. (2020). COVID-19 control in China during mass population movements at New Year. *The Lancet*, *395*, 764–766.
- Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation*, *10*(1), 7.
- DeVellis, R. F. (2016). *Scale development: Theory and applications*, Newbury Park, CA: Vol. 26. Sage Publications.
- Effron, D. A., & Raj, M. (2020). Misinformation and morality: Encountering fake-news headlines makes them seem less unethical to publish and share. *Psychological Science*, *31*(1), 75–87.
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, *4*(3), 272–299.
- Friedman, A. (2020). *Face masks are in*. The Atlantic. Retrieved from <https://www.theatlantic.com/politics/archive/2020/04/america-asia-face-mask-coronavirus/609283/>
- Gallagher, K. M., & Updegraff, J. A. (2012). Health message framing effects on attitudes, intentions, and behavior: A meta-analytic review. *Annals of Behavioral Medicine*, *43*(1), 101–116.
- Harrington, D. (2009). *Confirmatory factor analysis*. Oxford, UK: Oxford University Press.
- Howard, M. C. (2016). A review of exploratory factor analysis decisions and overview of current practices: What we are doing and how can we improve? *International Journal of Human-Computer Interaction*, *32*(1), 51–62.
- Howard, M. C. (2018). Scale pretesting. *Practical Assessment, Research, and Evaluation*, *23*(1), 5.
- Judah, G., Aunger, R., Schmidt, W. P., Michie, S., Granger, S., & Curtis, V. (2009). Experimental pretesting of hand-washing interventions in a natural setting. *American Journal of Public Health*, *99*(S2), S405–S411.
- Lam, B. C., Lee, J., & Lau, Y. L. (2004). Hand hygiene practices in a neonatal intensive care unit: A multimodal intervention and impact on nosocomial infection. *Pediatrics*, *114*, e565–e571.
- Long, H., Howells, K., Peters, S., & Blakemore, A. (2019). Does health coaching improve health-related quality of life and reduce hospital admissions in people with chronic obstructive pulmonary disease? A systematic review and meta-analysis. *British Journal of Health Psychology*, *24*, 515–546.

- Mellis, A. M., & Bickel, W. K. (2020). *Mechanical Turk data collection in addiction research: Utility, concerns and best practices*. *Addiction*.
- Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, 6(1), 42.
- Murphy, G., Loftus, E. F., Grady, R. H., Levine, L. J., & Greene, C. M. (2019). False memories for fake news during Ireland's abortion referendum. *Psychological Science*, 30, 1449–1459.
- Nicholson, J. A., Naeeni, M., Hoptroff, M., Matheson, J. R., Roberts, A. J., Taylor, D., . . . Wright, R. L. (2014). An investigation of the effects of a hand washing intervention on health outcomes and school absence using a randomised trial in Indian urban communities. *Tropical Medicine & International Health*, 19, 284–292.
- Ogden, J. (2012). *Health psychology: A textbook: A textbook*, New York City, NY: . McGraw-Hill Education.
- Presser, S., & Blair, J. (1994). Survey pretesting: Do different methods produce different results? *Sociological Methodology*, 24, 73–104.
- Robinson, J., Rosenzweig, C., Moss, A. J., & Litman, L. (2019). Tapped out or barely tapped? Recommendations for how to harness the vast and largely unused potential of the Mechanical Turk participant pool. *PLoS One*, 14(12), e0226394
- Teasdale, E., Yardley, L., Schlotz, W., & Michie, S. (2012). The importance of coping appraisal in behavioural responses to pandemic flu. *British Journal of Health Psychology*, 17(1), 44–59.
- Van de Schoot, R., Lugtig, P., & Hox, J. (2012). A checklist for testing measurement invariance. *European Journal of Developmental Psychology*, 9, 486–492.
- Wang, C., Horby, P. W., Hayden, F. G., & Gao, G. F. (2020). A novel coronavirus outbreak of global health concern. *The Lancet*, 395, 470–473.
- Wilson, D. K., Purdon, S. E., & Wallston, K. A. (1988). Compliance to health recommendations: A theoretical overview of message framing. *Health Education Research*, 3, 161–171.

Received 12 May 2020; revised version received 24 May 2020

### Supporting Information

The following supporting information may be found in the online edition of the article:

**Appendix S1.** All datasets for the current submission, but the submission manager would not allow.zip files to be uploaded.

**Appendix S2.** Complete Reporting of Studies 1, 2, and 3.

**Appendix S3.** Original, Intermediate, and Final Face Mask Perception Scale (FMPS) Items.

**Appendix S4.** Exploratory factor analysis results.

### Appendix A:

#### Face Mask Perceptions Scale (FMPS)

Please indicate the extent to which you disagree to agree with the following statements regarding face masks, which refers to cloth coverings worn on the face typically intended to prevent the spread of disease and illness. Answer each of the following items as if they began with: When I do not wear a face mask in public, it is because.

### **Comfort**

1. Face masks disrupt my breathing.
2. It is difficult to breathe when wearing a face mask.
3. Face masks cause me to overheat.
4. Face masks get too hot.

### *Efficacy Doubts*

1. Face masks provide few health benefits.
2. Face masks just provide a false sense of security.
3. Face masks are ineffective.
4. Face masks are unsafe because they force you to touch your face.

### *Access*

1. I do not know where to buy a face mask.
2. There is nowhere for me to buy the proper type of face mask.
3. It is difficult to get a face mask.
4. Face masks are too expensive.

### *Compensation*

1. I stay away from people when I go out.
2. I already social distance.
3. I can avoid people when I go out anyways.
4. I only go out for a short period of time.

### *Inconvenience*

1. I do not like remembering to wear a face mask.
2. I forget to wear a face mask when going out.
3. Wearing a face mask is too much of a hassle.
4. It is hard to develop the habit of wearing a face mask.

### *Appearance*

1. Face masks look dumb.
2. Face masks look silly.
3. Face masks are ugly.
4. Face masks look weird.

### *Attention*

1. Face masks make people seem untrustworthy.
2. Face masks make people look suspicious.
3. Face masks make others uncomfortable.
4. Face masks make other people feel uneasy.

### *Independence*

1. I do not like feeling forced to do something.
2. I do not like blindly following suggestions.
3. I value my independence.

4. I want to prove a point against authority.

Note When administering scale, do not include dimension labels.

## **Appendix B:**

### ***Non-Validated Scales Administered in Study 2***

#### ***Coronavirus Perceptions***

1. Concerns regarding coronavirus are overblown.
2. There is currently too much panic around coronavirus.
3. Coronavirus is not as dangerous as the media claims.
4. People should not be worried about coronavirus.

#### ***Socializing in Public Behaviours***

1. I have been going out in public regularly despite coronavirus.
2. I have found it impossible to properly self-isolate.
3. I have been seeing friends despite coronavirus.
4. I have been doing to social functions despite coronavirus.
5. I have been doing shopping for fun despite warnings about coronavirus.

#### ***Health Safety Perceptions***

1. People should thoroughly wash their hands whenever they go out because of coronavirus.
2. People should stay six feet apart when out in public due to coronavirus.
3. People should limit their trips to the store because of coronavirus.
4. People should stay at home due to coronavirus.
5. People should not touch others (e.g., shake hands) due to coronavirus.
6. People should take extra safety precautions due to coronavirus.

#### ***Face Mask Perceptions***

1. It is a good idea to wear a face mask due to coronavirus.
2. It is a good idea to wear a face mask in general.
3. People should wear face masks in public.
4. Wearing face masks should be more popular.