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Men's attitudes toward mask-wearing during COVID-19: Understanding the complexities of mask-ulinity

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Abstract

Path analyses indicated that the relationship between conformity to masculine norms (CMN) and attitudes toward mask-wearing to protect from COVID-19 was mediated by perceived benefits, perceived barriers, confidence in the scientific community, and empathy toward vulnerable persons, and that political ideology moderated the indirect effects from CMN to men's attitudes. Efforts to improve men's participation in combatting COVID-19 should address the perceptions and attitudes related to conforming to traditional masculine norms and moderated by political ideology, and might reconstruct masculinity to focus on being a guardian and protector of public health.

The COVID-19 pandemic is the greatest public health crisis in a century. To reduce infections and mitigate the spread and impact of the pandemic, public health organizations such as the World Health Organization and the Center for Disease Control and Prevention (CDC) have provided guidance for everyday actions that persons can take to protect themselves and others. Despite widespread international success implementing these guidelines which have helped other countries reach very low infection and mortality rates at the time of writing, the United States continues to experience high rates of infection in various parts of the country, largely due to the variability in Americans' adoption of the CDC's recommendations, such as wearing masks, at both individual and community levels.

Men, in particular, seem to be less willing to wear masks, with research reporting they do not intend to wear masks as much as women (Capraro and Barcelo, 2020). This is consistent with research that women report greater social distancing, handwashing, and mask-wearing (Okten et al., 2020), along with previous findings on gender differences in adopting recommended practices during past pandemics

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(Condon and Sinha, 2010; Lau et al., 2010). One explanation offered by recent research supports the role played by traditional masculine norms in not wearing masks, reporting that men are more likely to feel stigma from wearing a mask because doing so is viewed as a sign of weakness (Capraro and Barcelo, 2020). This is consistent with media reports about President Trump and other men who are local and national leaders who have been notably reluctant to endorse or model mask wearing, as well as other CDC-recommended practices such as physical distancing, because they are concerned about being seen as weak or unmasculine (Glick, 2020). This phenomenon about masculinity and COVID-19 related health behaviors should not come as a surprise, as it represents a new manifestation of patterns evident in the research literature on masculinity and general health risk behaviors. That is, research reports consistent links between the endorsement of traditional masculine norms and engagement in risky health behaviors in men (e.g. Iwamoto et al., 2011; Levant and Wimer, 2014; Mahalik et al., 2007, 2015). This body of research points to understanding masculinity as a social construct that incorporates health risk behaviors as an integral part of what it means to be a man (Courtenay, 2000). Put another way, "to 'be' or act like a man is to show a lack of concern for care of the self. . ." (Courtenay, 2000: 192). Applying this concept to the guidance suggested by the CDC, we expect that men who conform more to traditional masculinity norms (e.g. be self-reliant, emotionally controlled) will have more negative attitudes toward mask wearing.

Pathways to adopting CDC recommendations: Men's health beliefs, trust in science, and empathy

Although research on conforming to traditional masculinity norms (CMN) and health practices typically reports significant relationships between CMN and health risk behaviors, this direct relationship may not be a comprehensive explanation of men's rejection of recommended health practices. It may instead be the case that CMN could relate to men's health practices indirectly through other factors that arise from conforming to traditional masculine norms. For example, the Health Belief model (Becker, 1974; Becker and Rosenstock, 1984), supported by a substantial research literature (Carpenter, 2010), posits that people are more likely to adopt recommended health practices if they believed those practices would produce benefits (e.g. keep their loved ones healthy, end the pandemic) that outweigh their perceived barriers/costs (e.g. inconvenience, wearing masks makes one look weak or afraid). Research examining men's health beliefs finds CMN to be associated with perceiving fewer benefits to healthy behaviors (Mahalik and Burns, 2011). As such, health beliefs about the benefits of, and barriers to, following CDC recommendations should relate to men's health practices and attitudes toward mask wearing, such that higher levels of CMN may be associated with being less likely to view mask-wearing as beneficial as well as perceiving more barriers to wearing masks (e.g. fear of stigma or being perceived as weak).

Similarly, one's trust and confidence in scientific experts and the perceived value of science-informed health policy has also been reported to relate to whether persons follow scientific recommendations concerning the pandemic (Plohl and Musil, 2020). We believe that negative reactions to scientific expertise may arise from traditional masculine norms for men who view masculinity as being in control and having power because they may be less willing to "surrender control" to experts or let others make decisions for them. Relatedly, conforming to traditional masculine norms has also become intertwined with anti-intellectualism that portrays scientific experts in feminized terms (Read, 2018) and "laddism" where school-aged boys make a public show of not investing in education because learning is effeminate (Jackson, 2003; Willis, 1981). As such, confidence in scientific experts about the CDC recommendations should relate to men's attitudes toward mask wearing, but higher levels of CMN may be associated with men not

having confidence in those scientific experts and therefore being less likely to be receptive to following public health recommendations.

Another variable of interest to COVID-19 health practices is whether people have empathy for persons who are vulnerable to COVID-19. Feeling concern about other people who are especially vulnerable to the virus (e.g. high-risk groups and communities, pre-existing conditions) should relate to being more likely to take actions to protect them. Recent research supports this finding that feelings of empathy for vulnerable persons significantly related to the motivation to self-quarantine, staying in isolation if infected, maintaining social distance, and following rules imposed by the government (Pfattheicher et al., 2020). Although there is limited research on CMN and empathy, some research indicates that greater endorsement of masculine beliefs is negatively related with empathy (Gabbiadini et al., 2016). This would be consistent with scholarship that describes the masculine socialization process as emphasizing emotional and interpersonal disconnection from others (Chu and Gilligan, 2019; Way, 2011). Thus, empathy for persons who are vulnerable to COVID-19 should relate to men's attitudes toward mask wearing, but higher levels of CMN may be associated with men having less empathy for vulnerable persons and therefore being less likely to follow and have positive attitudes toward public health recommendations.

Masculinity and politics: Political ideology as a moderator

One of the complicating factors to gaining a handle on the COVID-19 virus in the U.S. is the politicization of efforts to combat the virus in the United States. In a survey in mid-March of 2020, Kushner Gadarian et al. (2020) reported that political affiliation was the strongest predictor of whether persons followed public health recommendations, with Democrats more likely than Republicans to wash hands, buy hand sanitizer, and maintain social distancing. Although the differences in behaviors have grown smaller between political ideologies as

the virus spread across the country, Democrats remained more likely to have followed social distancing recommendations (Kaiser Family Foundation, 2020). As there is consistent evidence that more traditionally masculine men tend to endorse more conservative political ideologies (Winter, 2010), we anticipate that political ideology will moderate the relationship between masculinity and the mediators (i.e. benefits, barriers, confidence in scientific experts, and empathy for vulnerable persons) in predicting men's attitudes toward mask wearing. Specifically, we anticipate that CMN will indirectly relate to health behaviors and attitudes as described above, but that those relationships will differ as a function of political ideology, with politically conservative men who are more conforming to traditional masculine norms reporting fewer benefits to the recommendation, more barriers to enacting recommendations, less confidence in scientific experts, and less empathy for persons vulnerable to the COVID-19 virus (See Figure 1).

Thus, masculinity, health beliefs, confidence in scientific experts, empathy toward the vulnerable, and political ideology may, when taken together, account for men's attitudes toward mask-wearing. However, the complex ways in which these factors may operate together remains unclear. The purpose of the present study is to clarify these relationships by testing the following hypotheses: (1) CMN will be significantly related to perceived benefits, perceived barriers, confidence in scientific experts, and empathy to persons vulnerable to COVID-19, (2) CMN's relationship attitudes toward mask wearing will be mediated by these four variables, (3) the four mediators will be significantly related to attitudes toward mask-wearing, (4) political ideology will moderate the indirect effect of masculinity on attitudes through the mediators, and that (5) demographic characteristics including age, race, education, and income, as well as whether persons are in high-risk categories and whether their local government and work setting have mandated health policies, will relate to both mediators as well as attitudes toward mask-wearing.
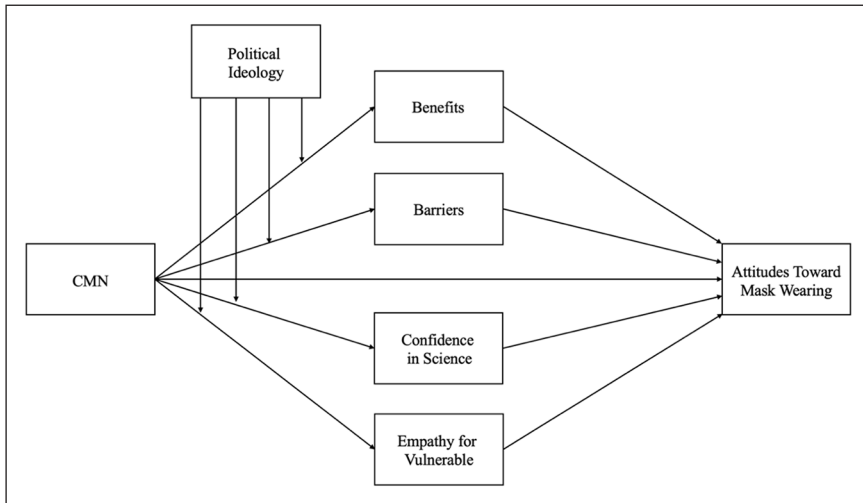
Figure 1. Conceptual model for moderated mediation hypotheses.

Method

Sample

Six-hundred thirty-one responses to our online survey were submitted. Reviewing cases for missing data and failed attention checks indicated that three cases were missing at least 50% of their data on at least one scale, 19 cases failed the first attention check, and 22 failed the second attention check. Considering these review criteria together, 35 cases were identified and eliminated, which led to a final analytic sample size of 596 participant men who ranged in ages from 18 to 78 years old ($M = 31.33$, SD = 10.59). Participants were mostly heterosexual (91.76%; 4.2% gay; 3.7% bisexual), White or European-American (68.2%; multi-racial 3.37%; 19.19% Asian or Asian-American; 6.01% African-American; and 9.43% Latino/Hispanic), and never married (65.54%; 31.76% married; 1.68% divorced). Participants were sampled from 49 states in the U.S., and their education ranged from no formal schooling to earning a doctoral degree, with the modal education category representing completion of a bachelor's degree. Annual income ranged from less than $9525 to over $200,000, with the modal income in the range of $38,701–$60,000. Participants were recruited in mid-August 2020 when 7-day average of cases were approximately 50,000 per day in the United States (New York Times, 2020).

Measures

Attitudes toward wearing face-masks. We developed seven questions to assess participants' attitudes toward wearing face-masks or facial coverings. Participants read: "The CDC recommends wearing a mask or facial covering when you are around people who don't live in your household" and were then asked to answer their level of agreement on a scale of 1 (*Strongly Disagree*) to 6 (*Strongly Agree*) for each statement. Example items include "I am comfortable being seen wearing a mask," "Wearing a mask shows that you are scared," and "I feel wearing a mask is part of my civic duty to protect others." Three items were reverse scored, then items were summed to create a total score with higher scores indicating more positive attitudes toward mask-wearing. In this sample, α was 0.77.

Conformity to traditional masculine norms. The *Conformity to Masculine Norms Inventory-30* (CMNI-30; Levant et al., 2020) is a 30-item short form of Mahalik et al.'s (2003) 94-item questionnaire that assesses conformity to an array of dominant cultural norms of masculinity in the U.S. (e.g. Risk-Taking, Self-Reliance,

Emotional Control). Items employ a six-point Likert-type response format ranging from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*) assessing behaviors, feelings, and thoughts that reflect conformity and non-conformity to an array of dominant cultural norms of masculinity in the United States. The CMNI-30 yielded strong confirmatory factor structure fit statistics, good internal consistency, full configural and metric invariance, and partial scalar and residual invariance between White men and men of color (Levant et al., 2020). The total score was used in this study. Mahalik et al. (2003) report evidence for validity of the CMNI total scale including differentiating men and women, significant relationships to other masculinity indices, as well as significant relationships to social dominance, aggression, and muscularity. In the current study, α was 0.82.

Health belief model for COVID-19. To assess health beliefs about the perceived benefits of, and the perceived barriers to, following CDC recommendations, we modified the *Health Belief Model Heart Disease Scale* (Mahalik and Burns, 2011) by changing the focus from heart-healthy behaviors to CDC recommendations. The *Benefits of Following CDC Recommendations* scale consisted of participants evaluating how beneficial it would be for them to engage in behaviors described in the *CDC Recommendations for Protecting Self and Others Scale* described above (e.g. do not spit). Participants were told: "The following items ask you how much you agree or disagree that the following behaviors are beneficial for you. Benefits could include protecting my health, protecting the health of loved ones, protecting public health, contributing to ending the pandemic, or other benefits not listed here but that are important to you." Items employed a six-point scale with anchors ranging from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). A sample item includes, "*It would benefit my life if I cleaned and disinfected frequently touched surfaces daily*." In this study, α was 0.85.

The *Barriers to Following CDC Behaviors* scale consisted of items assessing participants' perceptions of barriers to the nine behaviors described in the *CDC Recommendations for Protecting Self and Others Scale* (e.g. "I cover my mouth and nose with a tissue when I cough or sneeze or use the inside of my elbow"). Participants were told: "Barriers can include such things as having a job that puts you in close proximity to others, living situation that keeps you from social distancing, difficulty getting masks or sanitizing supplies, work or family responsibilities to care for sick persons, being reliant on public transportation, or other barriers not listed here but that affect you." Items on the scale were answered using a six-point scale ranging from 1 (*No barriers*) to 6 (*Barriers are impossible to overcome*) with α of 0.92 in this study.

Confidence in scientific community. We developed three items to assess participants' confidence in the scientific community's response to the pandemic. Participants were asked to rate their level of agreement on a scale of 1 (*Strongly Disagree*) to 6 (*Strongly Agree*) for each statement. The three statements included were: "I take the scientific community's warnings about the pandemic seriously," "I trust the scientific community's recommendations about the COVID-19 pandemic," and "I believe the scientific community's recommendations for protecting yourself and others from COVID-19 can be effective in fighting the pandemic if followed." In this sample, α was 0.91.

Empathy toward people vulnerable to COVID-19. We assessed participants' affective empathy for people most vulnerable to COVID-19 using an adapted version of the *Empathic Concern Scale* (Pfattheicher et al., 2020). We used three items to assess empathy (e.g. "I feel compassion for those most vulnerable to coronavirus (COVID-19)") as well as three filler items (e.g. "It is important to be equipped with enough food to deal with coronavirus (COVID-19)") to reduce response bias. Pfattheicher et al.'s (2020) measure of affective empathy predicted attitudes and behaviors related to physical distancing in US, UK, and German samples (Pfattheicher et al., 2020). Across four studies published by

Pfattheicher et al. (2020), all αs were >0.81. In this study, α was 0.83.

Political ideology. We assessed participants' political ideology using five items, three of which were adapted from Liu and Latané's (1998) measure of general liberalism. Participants were asked to describe their political ideology, views on social issues, and views on economic issues on a scale from 1 (*Very Liberal*) to 7 (*Very Conservative*). Additionally, we included one item addressing political party affiliation and one item asking about the likelihood that they would vote for President Trump in the 2020 election. In this sample, α was 0.90.

At-risk group membership. Participants read a list of 16 risk factors published by the Mayo Clinic (https://www.mayoclinic.org/diseases-conditions/coronavirus/symptoms-causes/syc-20479963) that place persons at higher risk for more severe symptoms of COVID-19 (e.g. persons over 60, persons with history of heart diseases, asthma, weakened immune system, diabetes), and then responded to two statements: (1) thinking about myself (a) I am not in any of the high-risk categories, (b) I am in one of the high-risk categories, or (c) I am in more than one of the high-risk categories; (2) thinking about people in my household (a) no one in my household is in any of the high-risk categories, (b) one person in my household is in at least one high-risk category, (c) more than one person in my household is in at least one high-risk category. These items were scored as 1, 2, or 3 for each question.

Local government and work mandates. Participants were asked to respond Yes (scored as 2) or No (scored as 1) to two statements about mandated health behaviors from local government or work settings: (a) I am currently living in a city, county, or state that requires wearing masks when in public places and (b) I am currently employed in a setting that requires wearing masks when at work or has other

requirements such as sanitizing surfaces, social distancing, or handwashing.

Procedure

Participants were recruited to complete the 10–15 minute anonymous online survey through Prolific, an online platform to connect academic researchers and participants. Prolific has been found to be well-suited for academic research in the social and behavioral sciences (Palan and Schitter, 2018). Individuals wishing to participate in online research projects for compensation make a Prolific user-account and are then able to view and participate in studies for which they are eligible. For this study, investigators constructed the survey using Qualtrics and posted the survey link on Prolific. The pre-screening criteria for eligible participants was as follows: (1) identifying as a man, including cisgender and transgender men, (2) currently living in the United States, and (3) being at least 18 years of age. Prolific users that met these criteria were able to see the survey in their account and choose to participate. Those who completed the survey were compensated $1.27, which equated to an average rate of $7.48 per hour as reported in Prolific's fair wage calculation for the study. All procedures were approved by the Boston College Institutional Review Board (Approval # 21.045.01e-1) with participants asked to indicate consent after reading the terms of consent by clicking "I agree to take part in this study. I understand what the study is about and my questions so far have been answered."

Planned analysis

Data analyses were conducted using SPSS version 25. We tested the two models using bootstrapping approach with Hayes' (2018) PROCESS macro. The bootstrap confidence interval (CI) for bias-corrected indirect effects is estimated based on 10,000 bootstrap samples. We first examined the mediation model of Health Beliefs, Confidence in Scientific Community,

Table 1. Means, standard deviations, and intercorrelations among variables.

Variable	M	SD	1	2	3	4	5	6
1. Mask-wearing	36.65	5.42	—					
2. CMN	93.58	16.36	–0.41**	—				
3. Benefits	47.96	5.76	0.51**	–0.16**	—			
4. Barriers	17.86	9.12	–0.40**	0.36**	–0.29**	—		
5. Confidence in science	16.12	2.54	0.59**	–0.29**	0.61**	–0.29**	—	
6. Empathy	12.94	2.20	0.40**	–0.29**	0.47**	–0.20**	0.45**	—
7. Political ideology	15.82	7.18	–0.44**	0.40**	–0.27**	0.25**	–0.42**	–0.21**

$N = 596$. Mask-Wearing = Attitudes Toward Wearing Face-Masks; CMN = Conformity to Masculine Norms; Benefits = Benefits to Following CDC Recommendations; Barriers = Barriers to Following CDC Recommendations; Confidence in Science = Confidence in Scientific Community; Empathy = Empathy for People Vulnerable to COVID-19.
*$p < 0.05$. **$p < 0.01$.

and Empathy Persons Vulnerable to COVID-19 as mediators of Conformity to Traditional Masculine Norms predicting Attitudes Toward Wearing Face-Masks while controlling for the covariates. Then, we tested the moderating model in which Political Ideology moderated the relationship between CMN and the mediators.

Data sharing statement

The current article includes the complete raw data-set collected in the study including the participants' data set, syntax file, and log files for analysis. Pending acceptance for publication, all of the data files will be automatically uploaded to the Figshare repository.

Results

Preliminary analyses

Linear interpolation using SPSS was used to impute missing data which ranged from 0.2% to 1.4% missing. Review of the data for normality indicated that participant responses for some variables were greater than ±1.96 on either skewness or kurtosis. Following Tabachnick and Fidell's (2007) recommendations, transformations were made for Attitudes Toward Mask-Wearing (kurtosis from 2.32 to −0.73), Barriers (kurtosis from 3.22 to 1.18), Confidence in Science (skewness from −2.07 to −1.03, kurtosis from 5.94 to 0.76), and Empathy (kurtosis = 2.14

to −1.11). Because all negatively skewed variables were subtracted from the highest value in the sample as part of the transformation (i.e. K−X), the directionality of these scores were reversed. To aid in interpretation, these variables (i.e. Attitudes Toward Mask-Wearing, Confidence in Science, and Empathy) were multiplied by −1 to correct interpretation back to the original direction of those variables.

Means, standard deviations, and inter-correlations are reported on Table 1. Examining mean scores from the sample indicate that participant men, on average, reported "agree" to positive statements about mask-wearing, "agree" to seeing benefits and "very small barriers" to adopting CDC recommendations, "agree" to having confidence in the scientific community, "somewhat agree" to having empathy for people vulnerable to COVID-19, and "moderate" on political ideology. Inter-correlations indicated that all the variables were significantly related to each other at small and medium effect sizes. Examining correlations for the variable of interest, Mask-Wearing was negatively related to CMN, Barriers, and Political Ideology, and positively related to Benefits, Confidence in Science, and Empathy.

Mediation analysis

To test our hypotheses regarding men's attitudes toward mask wearing, we followed guidelines for testing moderated mediation that

Table 2. Indirect effects results for mediation models.

Predictor	Mediator	Outcome	Effect (Std.)		Bootstrap		95%CI	
			β	SE	B	SE	LLCI	ULCI
CMN	Benefits	Mask-Wearing	−0.04	0.01	−0.003	0.001	−0.001	−0.001
CMN	Barriers	Mask-Wearing	−0.05	0.02	−0.004	0.001	−0.001	−0.002
CMN	Confidence in Science	Mask-Wearing	−0.10	0.02	−0.01	0.002	−0.01	−0.01
CMN	Empathy	Mask-Wearing	−0.02	0.01	−0.002	0.001	−0.004	−0.0001

N = 596. Mask-Wearing = Attitudes Toward Wearing Face-Masks; CMN = Conformity to Masculine Norms; Benefits = Benefits to Following CDC Recommendations; Barriers = Barriers to Following CDC Recommendations; Confidence in Science = Confidence in Scientific Community; Empathy = Empathy for People Vulnerable to COVID-19; LLCI = lower limit confidence interval; ULCI = upper limit confidence interval (95%).

examine indirect and conditional indirect effects (Edwards and Lambert, 2007; Hayes, 2018; Preacher et al., 2007). First, we used Hayes' (2018) PROCESS macro program for SPSS (Model 4) to conduct path analysis to examine whether perceived benefits, perceived barriers, confidence in science, and empathy for persons vulnerable to COVID-19 would mediate the relationship between CMN and attitudes toward mask wearing while controlling for the demographics of race, age, education, and income, as well as participant or household member being in at-risk group(s), and whether their local government and workplace mandate health practices. Bootstrap confidence intervals tested the significance of indirect effects for the model (Hayes, 2018; MacKinnon et al., 2002). Results indicated that CMN scores were significantly associated with all four mediators (Perceived Benefits: $B = -0.07$, $t = -4.48$, $p < 0.001$; Perceived Barriers: $B = 0.02$, $t = 9.33$, $p < 0.001$; Confidence in Science: $B = -0.01$, $t = -7.69$, $p < 0.001$; and Empathy: $B = -0.02$, $t = -7.07$, $p < 0.001$). For the second part of the model, results indicated that all four mediators had significant associations with Attitudes Toward Mask-Wearing (Perceived Benefits: $B = 0.05$, $t = 4.99$, $p < 0.001$; Perceived Barriers: $B = -0.20$, $t = -4.38$, $p < 0.001$; Confidence in Science: $B = 0.66$, $t = 2.19$, $p < 0.001$; and Empathy: $B = 0.11$, $t = 2.19$, $p < 0.05$). Results also indicated that CMN was significantly related to Attitudes Toward Mask-Wearing for the Total

effects model ($B = -0.03$, $t = -10.64$, $p < 0.001$), and a significant direct effect on Attitudes Toward Mask-Wearing ($B = -0.02$, $t = -5.67$, $p < 0.001$).

Bootstrapping procedures indicated that CMN had significant indirect effects on Attitudes Toward Mask-Wearing via Benefits ($B = -0.003$, 95% CI −0.01 to −0.001), Barriers ($B = -0.004$, 95% CI −0.01 to −0.002), Confidence in Science ($B = -0.008$, 95% CI −0.01 to −0.005), and Empathy ($B = -0.002$, 95% CI −0.004 to −0.001), such that CMN was significantly related to Attitudes Toward Mask-Wearing indirectly through all four mediators (see Table 2).

Moderated mediation analysis

Next, Hayes' (2018) PROCESS program was used to test the conditional effects (Model 7) by testing Political Ideology as the moderator of the mediation model described above, specifically with interactions between Political Ideology and CMN as they moderate the four mediation paths while controlling for the covariates. Results for testing moderated mediation are shown in Table 3.

Results indicated that there were significant main effects for CMN and Political Ideology, as well as significant interaction effects for CMN × Political Ideology with all scores centered for Perceived Benefits, Perceived Barriers, Confidence in Science, and Empathy for Vulnerable Persons (see Table 3 and Figure 2).

Table 3. Path analysis results.

Predictor	B	SE	t	LLCI	ULCI
Outcome: Benefits					
CMN	−0.03*	0.02	−1.97	−0.06	0.00
Political ideology	−0.20***	0.04	−5.67	−0.27	−0.13
CMN × political ideology	0.003*	0.002	1.97	0.00	0.01
$R=0.34$, $R^2=0.11$, MSE=29.92, $F(11, 584)=6.78$, $p<0.0001$					
Outcome: Barriers					
CMN	0.02***	0.003	7.37	0.01	0.02
Political ideology	0.02**	0.01	2.64	0.004	0.03
CMN × political ideology	0.001*	0.0003	2.31	0.0001	0.001
$R=0.44$, $R^2=0.19$, MSE=0.77, $F(11, 584)=12.77$, $p<0.0001$					
Outcome: Confidence in Science					
CMN	−0.01***	0.002	−3.91	−0.01	−0.003
Political ideology	−0.03***	0.004	−8.99	−0.04	−0.03
CMN × political ideology	0.0004*	0.0002	2.30	0.0001	0.001
$R=0.48$, $R^2=0.23$, MSE=0.33, $F(11, 584)=15.53$, $p<0.0001$					
Outcome: Empathy					
CMN	−0.01***	0.002	−5.28	−0.02	−0.01
Political ideology	−0.02***	0.01	−3.37	−0.03	−0.01
CMN × political ideology	0.001*	0.0003	2.48	0.0001	0.001
$R=0.38$, $R^2=0.14$, MSE=0.72, $F(11, 584)=8.71$, $p<0.0001$					
Outcome: Mask-Wearing					
CMN	−0.02***	0.003	−5.66	−0.02	−0.01
Benefits	0.05***	0.01	4.99	0.03	0.06
Barriers	−0.20***	0.05	−4.38	−0.30	−0.11
Confidence in Science	0.66***	0.08	8.10	0.50	0.82
Empathy	0.11*	0.05	2.19	0.01	0.22
$R=0.69$, $R^2=0.48$, MSE=0.92, $F(13, 582)=41.46$, $p<0.0001$					

$N=596$. LLCI=lower limit confidence interval; ULCI=upper limit confidence interval (95%); Mask-Wearing=Attitudes Toward Wearing Face-Masks; CMN=Conformity to Masculine Norms; Benefits=Benefits to Following CDC Recommendations; Barriers=Barriers to Following CDC Recommendations; Confidence in Science=Confidence in Scientific Community; Empathy=Empathy for People Vulnerable to COVID-19.
*$p<0.05$. **$p<0.01$. ***$p<0.001$.

When testing moderated mediation, the direct and indirect paths from the mediation model described in the mediated model remained significant. For moderated mediation, the overall model was significant, $F(13, 582)=41.46$, $p<0.001$, $R^2=0.48$. Specifically, higher CMN ($B=-0.02$, $t=-5.66$, $p<0.001$), higher Perceived Benefits ($B=0.05$, $t=4.99$, $p<0.001$), lower Perceived Barriers ($B=-0.20$, $t=-4.38$, $p<$ 0.001), higher Confidence in Science ($B=0.66$, $t=8.10$, $p<0.001$), and higher Empathy ($B=0.11$, $t=2.18$, $p<0.05$) all significantly related to higher Attitudes Toward Mask-Wearing scores. Furthermore, CMN's conditional indirect effect was significant through all four mediators. Specifically, bootstrap indirect effects for Benefits mediating CMN's relationship to Attitudes Toward Mask-Wearing at $+1/-1$
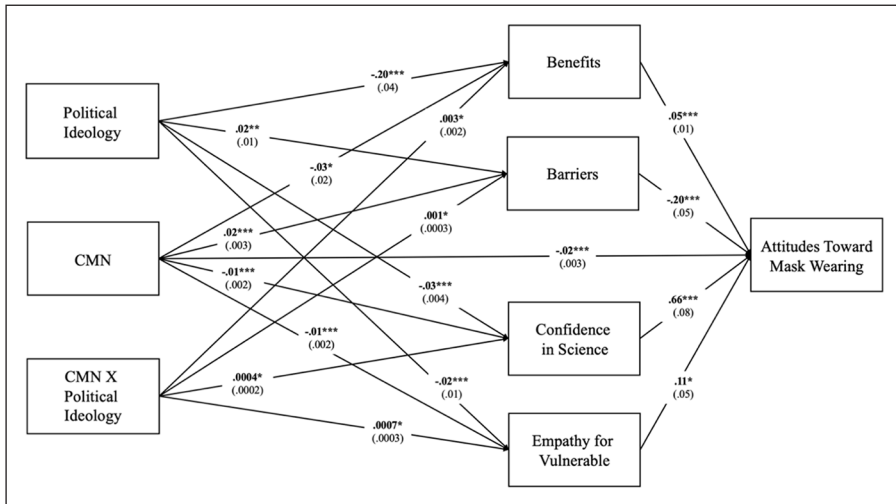
Figure 2. Statistical model of moderated mediation results. Unstandardized path coefficients shown with standard errors in parentheses.
See Table 3 for conditional mediation effects; see Figures 3–6 for illustration of moderation effects.
*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

standard deviation of Political Ideology were not significant for conservative men ($B=-0.0003$, SE$=0.001$, 95% CI (-0.002, 0.002)) but were significant for liberal men ($B=-0.003$, SE$=0.001$, 95% CI (-0.005, -0.001)). Examining Figure 3 illustrates this result indicating that politically conservative men reported perceiving fewer benefits to following CDC recommendations than politically liberal men regardless of level of conformity to traditional masculine norms, and that the relationship between CMN did not contribute to conservative men's attitudes toward masks but was associated with less positive attitudes toward mask-wearing for liberal men.

Bootstrap indirect effects for Barriers mediating CMN's relationship to Attitudes Toward Mask-Wearing were significant for conservative men ($B=-0.005$, SE$=0.002$, 95% CI (-0.008, -0.002)) and liberal men ($B=-0.003$, SE$=0.001$, 95% CI (-0.005, -0.001)). Figure 4 illustrates that both politically conservative and liberal men perceived few barriers to following CDC recommendations at low levels of CMN but both groups perceived more barriers the more they conformed to traditional masculine norms and this increase was greatest for conservative men.

For Confidence in Science, bootstrap indirect effects were not significant for conservative men ($B=-0.002$, SE$=0.002$, 95% CI (-0.006, 0.001)) but were significant for liberal men ($B=-0.006$, SE$=0.001$, 95% CI (-0.009, -0.004)). Figure 5 illustrates that conservative men had less confidence in the scientific community than liberal men and this lack of confidence did not change across levels of CMN, but liberal men were significantly less likely to have confidence in science the more they conformed to traditional masculine norms.

Finally, bootstrap indirect effects for Empathy were not significant for conservative men ($B=-0.001$, SE$=0.001$, 95% CI (-0.002, 0.00)) but were significant for liberal men ($B=-0.002$, SE$=0.001$, 95% CI (-0.004, -0.0001)). Figure 6 indicates that that all men were less empathic the more they conformed to traditional masculine norms, conservative men reported less empathy for persons vulnerable to COVID-19 and that level did not significantly change regardless of CMN, and although liberal men had more empathy when not conforming to traditional masculine norms they reported empathy at similar levels to conservative men at high levels of CMN.
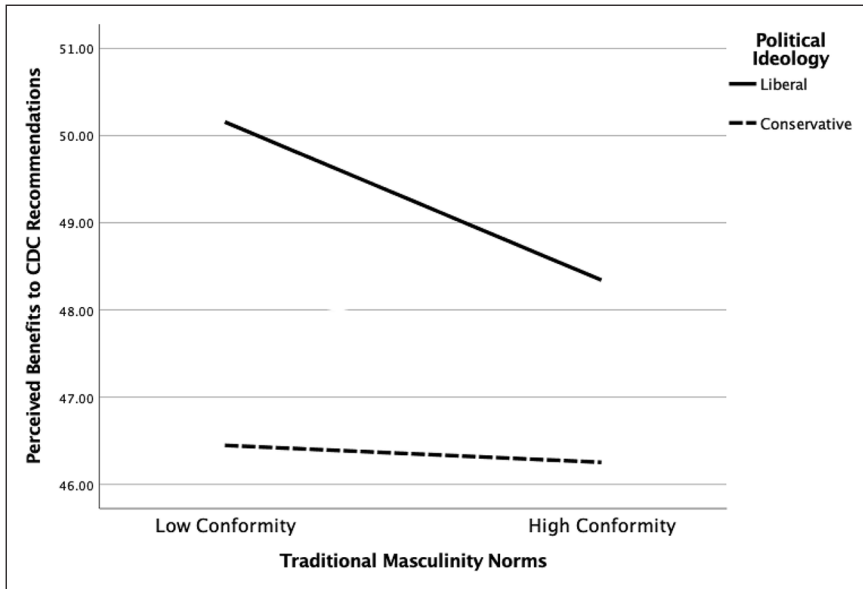
Figure 3. The relationship between conformity to masculine norms and benefits to adopting CDC recommendations as moderated by political ideology.
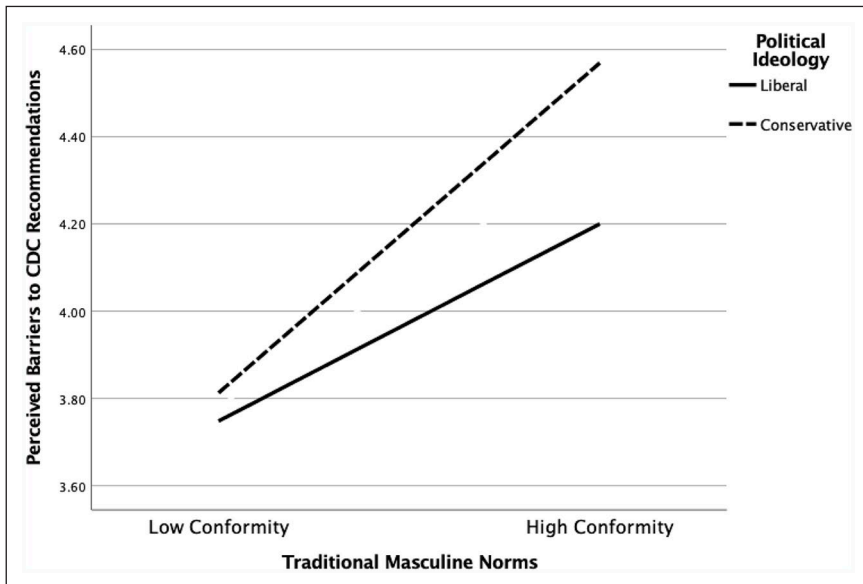

Figure 4. The relationship between conformity to masculine norms and barriers to adopting CDC recommendations as moderated by political ideology.

Analysis of control variables

To control for the variance accounted for by demographics, at-risk group membership, and local government and work mandates, these variables were modeled as covariates in our analyses of Hayes PROCESS Models 4 and 7. Analysis of the covariates indicated that participants had
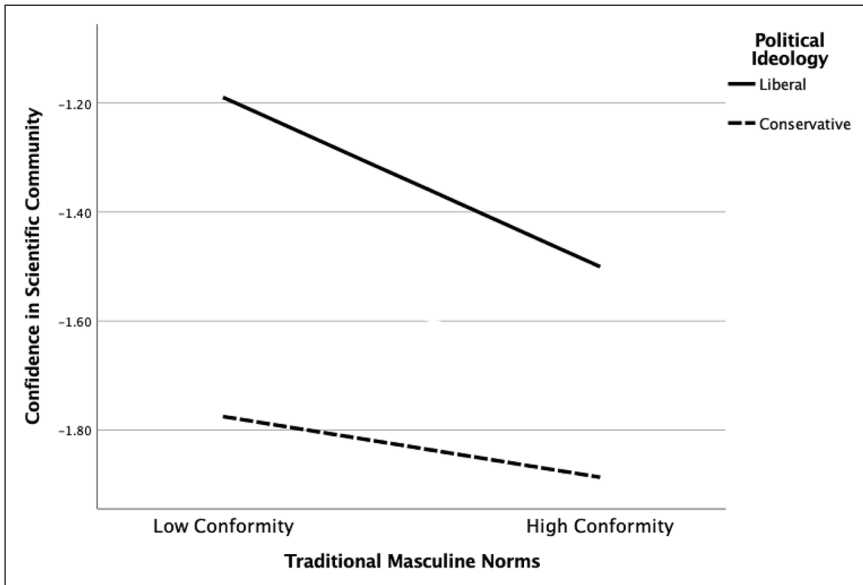
Figure 5. The relationship between conformity to masculine norms and confidence in the scientific community as moderated by political ideology.
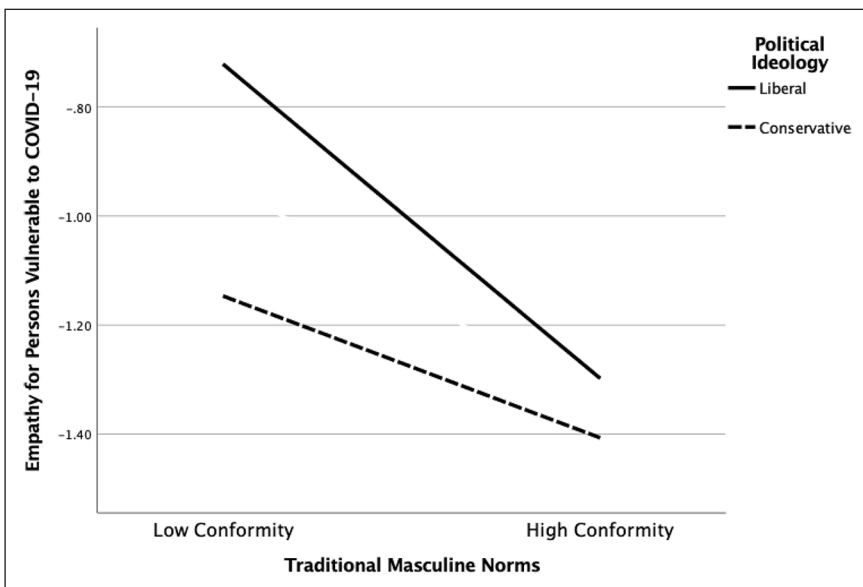

Figure 6. The relationship between conformity to masculine norms and empathy for persons vulnerable to COVID-19 virus as moderated by political ideology.

more confidence in scientific experts if they were men of color ($B=-0.12, t=-2.01, p<0.05$), had more education ($B=0.05, t=3.67, p<0.001$), and had more empathy toward persons vulnerable to COVID-19 if they were living with someone in an at-risk category ($B=0.12, t=2.33, p<0.05$). None of the other covariate relationships were significant.

Discussion

The results supported the hypotheses of the study that the relationship between conformity to traditional masculinity norms (CMN) and attitudes toward mask-wearing was mediated by perceived benefits, perceived barriers, confidence in scientific experts, and empathy to persons vulnerable to COVID-19. All four mediators significantly related to attitudes toward mask-wearing, and political ideology moderated the indirect effect of CMN on attitudes toward mask-wearing. These finding are consistent with a growing body of literature finding that traditional masculine norms relate to engagement in risky health behaviors in men (e.g. Iwamoto et al., 2011; Levant and Wimer, 2014; Mahalik et al., 2007, 2015), and extends that literature to a critical health behavior needed to fight the current public health crisis (i.e. mask-wearing).

The finding that CMN's relationship to attitudes toward mask-wearing is mediated by constructs related to both CMN and health behaviors is a significant extension to the research literature on masculinity and health highlighting the importance of pathways between CMN and health behaviors. Our findings suggest that conforming to traditional masculine norms contributes to negative thinking about suggested health promotion behaviors (i.e. that they are not beneficial and there are barriers to adopting them) which in turn relates to having negative attitudes toward mask-wearing. Our findings likewise suggest that conforming to traditional masculinity norms contributes to negative valuations of both scientific expertise and whether one should be concerned about vulnerable persons. It is these negative valuations which help explain men not adopting recommendations and their negative attitudes toward mask-wearing.

The fact that CMN was mediated in its relationship to attitudes toward mask-wearing suggest that health efforts should focus on addressing the sequelae resulting from men's gender constructions that interfere with COVID-19 health practices. Specific to the results of this study, efforts such as public health messaging should focus on helping men who conform to traditional masculine norms see the benefits of mask-wearing, understand what they view as barriers to mask-wearing and make efforts to address or mitigate perceived barriers (e.g. negative reactions from co-workers), highlight the importance of helping men recognize the value and importance of scientific expertise in combating the virus (e.g. being willing to follow guidance), as well as developing more empathy for persons who are vulnerable to the virus and act accordingly.

That these mediated relationships were moderated by political ideology suggests that both gender constructs and political ideology need to be addressed together to bolster engagement in an effective, collective response to the COVID-19 public health crisis. As predicted, conservative men who conformed to traditional masculine norms were the most likely to report barriers to adopting CDC recommendations, while men who conformed less to traditional masculine norms perceived fewer barriers regardless of political ideology. The other three moderation effects also showed that liberal men were more likely to see benefits, have confidence in the scientific community, and empathy for vulnerable persons than conservative men. However, the conditional indirect effect between high conformity and low conformity was greater for liberal men than conservative men. Put another way, conservative men were less likely to see benefits to CDC recommendations, more likely to see barriers, and had less confidence in science and empathy for the vulnerable; but liberal men were more likely to respond to COVID-19 recommendations like conservative men the more they conformed to traditional masculine norms.

We also view the finding that CMN's relationship toward mask-wearing had both direct and indirect effects as important and likely connected to Capraro and Barcelo's (2020) findings that men were more likely to feel stigma wearing a mask and to view it as a sign of weakness. The finding is consistent with precarious manhood theory (Vandello and Bosson, 2013)

which would suggest that because mask-wearing occurs in public, men who conform to traditional masculine norms may feel that publicly wearing a mask, in the eyes of others, reflects weakness or fear such that he is seen as "unmanly." Through this lens, a public demonstration of one's masculinity to reduce feelings of threat to their manhood (e.g. displays of invulnerability, bravery, risk-taking) could be accomplished through rejecting mask-wearing, even if it comes with significant risk to individual or public health.

Implications and future research

We agree with the conclusion reached by Okten et al. (2020) that policymakers should focus on disseminating public health messages aimed at motivating men's adherence to prevention efforts, and view our findings as providing several specific applications for engaging men in individual and public health-promotive behaviors amidst the COVID-19 crisis. First, we recommend that efforts be made to intervene with men to increase their perception of the benefits of mask-wearing, particularly men who conform to traditional masculine norms and are politically conservative. For example, research could identify what resistant groups of men value in relation to ending the pandemic (e.g. being employed, re-opening the economy, family visits and socializing, the return of college and professional sports) to be able to frame mask-wearing as having benefits to them. Such psychoeducation efforts should seek to navigate the complexity of men's resistance to wearing masks highlighted by this study, perhaps working from a strengths-based or positive masculinity approach (Kiselica et al., 2016) where mask-wearing could be an expression of male ways of caring through taking action to protect loved ones and friends (Kiselica and Englar-Carlson, 2010). Each of these recommendations share a common thread: the need for traditional norms of masculinity in the U.S. to be reconstructed so that men's sense of worth and identity is less defined by the performance of invincibility and fearlessness, but rather by asking what was needed of them in this time of crisis to be a protector of others' health and to participate in keeping their communities safe.

Consistent with past research on persons' experience of barriers to health practices (e.g. Carpenter, 2010), efforts need to be made to identify specific barriers that men who conform to traditional masculine norms experience, particularly politically conservative men. Given the unprecedented and immense disruptions the pandemic has caused which may feel beyond men's control (e.g. living or working conditions making recommendation adherence unrealistic), it might be that following CDC recommendations could be experienced as another limitation to one's sense of control and power. As a "reframe" in response to such perceived barriers, psychoeducational interventions could present mask-wearing as a way for men to maintain their health so they can remain successful and effective in the areas of their lives that are important to them as men (e.g. being healthy and strong, a good provider).

Our study also emphasizes that men's COVID-specific health practices and attitudes cannot be fully removed from the current socio-political context, especially when individual and collective pandemic responses in the U.S. have become so politically charged. For example, our findings related to confidence in the scientific community suggest that public health efforts need to increase resistant men's sense of the value of science and its contributions to their well-being, as well as how necessary their own participation is to collective efforts to address the pandemic. Such a campaign may tout accomplishments that impact men's lives that could only have happened because of scientific expertise, such as testimonials from other Americans who have relied on the scientific community for medical cures urging others to trust and follow their recommendations. However, given the gendered and politicized lens through which men may interpret this kind of messaging, it may be important to identify the most impactful messengers for different groups of men in addition to scientists (e.g. men who are role models, respected public figures) and involve them in raising awareness in

support of the scientific community and their recommended health practices. Similarly, research should identify impactful messengers who could successfully promote or model empathy for vulnerable persons amongst men most resistant to adopting public health guidelines.

Limitations

In addition to these intervention efforts, future research could address the limitations in this study. For example, the use of the CMNI total score provides less specific information about which of its 11-subscales may be contributing the most to the results. Future research should examine specific masculinity norms contribution to these effects similar to Wong et al.'s (2017) meta-analysis of masculinity norms and mental health outcomes.

Second, our study was drawn from a national sample and is heterogeneous in terms of age, sexual orientation, race, and employment status. However, caution should be exercised in generalizing of our findings to specific groups of men because the experience of risk, illness, and mortality is different for groups of men in the United States. The intersection of race, age, sexual orientation, class, immigration status, and other social, political, and personal variables are likely to influence the ways in which men experience the pandemic and health behaviors, especially given health disparities in marginalized communities (Kazak et al., 2012), generally, and for the COVID-19 virus (Centers for Disease Control and Prevention, 2020), specifically.

The focus of this study was on men's attitudes toward mask-wearing. As such, we did not examine women's health practices which also vary and are important to address to contain the virus. Our choice to examine men in this study was in response to evidence that men are less compliant with recommended practices in this pandemic as well as past pandemics (Capraro and Barcelo, 2020; Condon and Sinha, 2010; Lau et al., 2010; Okten et al., 2020), and prevalence of the public narrative in the United States conveying gendered messages about public health behaviors, such as that wearing a face covering is perceived as a sign of weakness and unmasculine (Capraro and Barcelo, 2020; Glick, 2020). Future research should examine factors that affect adoption of CDC recommended health practices across genders.

Conclusion

The personal investment in public health efforts that the COVID-19 crisis requires of individuals and communities in the U.S. represents a stark contrast to traditional masculine socialization that tends to encourage the neglect of caring for one's health. Our findings indicate that this lack of concern also extends to the health of others in the form of negative attitudes toward mask-wearing that put people in jeopardy during a global pandemic with a deadly air-borne virus. Our results provide a more complex representation of the relationships among the variables beyond "men don't wear masks," and highlight the critical relationship between conformity to traditional masculine norms and mediators of its relationship to health behaviors and attitudes affecting the transmission of the COVID-19 virus. Our findings also underscore the importance of political ideology as it intersects with constructions of masculinity, suggesting that efforts to improve men's adoption of COVID-19 recommendations should focus how both gender constructions and political identity contribute to ways of thinking that account for compliance, or lack thereof, to public health recommendations. Therefore, finding effective ways to address men's behaviors may be particularly critical at this point in time, as their greater resistance to recommendations only adds to the rates of infection, mortality, and human suffering.

Public significance statement

The study identified contributors to men's attitudes toward mask-wearing for combatting COVID-19. Public health efforts to improve men's participation in combatting the pandemic should address the perceptions and attitudes that arise from conforming to traditional masculine norms and political ideology which can impede health-promotive behaviors.

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