



Gender, face mask perceptions, and face mask wearing: Are men being dangerous during the COVID-19 pandemic?

Matt C. Howard*

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



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ABSTRACT

Recent popular press authors have proposed that men are less likely to wear face masks during the COVID-19 pandemic. We investigate this notion in the current article by analyzing three extant datasets. We also assess the mediating effect of eight different face mask perceptions in the relation between gender and face mask wearing via the Face Mask Perceptions Scale. Across the three datasets, the sample-size weighted meta-analytic correlation between gender and face mask wearing was not statistically significant, and no face mask perception was a consistent mediator of this effect. Gender did have significant relations with two face mask perceptions, however. Men were more likely to perceive face masks as infringing on their independence, whereas women were more likely to perceive face masks as uncomfortable. Therefore, although gender does not relate to whether a person wears a face mask, it does relate to face mask perceptions. We offer several suggestions for research and practice from these results, such as the positioning of face mask wearing alongside passive health behaviors, the broader study of face mask perceptions' outcomes beyond face mask wearing, as well as the creation of interventions to target differing face mask perceptions across genders.

1. Introduction

To date, the COVID-19 pandemic has resulted in 1,000,000 deaths worldwide (Wood et al., 2020). Because no end to the pandemic is currently in sight, public health officials have called for the widespread adoption of preventative behaviors that can curb the spread of COVID-19. Among the most effective preventative behaviors is face mask wearing, which has been extensively supported to reduce airborne transmission of viruses (Leung et al., 2020; O'Dowd et al., 2020); however, many people are resistant to face mask wearing despite the effectiveness of the practice, which poses extreme risks in the context of the COVID-19 pandemic (Howard, 2020; Lyu & Wehby, 2020). These risks are exponentially heightened as more people refuse to wear face masks, because each unmasked person multiplicatively increases the likelihood of infecting each other (Howard et al., 2020). For these reasons, it is important to understand the antecedents of face mask wearing that can identify avenues to encourage the practice.

Many popular press authors have suggested that men are less likely to wear face masks than women (Haischer et al., 2020; Vershbow,

2020).¹ Men are known to engage more in risky active health behaviors² than women, such as smoking, drinking, and drug use (Finucane et al., 2000; Hughes et al., 2016; Minugh et al., 1998), but men and women are known to engage in similar amounts in passive health behaviors, such as vaccinating and presenteeism (Flanagan et al., 2017; Miraglia & Johns, 2016). Some limited research also supported that men and women reported similar face mask wearing willingness and behaviors surrounding the SARS pandemic (Barr et al., 2008; Bish & Michie, 2010; Brug et al., 2004), but such preventative measures were not formally recommended by most governments during this time and such gender differences would be difficult to observe due to low base-rates (Hair et al., 2019). It is therefore unclear whether men would indeed be less likely to wear face masks during the COVID-19 pandemic. To aid in understanding the relation of gender and face mask wearing, we investigate face mask perceptions due to their pivotal role in behavioral decision making (Ajzen, 1991).

Howard (2020) recently developed the eight-dimension face mask perception scale (FMPS) and supported that face mask perceptions are important in understanding face mask wearing. We stress the relevance

* 5811 USA Drive S., Rm. 337, Mitchell College of Business, University of South Alabama, Mobile, AL, 36688, USA.

E-mail address: MHoward@SouthAlabama.edu.

¹ It is recognized that gender is a spectrum and encompasses more than “male” and “female”. For the conciseness of our writing, however, we only refer to men and women when discussing gender differences.

² We use the terms active and passive health behaviors, but other terms can also be used for these categories of health behaviors. Active health behaviors can also be called approach-oriented or stimulation-seeking behaviors. Passive health behaviors can also be called avoidance-oriented, protective, or preventative behaviors.

of gender to two perceptions. First, one of Howard's (2020) eight face mask dimensions is the perception that face masks infringe upon the wearer's independence. Desires for independence are deeply integrated into notions of masculinity within Western societies, such that men are conditioned to even resist help from others (Smith et al., 2007). Some authors have argued that the extreme demand for independence is a central aspect of toxic masculinity (Jones et al., 2019), and we therefore expect men to have stronger perceptions of face masks infringing upon independence. Second, popular press outlets have also suggested that women find face masks less comfortable than men (Porterfield, 2020; Pugh, 2020). Many face masks are designed to be worn by both men and women (e.g., one-size-fits-all), but their sizes may be too large for most women. For this reason, women may have a worse perception of comfort regarding face masks. Lastly, due to the integral relation of perceptions and behaviors (Ajzen, 1991), we suggest that face mask perceptions mediate the relation of gender and face mask wearing. We do not propose a firm hypothesis regarding the direction of these indirect effects, as the perceptions are not overwhelmingly associated with masculinity or femininity. Nevertheless, by testing the role of this explanatory mechanism, we provide a more complete depiction of differences in face mask wearing between the genders.

From these efforts, the current investigation poses many benefits for research and practice. First, we identify a potential population (i.e., men) that may be particularly susceptible to not wearing face masks, and future interventions could be created to encourage this population to wear face masks and reduce the spread of COVID-19. Second, the current article assesses several popular press assertions regarding face masks, such as differences between genders and perceptions of women. The current results provide insights regarding the accuracy of these claims and whether they should be used for subsequent investigations or dismissed entirely. Third, if no relation is supported between gender and face mask wearing, then the current results would provide further support that face mask wearing is a passive health behavior – even in the context of the COVID-19 pandemic. Fourth, the FMPS was very recently developed, and the current article can provide further support for the importance of perceptions in understanding face mask wearing. Fifth, by using the FMPS, we identify specific perceptions (e.g., independence, comfort) that can be targeted in interventions to increase face mask wearing in certain populations. Sixth, our results provide insights into theoretical lenses that may be beneficial for the study of face mask wearing (e.g., toxic masculinity; Kupers, 2005) as well as the role of gender in broader models of health behaviors (e.g., COM-B; Michie et al., 2011).

2. Method

The current article utilizes three extant datasets to investigate our research questions. The first two were previously used for Study 2 and Study 3 in Howard (2020), whereas the third was used for Study 1 in Howard (Revise & Resubmit). Neither of these articles incorporated gender into their analyses, allowing the current article to provide entirely novel inferences.

2.1. Participants and procedure

Participants in all three datasets were recruited from MTurk and provided monetary compensation. All surveys included multiple attention checks, and participants were removed from analyses if they failed any. All statistics, including the reported sample sizes below, reflect the sample after removing these participants' responses.

Dataset 1. Participants ($M_{\text{age}} = 36.76$, $SD_{\text{age}} = 12.59$, 45% female, 85% Western English-speaking countries) enrolled into the study via MTurk on 28 April 2020, provided their demographic information, and answered an item regarding face mask wearing within the past six months ($n = 745$). One day later, they completed a second survey that included items regarding face mask perceptions ($n = 475$). Two days

after the second survey, they completed a third survey that included an item regarding face mask wearing within the past three days ($n = 393$).

Dataset 2. Participants ($M_{\text{age}} = 36.46$, $SD_{\text{age}} = 11.52$, 43% female, 66% Western English-speaking countries) enrolled into the study via MTurk on 3 May 2020 and provided their demographic information ($n = 667$). One day later, they completed a second survey that included items regarding face mask perceptions ($n = 327$).

Dataset 3. Participants ($M_{\text{age}} = 36.97$, $SD_{\text{age}} = 12.14$, 50% female, 86% Western English-speaking countries) enrolled into the study via MTurk on 25 June 2020 and provided their demographic information ($n = 567$). One week later, they completed a second survey that included measures not discussed in the current article ($n = 317$). One week after the second survey, they completed a third survey that included items regarding face mask perceptions ($n = 251$). One week after the third survey, they completed a fourth survey that included items regarding face mask wearing ($n = 209$).

2.2. Measures

Gender. Participants were asked to report their gender as “Male” (0), “Female” (1), or “Other”. Those who responded as Other could type their gender. Not enough participants responded as Other to include in analyses, and thereby these responses were removed.

Face mask wearing. The face mask wearing items were slightly different across the three datasets. In Dataset 1, participants were given the following two items: “Have you worn a face mask in public within the past six months?”, and, “Have you worn a face mask in public since the first survey (three days ago)?” Participants could answer, “Yes” (1), or, “No” (0). For the second item, analyses were restricted to only those who responded affirmatively to the item, “Have you gone in public since the first survey (three days ago)?”. In Dataset 2, no face mask wearing items were administered. In Dataset 3, participants were given three items that read, “Within the past [six months/three weeks/week], how often have you worn a face mask when going into public?”. Participants responded on a 1 (Never) to 7 (Every Time) frequency scale, and they were also given the option, “N/A – I did not go into public during this time”.

Face mask perceptions. The FMPS was administered (Howard, 2020), which includes four items for each of the eight dimensions. The scale's instructions read: “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...” Example items are, “I value my independence” (independence), and, “Face masks disrupt my breathing” (comfort). Higher scores for each dimension represent more negative face mask perceptions.

3. Results

Correlations of gender with face mask wearing and face mask perceptions are provided in Table 1. We provide correlations among these variables for each individual dataset, but we also provide the sample-size weighted correlations that average the effects across the three datasets using a random-effects meta-analytic model. Using this approach, gender did not have a statistically significant relation with face mask wearing ($\bar{r} = 0.04$, 95% C.I. [-0.05, 0.12], $n = 698$). It did, however, have significant relations with two face mask perceptions. Men were significantly more likely to perceive face masks as infringing upon their independence ($\bar{r} = -0.10$, 95% C.I. [-0.16, -0.03], $n = 1038$), and women were significantly more likely to perceive face masks as uncomfortable ($\bar{r} = 0.12$, 95% C.I. [0.06, 0.18], $n = 1038$). Supplemental Material A includes analyses assessing the mediating effect of face mask perceptions between the relation of gender and face mask wearing, which were conducted using Hayes's (2017) PROCESS

Table 1
Correlations of gender with face mask perceptions and behaviors.

	Dataset 1	Dataset 2	Dataset 3	\bar{r}
1.) Comfort	0.10*	0.10	0.20**	0.12**
2.) Efficacy	0.07	-0.00	0.04	0.04
3.) Accessibility	0.09	0.07	-0.02	0.06
4.) Compensation	0.04	-0.06	0.02	0.00
5.) Inconvenience	-0.02	-0.03	0.05	-0.01
6.) Appearance	-0.00	-0.08	-0.02	-0.03
7.) Attention	-0.08	-0.15**	0.03	-0.07
8.) Independence	-0.13*	-0.08	-0.05	-0.10**
9.) Worn within past six months	-0.02 ^a	-	0.10 ^b	0.03 ^c
10.) Worn within past three days	0.05 ^d	-	-	0.05 ^d
11.) Worn within past three weeks	-	-	0.05 ^b	0.05 ^b
12.) Worn within past week	-	-	0.07 ^b	0.07 ^b
N of perceptions correlations (1–8)	463	324	251	1038

Note: Sample sizes reported above may slightly differ from sample sizes reported in-text due to participants not providing their gender. Person correlation were calculated for individual studies. Sample-size weighted average of all correlations between gender and face mask wearing was 0.04 (95% C.I. [-0.05, 0.12], Z -value = 0.85, p = .39, n = 698).

\bar{r} = sample-size weighted average correlation.

For the coding of gender, Male = 0 and Female = 1.

* $p < .05$

** $p < .01$

^a Represents a sample size of 742 due to being measured at Time 1.

^b Represents a sample size of 205 due to being measured at Time 2.

^c Represents a sample size of 947 due to not including an effect size for Dataset 2.

^d Only includes responses of participants who went into public within the past three days, which resulted in a sample size of 243.

macro that provides bootstrapped estimates of effects. No indirect effect was consistently significant (1 of 50 analyses), including both the total indirect effect as well as the individual indirect effects via each dimension. Therefore, while gender does relate to certain face mask perceptions, it does not have a relation with face mask wearing whether directly or indirectly.

Lastly, we replicated all analyses while controlling for whether the participants' location enforced a face mask ordinance at the time of their final survey (Supplemental Material B), as this could have influenced their responses. All significant results in our primary analyses remained significant in these supplemental analyses, and all non-significant results remained non-significant. These supplemental analyses suggest that our findings are robust.

4. Discussion

Our goal was to provide novel insights regarding the relations of gender, face mask perceptions, and face mask wearing. We did not find significant direct or indirect effects between gender and face mask wearing, indicating that men and women are equally likely to wear face masks during the COVID-19 pandemic. We did, however, support that men and women have differing perceptions of face masks. Men were more likely to perceive face masks as infringing upon their independence, whereas women were more likely to perceive face masks as being uncomfortable. These results provide many implications for research and practice.

While men take greater active health risks (Finucane et al., 2000; Minugh et al., 1998), men and women perform similar amounts of passive health risks (Flanagan et al., 2017; Miraglia & Johns, 2016). The current results provide further support that face mask wearing is a passive health behavior, even in the context of the COVID-19 pandemic, and face mask wearing should thereby be associated with other passive health behaviors. For instance, future research should generalize prior results on vaccination and presenteeism rather than drinking and drug use to the study of face mask wearing. We suggest that adapting prior

models of vaccination willingness could be particularly beneficial, as prior authors have already applied a variety of theories to better understand this health behavior (e.g., protection motivation theory; Liu et al., 2016).

Further, the current results speak towards the role of masculinity and toxic masculinity in the context of health behaviors. Both are associated with a pronounced desire for independence (Kupers, 2005), which is likely the cause for the association between gender and perceptions of face masks infringing upon independence. Future research should extend these findings in two manners. Researchers should assess whether perceptions of independence explain the relation of gender and other health behaviors. Men may be, in part, more likely to perform certain risky health behaviors because they are counter-cultural, and men may enjoy feelings of independence from performing them. Also, researchers should test whether other aspects of masculinity and toxic masculinity predict health behaviors, such as the fear of appearing weak (Kupers, 2005). Men may be more likely to perform risky active health behaviors because they are dangerous, thereby implying that they are strong and capable of performing dangerous activities. Research has already supported a link between masculinity and risky active health behaviors (Capraro, 2000; Mullen et al., 2007), and future researchers should therefore apply modern gender theory to better understand perceptions surrounding health behaviors, including face mask wearing.

The current results can also improve our understanding of gender, perceptions, and behaviors in broader models of health behaviors, such as the COM-B model (Michie et al., 2011). This model identifies the interrelationships between behavioral sources, intervention functions, and policy categories in understanding health behaviors. Howard (2020) positioned face mask perceptions in the COM-B model by starting,

“Face mask perceptions are a type of reflective motivation source, which involves evaluation and cognition in developing behavioral 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.” (p. 8).

Generally absent from the COM-B model is the role of individual differences, which are not present in the statement above. The current results therefore suggest that the predictive ability of the COM-B model can be improved by integrating the role of individual differences, such as gender, because such aspects significantly related to perceptions. We urge future authors to perform further integrations of individual differences with the COM-B model, which could be aided by novel experimental and intervention-creation designs (e.g., multiphase optimization strategy [MOST], sequential multiple assignment randomized trial [SMART]; Howard & Jacobs, 2016). MOST and SMART can identify the influence of individual differences on health behaviors, but they can also analyze any effects of interventions on health behaviors that are dependent on individual differences. Men and women may respond differently to face mask interventions due to their differing perceptions, which can be analyzed via MOST and SMART.

Several additional avenues for future research are also uncovered by our results. The relation of gender and face mask wearing may differ across contexts, as unobserved moderating influences may alter the relation of gender and face mask wearing. We suggest that one possible moderating influence is political orientation. Face mask wearing has become a source of political contention in many countries (Adolph et al., 2020). In the United States, for example, President Donald Trump claimed that some Americans wear face masks as a signal of disapproval towards him (Lovell, 2020). While political orientation may have direct effects on face mask perceptions and wearing, we suggest that it may also produce moderating effects. For instance, conservative men may have an even stronger need for independence; their political

orientation may exacerbate their sense of masculinity, which are both intertwined with notions of independence (Kupers, 2005). If the case, conservative men may be particularly sensitive to perceptions of subservience produced by wearing face masks, and they would be less likely to wear face masks than conservative women, liberal women, and liberal men. Therefore, the antecedents of face mask wearing may be quite complex, and a non-significant overall relation should not preclude subsequent research on an antecedent effect.

It is also important to highlight that, although gender did not indirectly relate to face mask wearing via perceptions, it did significantly relate to certain face mask perceptions. Face mask perceptions may relate to broader outcomes than face mask wearing. Because face masks have become a politicized topic in many countries, it is likely that people share extensive word-of-mouth regarding face masks' appearance, efficacy, and other topics (Adolph et al., 2020; Lovelace, 2020). People may also act as "social police", wherein they criticize others based on their personal perceptions of face masks. For this reason, gender may not significantly relate to personal face mask wearing, but it may relate to word-of-mouth regarding face masks and subsequently others' face mask wearing behaviors. Future research should therefore investigate both the broader relations of face masks perceptions as well as the role gender in such relations.

In conducting these future studies, researchers should analyze longitudinal trends in the relations of face mask perceptions and wearing, especially in the context of the continuing COVID-19 pandemic. The relation of gender and independence weakened across the three datasets, which were collected approximately one month apart. Men may feel that their independence is less threatened as the pandemic continues. At the same time, we observed stronger relations of gender and the perception of comfort as time progressed across the datasets. Unlike men and independence, the discomfort of wearing face masks may grow for women as they are expected to wear them for longer periods of time. These differences were not statistically significant in unreported moderation analyses, but it is possible that predictors of face mask perceptions and wearing, such as gender, may further change as additional time progresses. Such considerations are important for the development of face mask interventions. Practitioners should be aware that interventions designed to target a specific face mask perception may have differing efficacy at a later date.

The current results also pose many implications for the development of face mask interventions. The null relation between gender and face mask wearing suggests that neither gender is more beneficial to target via interventions to promote face mask wearing. The significant relation between gender and specific face mask perceptions, however, suggests that certain interventions may be more effective at altering specific perceptions of men or women. For men, interventions should focus on the notion of independence, which has been discussed in some popular press outlets (Duarte, 2020; Vershbow, 2020). Specifically, these outlets have argued that face mask wearing has become a threat to masculinity for certain men (e.g., "e-mask-ulating"), and these men perceive mask wearing as a symbol of subservience. To counteract this notion, interventions directed towards men should reinforce their masculinity and strength, perhaps in a similar manner to public service announcements after the creation of the seatbelt.

Alternatively, interventions for women may need to be more practical. That is, women's perception that face masks are uncomfortable may be because face masks are indeed uncomfortable for women. Face masks are often designed as "one size fits most", but one size may not fit all comfortably. Manufacturers of face masks should investigate whether face masks in different sizes and/or shapes may be more comfortable for women, which could increase the adoption of face masks by women. If such a mask were developed, then interventions could be created to alter the perception that face masks are uncomfortable for women.

Lastly, future researchers should also replicate the current results by addressing our limitations. We considered gender a dichotomy, but

gender exists on a spectrum (Cameron & Stinson, 2019). Future research should assess gender using a continuous format. Similarly, we allowed participants to report their gender as "Other", but we did not obtain enough Other responses to analyze this population. Future research should reassess our results using samples with greater gender diversity. Also, while our sample represented participants from many different countries, future research should replicate our results using more geographically diverse samples. These researchers should also assess person-context interactions, as certain individual differences, such as gender, may more strongly predict face mask wearing and behaviors in certain geographic locations and cultural contexts. Lastly, we measured face mask wearing via a self-report measure, but different results may have been obtained if we measured face mask wearing via an observational or other-report design. A future study should re-investigate the current findings with these alternative measurement approaches, which can support the robustness of our results. Therefore, while the current article provides many insights into the relation of gender and face mask wearing, it should only be the first of many studies on the topic.

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CRedit authorship contribution statement

Dr. Matt C. Howard completed all portions of the current manuscript.

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