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The Relationship Between Masculinity and Men's COVID-19 Safety Precautions: A Systematic Review and Meta-Analysis

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Studies have indicated that men are less likely to engage in COVID-19- safety precautions such as mask wearing and social distancing compared to women, and men's adherence to masculine gender norms may contribute to this discrepancy. This systematic review sought to consolidate extant research exploring the relationship between men's adherence to masculine norms and their attitudes and engagement with COVID-19 safety precautions. A systematic search was conducted across APA PsycInfo, MEDLINE, and SCOPUS to identify data from quantitative and qualitative studies, written in English, using samples including adolescent or adult males. Of the 4,326 studies initially identified, 11 studies met the inclusion criteria (eight quantitative and three qualitative). A total number of 3,134 male participants were included, the majority of which were from North America. The meta-analysis revealed a negative relationship between men's adherence to masculine norms and wearing masks ($r = -.52$, $n = 2{,}783$) and general or mixed measures of COVID-19 precautions ($r = -.18$, $n = 612$). There was insufficient evidence to metaanalyse other specific relationships; however, the thematic synthesis revealed a limited quantity of evidence that reported mixed findings about whether or not masculinity is related the specific precautions of hand washing, social distancing, restricted travel, vaccinations, and staying at home. As the majority of studies were U.S. based and the concept of masculinity can vary by culture, further research is required to determine the cross-cultural validity of these findings. The present review provides valuable insight for policy makers looking to mitigate the spread of COVID-19.

Public Significance Statement
The COVID-19 pandemic continues around the globe, and public health response strategies must continually be updated to ensure they remain efficacy. This review shows consistent evidence that men who adhere to traditional social norms around masculinity are less likely to engage in safety precautions that protect themselves and their communities from contracting COVID-19. This has serious implications including contributing to the longevity of the pandemic and associated financial, health, and well-being costs.

Keywords: COVID-19, coronavirus, masculinity, men's health, men's health gap

As the COVID-19 pandemic continues, researchers have observed that the mortality and contraction rates of the virus are higher for men than for women (e.g., Lakbar et al., 2020; Mihăilă & Martin, 2020; Wang et al., 2022). One factor that may contribute to this discrepancy is the differing rates of adherence to recommended COVID-19 safety precautions between genders. For instance, research has identified that, compared to women, men are less likely to wear masks (Okten et al., 2020), less likely to socially distance (Wang et al., 2022; Trevas et al., 2023), and less likely to practice frequent hand washing (Guzek et al., 2020). To understand the underlying drivers of this discrepancy, we can draw from the research into gender discrepancies across broader fields of health.

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The present review is registered via Prospero. Protocol can be accessed via https://www.crd.york.ac.uk/prospero. No amendments were made. Registration number is CRD42022348294. Data forms used in this review are available on request. Parts of the data presented in this article have previously been presented at an academic conference. Specifically, an early version of the systematic review portion of the article was presented at the Australian Catholic University School of Psychology conference in 2022.

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The major aim of this article is to identify and synthesize extant research exploring the relationship between men's adherence to masculine norms and their (Wang et al., 2022) attitudes and engagement with COVID-19 safety precautions.

Theoretical Accounts Explaining the "Men's Health Gap"

On average, men tend to have shorter life expectancies and worse health outcomes compared to women—this disparity is referring as the "men's health gap" (e.g., Baker et al., 2020; Baker & Shand, 2017; Griffith, 2012). There are a range of factors contributing to the men's health gap. For instance, compared to women, men are less likely to engage in preventative health behaviors such as wearing seat belts (Diawara et al., 2021), regularly brushing teeth (Lipsky et al., 2021), attending routine physical exams (Bunten et al., 2020), and seeking medical treatment for both physical and mental health concerns (Wong et al., 2017). In order to close this gap, theorists have explored a number of factors that may perpetuate this gender discrepancy (Teo et al., 2016; Wong et al., 2017). Extensive research indicates that a significant factor perpetuating the gender discrepancy in health-related behaviors is the pressure to conform to masculine gender norms.

Gender norms can be defined as social expectations that may shape the attitudes and behaviors of men and women (Levant et al., 2020). Research has shown that gender norms are learned and reinforced through social experiences, beginning in childhood (Keener et al., 2017). In contemporary Western society, masculine gender norms encourage men to present themselves in ways that are stereotypically masculine such as being self-reliant, limiting their emotional expression, and pursuing high social or professional status (Levant et al., 2020). They are also expected to pursue multiple sexual partners, a masculine norm that has been described by Levant et al. (2020) as the "playboy" norm. More relevant to the men's health gap, gender norms and stereotypes around men might lead them to engage in riskier health behaviors (including drinking, smoking, and poorer dietary choices; e.g., Fleming & Agnew-Brune, 2015), to engage in unhealthy coping mechanisms (e.g., Matud et al., 2023), to be reluctant to ask for help (including seek medical help, e.g., Galdas et al., 2005), and to avoid talking about mental health problems or seeking preventative care for health concerns (e.g., Yousaf et al., 2015). The extent to which an individual adheres to these masculine norms can vary, with researchers finding that greater adherence is related to a range of detrimental physical and mental health outcomes for men (Salgado et al., 2019; Wong et al., 2017).

One theoretical account explaining the relationship between adherence to masculine norms and poor health outcomes relates to precarious manhood theory (Vandello et al., 2008). This theory suggests that some men feel they may lose their status as masculine if their behavior is inconsistent with masculine norms and may then act in ways that will engage in manhood "restoring" behaviors, even if these go against social norms, are unsafe, or nonlogical. This theory is now backed by a large and growing base of evidence (e.g., Bosson et al., 2021; DiMuccio et al., 2017; Falomir-Pichastor et al., 2019; Iacoviello et al., 2020; Kosakowska-Berezecka et al., 2023; Valsecchi et al., 2022; Vandello & Bosson, 2013). According to this theory men may avoid certain health behaviors such as help seeking for mental health, in order to retain their masculine image (Vandello et al., 2019). This same mechanism may therefore explain men's lower adherence to COVID-19 precautions.

Gender Discrepancies in COVID-19 Precautions

A growing number of researchers have explored whether the gender discrepancy in the use of precautions against COVID-19 (e.g., Levant et al., 2022; Mahalik et al., 2021) is related to masculinity. This research suggests that gender differences in adherence to COVID-19 safety precautions are consistent with the discrepancy observed across a range of different health-related behaviors (Teo et al., 2016; Wong et al., 2017). For instance, in an online survey, with a sample of 596 North American men, Mahalik et al. (2021) measured men's conformity to masculine norms as well as their attitudes toward wearing masks. These researchers found a significant negative relationship between conformity to masculine norms and attitudinal support for mask wearing. This relationship was moderated by political ideology, with conservative men holding more negative attitudes to masks compared to liberal men. Similarly, based on data from a telephone-based survey in the United States, Cassino and Besen-Cassino (2020), negative views on mask wearing were associated with men's gender identities, and this effect was stronger for participants who reported that their male gender identity was more important to them. Based on these findings, researchers have argued that targeted interventions should be used to encourage COVID-19 safety behaviors in men (e.g., Levant et al., 2022).

In order to design interventions targeting men's COVID-19 safety behavior, guidance could be drawn from existing interventions that aim to reduce the gender discrepancy in physical and mental health. These interventions typically utilize psychoeducation to encourage more progressive conceptualizations of masculinity. For example, Watkins et al. (2017, 2020) developed a group mental health intervention program aimed at young African American men. This program involved facilitated discussion and activities designed to encourage participants to consider the subjectivity of gender norms. A qualitative evaluation of this program found that participants experienced a positive change toward active coping skills, which the researchers attributed this change to feeling less pressure relating to the masculine norms of self-reliance and emotion control (Goodwill et al., 2018). A similar intervention could encourage men in the adoption of COVID-19 safety behaviors by reducing the pressure to adhere to related masculine norms.

The success of targeted interventions that reframe masculine norms could have direct, positive impact on men, by encouraging COVID-19 safety behaviors and reducing their elevated risk of COVID-19 mortality (De Giorgi et al., 2021). Greater male uptake of COVID-19 safety behaviors would also reduce the spread of COVID-19, benefitting society as a whole (De Giorgi et al., 2021). In order to inform the development of such interventions, a synthesis of the existing research exploring the role of masculine gender norms in men's COVID-19 safety behaviors is required.

Aims and Objectives of Review

The present review aimed to systematically identify and synthesize the existing research on the role of masculine gender norms in men's attitudes toward and engagement with COVID-19 safety precautions. To achieve this aim, we did not limit the review to any specific safety precautions, and as such, a secondary aim of the

review was to identify the range of relevant precautions that have been explored in this literature. We adopted a mixed-methods approach to this systematic review.

Method

This review follows the most recent guidelines of Preferred Reporting Items for Systematic Review and Meta Analysis Protocols (Page et al., 2021). A checklist of reported items is available in additional online material Tables S1 and S2 (see https://osf.io/jszdr/). This review is registered with Prospero (Registration number: CRD42022348294).

Eligibility Criteria

This systematic review sought to include all studies examining data from male participants which reported the relationship between a measure of masculinity and COVID-19 safety precautions. The outcome of interest (COVID-19 safety precautions) was any evidence-based, preventative measure recommended by the World Health Organization (World Health Organization, 2022). Quantitative, qualitative, and mixed-method research were considered. As this research relates to the COVID-19 pandemic, only research published after 2020 were included by the search strategy (see Table 1).

Search Strategy

A systematic search was conducted in accordance with the latest PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement (Page et al., 2021). Electronic databases APA PsycInfo, MEDLINE, and SCOPUS were conducted in September 2023 using the terms "(attitud* OR behavior OR behavior OR compliance OR adherence or Resist* or conform* or defiance or defy) and (Masculin* OR 'Psychology of Men' OR Patriarchy OR 'Sex Role Attitudes' OR 'Sex Roles' or 'sex-roles' OR 'Social Norms' OR 'gender role' OR 'gender-role' or 'gender role strain' or 'gender-role strain') and (COVID-19* or coronavirus or SARS-CoV-2)." The search terms were required to appear in the title, subject, or abstract. Searches were limited to articles written in English. Research was limited to articles published after 2020. Hand searching of reference lists of studies identified as relevant from the initial search, as well as by screening articles citing these relevant studies in Web of Science or Google Scholar was conducted to obtain additional sources.

Study Records

Data Management

Records were managed through the reference managing software End Note.

Selection Process

Initial search results were exported as EndNote libraries, before being merged having duplicate records removed. This final library was uploaded into Covidence where two researchers independently screened titles and abstracts of the relevant records, aiming to exclude studies based on relevance to the research questions. The full text of the remaining articles was then reviewed by two independent researchers to determine their suitability for inclusion based on the stated eligibility criteria. Articles that had a mix gender sample but did not report results (i.e., correlation coefficients, sample sizes) for males separately to the rest of the data set were also excluded. No additional studies were yielded through the call for unpublished studies, through Google Scholar search, or through search of the reference list of included studies.

Data Collection Process

Data collection was completed using a bespoke extraction table.

Outcomes and Prioritization

Data was extracted by one reviewer and checked for accuracy by a second reviewer. The extracted data included: author, year and location of study, design, participant characteristics, measure of masculinity, type of health behavior outcome, and univariate and bivariate findings.

Risk of Bias in Individual Studies

Studies were assessed for quality at the individual levels by two independent authors. Qualitative studies were assessed using the Critical Skills Appraisal Program's Qualitative Checklist (CASP, 2018). The CASP is a six-item checklist. Affirmative

Table 1
Summary of Inclusion and Exclusion Criteria for Studies

Criterion	Included	Excluded
Study methodology	Quantitative, qualitative, and mixed methods	Reviews
Population	Adolescent and/or adult males	Children, females
Language	English	Other
Dependent variable	Any measure of masculine gender norms	Studies that examine sex/gender differences in COVID-19 safety behaviors without a dependent variable measuring masculinity.
Outcome measures	COVID-19 safety behaviors endorsed by the World Health Organization (e.g., use of face masks, social distancing, COVID-19 vaccinations, and handwashing)	COVID-19 safety behaviors that are not evidence based (e.g., ingesting ivermectin). COVID-19 physical or mental health outcomes (e.g., infection, mortality, stress).
Date	2020–present	Published prior to 2020.

answers to items indicate higher study quality. Quantitative studies were assessed using the Appraisal Tool for Cross-Sectional Studies (AXIS; Downes et al., 2016). The AXIS is a 20-item checklist. Affirmative answers to items indicate higher study quality. Results are described in the results section and are detailed in additional online material Tables S3 and S4 for the qualitative and then quantitative studies, respectively (see https://osf.io/jszdr/).

Data Synthesis

A narrative synthesis of the quantitative and qualitative data is presented as a mixed-methods systematic review. In addition, bivariate quantitative effects were meta-analysed for each COVID-19 safety precaution. Based on recommendations by (Borenstein, 2009), we only meta-analysed data that were reported across at least three samples (i.e., effects for each precaution that were reported only once or twice were included in the systematic review but not in the meta-analysis). The meta-analyses were conducted in Comprehensive Meta-Analysis, Version 3 (Borenstein et al., 2021).

Random-effects models were used to estimate overall effects using Fisher's Z estimates; however, we also reported Pearson's r correlation coefficient for ease of interpretation. We estimated heterogeneity using Cochran's Q statistic and I^2 values. A significant Q value indicates that the variance of the reported effects is greater than if the same effect was due to sampling error (Cochran, 1954). I^2 values determine the percentage of heterogeneity in the reported effect (values of 25%, 50%, and 75% equating to low, moderate, and high levels of heterogeneity, respectively; Higgins et al., 2003). If enough effects were reported to explore moderating factors, random-effects subgroup analyses would be conducted.

Metabias(es)

A call for unpublished studies was disseminated to assist in the assessment of publication bias; however, this did not yield any studies.

Results

Study Selection

The search strategy generated 4,326 references. Screening of titles and abstracts resulted in 184 studies suitable for full-text review. Full-text review eliminated 171 studies that did not meet inclusion criterion, leaving 11 eligible studies. Examples of studies that were excluded based on the inclusion criteria were those that examined men's engagement with COVID-19 precautions but did not include a measure of masculinity (e.g., Kleitman et al., 2021) and those that examined the role of masculinity in men's COVID-19 infection or mortality rates, without examining COVID-19 precautions (e.g., Voegel & Wachsman, 2022). The PRISMA flow diagram depicts the selection process of included studies can be seen in Figure 1.

Study Characteristics

The full characteristics of each article can be seen in Table 2. Eight of the 12 included studies used quantitative methods, with three studies using qualitative methods. Across all studies, data were reported on 3,134 male participants. The age range across studies was 18–78 with the mean ages ranging from 25.54 (SD = 9.78) to 45.45 years (SD = 16.01). For quantitative studies overall sample sizes ranges from 119 to 749. The total sample size for the qualitative studies was 72. One third (k = 3) of the quantitative studies used all male samples (Levant et al., 2022; Mahalik et al., 2021; Sileo et al., 2023)—the remaining five studies included a mixed gender sample but provided results by gender. The majority of the research (k = 9) was conducted in the United States, with Paramita et al. (2021) utilizing Indonesian participants, and de Sousa et al. (2022) utilizing Brazilian participants.

To measure participants' masculinity the quantitative studies used a range of validated measures. Two studies used Conformity to Masculine Norms–30 (CMNI-30; Levant et al., 2020), one study used the Male Role Norms Inventory–Very Brief (MRNI-VB; McDermott et al., 2019), one study used Masculine Role Norms Index (Levant et al., 2010), one study used the Male Role Norms Scale (Thompson & Pleck, 1986), one study used the Masculinity subscale of Hofstede's (2013) Individual Culture Scale (Gerace et al., 2022), and one study used a modified version of Reidy et al.'s (2014) scale divided into a subscale measuring gender role discrepancy and a subscale measuring gender role discrepancy stress. Finally, one quantitative study used a Likert-style single item measure to assess self-reported gender identity.

Three of the quantitative studies asked participants about their level of engagement with COVID-19 related safety precautions (Levant et al., 2022; Paramita et al., 2021; Schermerhorn & Vescio, 2023). Four studies were interested in participants' attitudes toward certain precautions (Cassino & Besen-Cassino, 2020; Mahalik et al., 2021; Palmer & Peterson, 2020). The remaining quantitative study measured both behavioral and attitudinal responses (Gerace et al., 2022). All studies were interested in attitudes or behaviors relating to mask wearing. Three studies also explored attitudes and behaviors regarding other COVID-19 safety precautions such as social distancing and hands washing (Cassino & Besen-Cassino, 2020; Levant et al., 2022; Paramita et al., 2021). Study characteristics can be seen in Table 2.

Quality of Studies

Studies were assessed for quality at the individual level. Qualitative studies were assessed using the Critical Skills Appraisal Program's Qualitative Checklist (CASP, 2018). As can be seen in additional online material Table S3 all qualitative studies were rated as good quality. Quantitative studies were assessed using the Appraisal Tool for Cross-Sectional Studies (AXIS; Downes et al., 2016) As can be seen in additional online material Table S4 (see https://osf.io/jszdr/), most (n = 6) studies were rated as good quality with the remaining two rated as moderate quality.

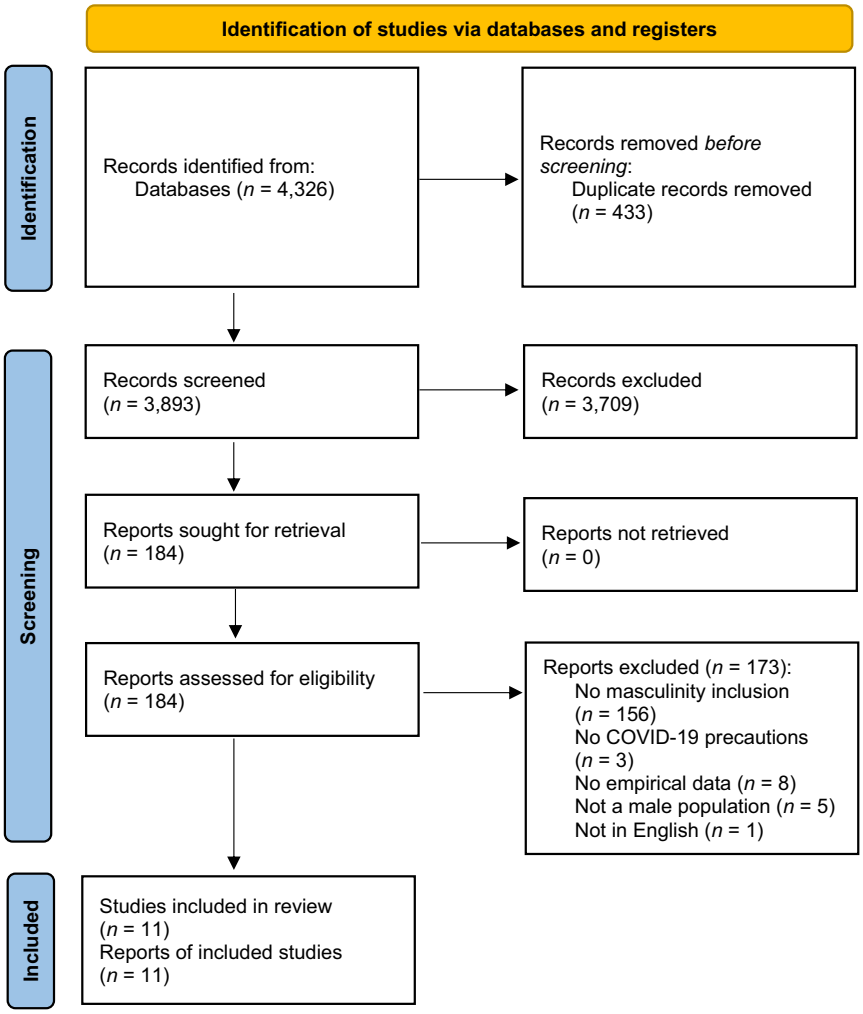
Results of Individual Studies

Univariate results of all studies are presented in Table 3.

Summary of Qualitative Findings

Findings from the qualitative studies were mixed. All authors shared participant responses indicating that men are less likely to engage in COVID-19 precautions than women. Shelus et al. (2020) and de Sousa et al. (2022) attributed this difference to men's

Figure 1
PRISMA 2020 Flow Diagram (Page et al., 2021)



Note. Despite attempts, zero records were identified using other means, including calls for unpublished data, Google Scholar searching, and citation searching. PRISMA = Preferred Reporting Items for Systematic review and Meta-Analysis. See the online article for the color version of this figure.

adherence to masculinity; however, Umamaheswar and Tan (2020) did not draw the same conclusion. Umamaheswar and Tan (2020) conducted interviews using open ended questions to explore men and women's experience of COVID-19. Using grounded theory to analyze results, they found that for women, but not for men, the choice to take precautions against COVID-19 was motivated by their desire to protect vulnerable family members. Based on this, the authors argue that men's more relaxed attitudes to precautions such as mask wearing is not related to masculinity but rather is a reflection of their limited care taking responsibility.

In contrast, de Sousa et al. (2022) explored the impact of masculinity more directly by asking their all male sample "as a man, have you noticed any impairments caused by the COVID-19 pandemic?" (de Sousa et al., 2022, p. 3). Some respondents attributed their lack of adherence to precautions to a sense of invulnerability based on their masculinity. For example, participants explained that "sometimes I don't feel so fragile and it's because men feel powerful to the point where they think 'it's a cold, which doesn't influence me. [sic]'" (using a collective subject discourse method). Additionally, the researchers observed that lock down measures threatened some respondents' sense of virility and status as a provider, contributing to increased neglect of their health.

The findings by de Sousa et al. (2022) are consistent with Shelus et al. (2020). These researchers used focus groups to identify motivations and barriers to the use of face masks as COVID-19 protection. The authors identified six barriers to face mask use, with one barrier (identity and autonomy) related to masculinity. Masculinity emerged as a subtheme within identity and autonomy, with participants suggesting that men tend to be less comfortable wearing masks out of a "pride type thing, or like I'm too cool for this or whatever." The researchers note that masculinity was only suggested as a barrier by White rural participants, with other

Table 2
Study Characteristics

Author	Design	Location	Male *N*	Male age (*M, SD*)	Masculinity measure	COVID-19 outcome
Cassino and Besen-Cassino (2020)	CS	United States	502	NR	Gender identity rated on a 6-point, scale running from *completely masculine* to *completely feminine*.	Attitudes toward wearing masks, isolation for positive cases, vaccinations, government alerts for close contacts of positive cases, and government sharing of personal health information to track the virus's spread.
de Sousa et al. (2022)	Q	Brazil	50	Ages ranged from 18 to 67 years (*M* and *SD* NR)	Not relevant (qualitative design)	Not relevant (qualitative design)
Gerace et al. (2022)	CS	United States	332	45.42 (16.01)	Masculinity subscale from Hofstede's (2013) values survey module.	Self-reported behavior regarding mask wearing and attitudes to state imposed COVID-19 restrictions.
Levant et al. (2022)	CS	United States	161	41.79 (15.90)	CMNI-30 (Levant et al., 2020) and five items from the MRNI-VB (McDermott et al., 2019).	Self-reported behaviors regarding mask wearing, frequent handwashing, cleaning surfaces, minimizing touching one's face, and social distancing. Responses were condensed into a single variable.
Mahalik et al. (2021)	CS	United States	596	31.33 (10.59)	CMNI-30 (Levant et al., 2020).	Attitudes toward wearing masks.
Palmer and Peterson (2020)	CS	United States	491	39.42 (11.90)	Toughness subscale from the MRNI (Levant et al., 2010).	Attitudes toward wearing masks.
Paramita et al. (2021)	CS	Indonesia	112	35.50 (*SD* NR)	The Male Female Relations Questionnaire (Sherman & Spence, 1997); A binary scale adapted from Spence et al. (1973) measuring masculinity and femininity characteristics.	Self-reported behaviors regarding mask wearing, frequent handwashing, social distancing, and restricting travel.
Schermerhorn and Vescio (2023)	CS	United States	119	For overall sample ages ranged from 18 to 41. *M* and *SD* for males NR	Male Role Norms Scale (Thompson & Pleck, 1986)	Self-reported behaviors that risked COVID infection including not wearing masks, not washing hands, and not socially distancing.
Sileo et al. (2023)	CS	United States	749	48.40 (17.80)	A modified version of Reidy et al. (2014)'s scale divided into a subscale measuring gender role discrepancy and a subscale measuring gender role discrepancy stress.	Self-reported vaccination status or intention to vaccinate, self-reported mask wearing, hand sanitization, and social distancing.
Shelus et al. (2020)	Q	United States	5	NR	N/A (qualitative design)	N/A (qualitative design)
Umamaheswar and Tan (2020)	Q	United States	17	Ages ranged from 18 to 78 years old (*M* and *SD* NR)	N/A (qualitative design)	N/A (qualitative design)

Note. CS = cross-sectional; Q = qualitative; NR = not reported; CMNI = Conformity to Masculine Norms Inventory; MRNI = Masculine Role Norms Index; MRNI-VB = Male Role Norms Inventory–Very Brief.

Table 3
Univariate Findings of Quantitative Research on Impact of Masculinity on Precautions (Pearson's r)

Author	Mask wearing	Hand washing	Social distancing	Travel restrictions	Stay home	Vaccinate	COVID-19 precaution
Cassino and Besen-Cassino (2020)	−.40*						
Gerace et al. (2022)	−.13*						−.26**
Levant et al. (2022)							−.01
Mahalik et al. (2021)	−.41**						
Palmer and Peterson (2020)	−.86**						
Paramita et al. (2021)	−.14*	.01	<.01	−.08	.01		
Schermerhorn and Vescio (2023)							−.31**
Sileo et al. (2023)	−.05	.04	.04		−.08**	<.01	

* $p < .05$. ** $p < .01$.

demographics more likely to share barriers such as fear of offending others or mixed messaging regarding mask efficacy.

Overview of Quantitative Results

Overall, most included studies reported negative relationships between men's adherence to masculine norms and self-reported attitudes and/or behaviors regarding COVID-19 precautions. The most commonly researched precaution was face masks; however, only six studies provided results for males (Cassino & Besen-Cassino, 2020; Gerace et al., 2022; Mahalik et al., 2022; Palmer & Peterson, 2020; Paramita et al., 2021; Sileo et al., 2023). All of these studies found a negative relationship between men's adherence to masculine norms and self-reported mask wearing attitudes and behaviors, although this relationship was not statistically significant for Sileo et al. (2023). Sileo et al. (2023) did, however, find that men who wished they had greater adherence to masculine norms were significantly less likely to wear masks than men who did not experience gender discrepancy stress.

Four studies included precautions other than face masks (Cassino & Besen-Cassino, 2020; Levant et al., 2022; Paramita et al., 2021; Sileo et al., 2023). Paramita et al. (2021) explored self-reported engagement with social distancing, frequent handwashing, or restriction of travel but did not find a significant relationship to masculinity. In contrast Cassino and Besen-Cassino (2020) found that men who rated themselves as completely masculine reported significantly less support for public bans on large gatherings, mandatory isolation for positive cases of COVID-19, and mandatory government sharing of personal health information to track COVID-19 compared to men who reported themselves as not completely masculine. Similarly, Sileo et al. (2023) found that men who wished they were more masculine were less likely to sanitize their hands, socially distance and vaccinate against COVID-19 than men who were not experiencing gender discrepancy threat.

Finally, three studies combined examined COVID-19 precautions as single dependent variable (Gerace et al., 2022; Levant et al., 2022; Schermerhorn & Vescio, 2023). Gerace et al. (2022) found a small, negative between masculinity and engagement in COVID-19 safety precautions, and Schermerhorn and Vescio (2023) found a moderate, positive relationship between masculinity and COVID-19 risk-taking behaviors. Levant et al. (2022) did not find a relationship between masculinity and adherence to the Centers for Disease Control and Prevention recommended precautions; however, they found a moderated effect in multivariate analysis.

Moderators and Mediators

The majority of the studies found a negative relationship between men's adherence to masculine norms and COVID-19 safety precautions through univariate analysis (Cassino & Besen-Cassino, 2020; Mahalik et al., 2021; Palmer & Peterson, 2020; Paramita et al., 2021). Four studies explored variables that may moderate or mediate the relationship between these variables. (Levant et al., 2022; Mahalik et al., 2022; Paramita et al., 2021; Sileo et al., 2023). Paramita et al. (2021) explored situational pathogen avoidance (i.e., the extent to which an individual is motivated to avoid pathogens). Although these authors found a significant negative relationship between men's self-rated masculinity and the attitude to mask wearing, this relationship was not moderated by situational pathogen avoidance.

Levant et al. (2022) explored the impact of the 10 masculine norms measured by the CMNI-30 (Levant et al., 2020). Only one direct path was found, with adherence to precautions positively related to conformity to the masculine norm of pursuit of status. A significant, indirect relationship between the playboy norm and compliance with COVID-19 precautions via belief in conspiracy theory—for men who endorsed conspiratorial attitudes, adherence to the playboy norm was negatively related to COVID-19 safety behaviors. Although at face value, it might be surprising for these variables to be the ones associated with COVID-19 behaviors, they do reflect the more hegemonic aspects of a traditionally masculine ideology and so this does make theoretical sense.

Sileo et al. (2023) found moderation effects for income, sexual orientation, and race. Income moderated the relationship between gender discrepancy stress and mask wearing and social distancing. Regarding income, for men experiencing gender discrepancy stress, those who earn less than $30,000 per year were less likely to wear masks and socially distance, whereas men who earn more than $100,000 per year were more likely to socially distance. Regarding sexual orientation, nonheterosexual men who experience gender discrepancy stress were less likely to socially distance than heterosexual men. They further found an interaction between race and gender-discrepancy stress, with gender discrepancy reducing the likelihood that minority men will vaccinate against COVID-19.

Finally, Mahalik et al. (2022) explored whether political ideology moderated the proposed relationship. These authors found that in general, conservative men had more negative attitudes to masks than liberal men. Specifically, they found that masculinity did not significantly impact attitudes toward mask wearing for conservative men but was related to less positive attitudes for liberal men.

Additionally, Mahalik et al. (2022) explored four mediators: perceived benefits of mask wearing, perceived barriers to mask wearing, belief in science, and empathy toward those vulnerable to COVID-19. Men's Conformity to Masculine Norms Inventory–30 scores were indirectly related to attitudes toward mask wearing through all four mediators. Perceived benefits of mask wearing, belief in science, and empathy were related to positive attitudes. Whereas perceived barriers to mask wearing were related to negative attitudes.

Extraneous Variables

Results were robust to several potential confounding variables. Palmer and Peterson (2020) and Schermerhorn and Vescio (2023) controlled for political partisanship. Palmer and Peterson (2020) and Mahalik et al. (2021) controlled for age. Mahalik et al. (2021) additionally controlled for race, education, participant, and/or household membership of a group at risk for COVID-19 and whether the participant was mandated to engage in COVID-19 safety precaution through local government and workplace rules. Schermerhorn and Vescio (2023) controlled for personal experience with COVID-19.

Meta-Analysis

Effect Sizes

The systematic search identified six studies reporting the correlation between mask wearing and masculinity ($n = 2{,}782$) and three studies reporting the correlation between general COVID-19 precautions (nonspecific) and masculinity ($n = 612$)—the remaining precautions were not reported frequently enough to warrant meta-analysis. As such, two meta-analyses were conducted, and each produced a positive and significant effect size. Specifically, the effect size for mask wearing was strong, and the effect size for COVID-19 precautions was weak (see Table 4).

Heterogeneity

In each analysis, the Cochran's Q value was significant and greater than 70, indicating the presence of high levels of heterogeneity (see Table 4). This suggests that other factors may be moderating these effects; however, we were unable to identify potential moderators in the data, and so subgroup analyses were not conducted.

Discussion

The present review synthesized the existing research exploring the relationship between men's adherence to masculine norms and their attitudes and behaviors toward COVID-19 safety precautions. Our systematic search revealed a small number of studies exploring this relationship. Overall, meta-analytic findings from the quantitative research indicates that, for men, greater adherence to masculine norms is associated with lower support for and engagement in mask wearing and generic COVID-19 precautions. This research, however, yielded insufficient evidence regarding other specific forms of precautions, and so meta-analysis for other forms (e.g., hand washing, social distancing) were unable to be meta-analysed.

Similar to the quantitative research, the three qualitative studies found that male interviewees tended to report a lack of engagement with COVID-19 safety precautions. Consistent with the quantitative findings, Shelus et al. (2020) and de Souza et al. (2022) found evidence attributing this to men's adherence to masculine norms. Umamaheswar and Tan (2020), however, argued that men's limited of engagement with precautions can be better attributed to their limited caretaking responsibilities for vulnerable children and older people.

Masculinity and COVID-19 Precaution Type

The quantitative research predominantly examined men's attitudes toward and self-reported behaviors regarding mask wearing (Cassino & Besen-Cassino, 2020; Mahalik et al., 2021; Palmer & Peterson, 2020; Paramita et al., 2021; Reny, 2020). The finding that adherence to masculine norms is negatively related to mask wearing provide insight into the gender gap in mask wearing that has been well documented by observational studies (e.g., Howard, 2021; Trevas et al., 2023). Although observational studies show similar gender gaps regarding other precautions such as social distancing (e.g., Trevas et al., 2023), the present review found mixed evidence for the link between adherence to masculinity norms and nonmask wearing.

Mixed support was found for handwashing and social distancing. Specifically, Paramita et al. (2021) found no relationship between these variables and masculinity, while Sileo et al. (2023) found that men who would like to be more masculine are less likely to wash their hands and socially distance. Similarly, Cassino and Besen-Cassino (2020) found that, compared to men who reported themselves as not completely masculine, self-reported completely masculine men held significantly less support for bans on large gatherings, mandatory isolation for positive cases, and mandatory government tracking COVID-19-related health information.

Table 4

Meta-Analytic Statistics Summarizing Quantitative Research on Impact of Masculinity on Precautions (Pearson's r)

	Combined effect size					Included subject and study		Heterogeneity	
		95% CI							
Precaution	Correlation	*LL*	*UL*	*Z*	*p*	*n*	*k*	*Q*	I^2
Mask wearing	−.52	−.09	.31	−1.66	.049*	2,782	6	1789.59	99.72%
COVID-19 precautions	−.18	−.51	.20	−.203	.021*	612	3	7.22	72.30%

Note. k = number of effects in the analysis; CI = confidence interval; *LL* = lower limit; *UL* = upper limit.
* $p < .05$.

Precarious Manhood Theory

The present review adds to the wealth of research demonstrating that greater adherence to masculine norms is negatively related to a range of health-related attitudes and behaviors for men (e.g., Wong et al., 2017).

Consistent with precarious manhood theory, many of the authors of the included studies argue that men who view themselves as highly masculine typically find behaviors that risk their health, such as not wearing masks, affirms their sense of masculine toughness (e.g., Levant et al., 2020). Support for this proposed mechanism is found in both qualitative and quantitative studies included in this review. For example, quantitative analysis by Palmer and Peterson (2020) used only the toughness subscale of the MRNI () and yielded the strongest effect size of the studies. Whereas qualitative analysis by de Sousa et al. (2022) found that perceived invulnerability to Covid due to male toughness was a dominant theme of their interviews. For example, one respondent who described disengagement with mask wearing reported "the idea of a strong man, has led not to fear the COVID-19."

Providing further evidence for this proposed mechanism, Sileo et al. (2023) found that, after controlling for a range of demographic covariates, self-reported conformity to masculine norms was not related to mask wearing, however men who self-reported that they wished they were more masculine, were less likely to wear them. Mahalik et al., 2022, further indicates this mechanism may explain the discrepant results between mask wearing and other forms of COVID-19 precautions. These authors argue that as masks are a visible sign of compliance, unlike more inconspicuous precautions such as hand washing, they present a greater threat to masculinity (Mahalik et al., 2022).

Of the included studies, only one challenges the idea that antimask attitudes and behaviors grows from a desire to embody masculine norms (Umamaheswar & Tan, 2020. Instead, Umamaheswar and Tan (2020) argue that, compared to women, men tend to have less care responsibility for children and the elderly and are therefore are less concerned about mitigating the spread of COVID-19. This argument is supported by research revealing that since the beginning of the pandemic, women tended to experience greater responsibility for care tasks than men (Power, 2020). It could be argued, however, that men's reduced caregiving responsibilities is, in itself, a reflection of adherence to masculine norms (e.g., Petts et al., 2018). Nevertheless, quantitative researchers may wish to control for caregiving in future analyses.

Extant Research Strengths and Limitations

As demonstrated in the quality assessments (see additional online material Tables S3 and S4; https://osf.io/jszdr/), many of the included studies were of a high quality. The strengths of these studies include representative sampling and reporting that would allow for replication. Additionally, almost all studies controlled for a number of extraneous variables, providing further weight to their findings (Cassino & Besen-Cassino, 2020; Mahalik et al., 2021; Palmer & Peterson, 2020; Paramita et al., 2021).

Several study limitations should also be acknowledged. One limitation relates to the challenge of measuring men's adherence to masculine norms. The lack of consistent measure used by the included studies made it difficult to directly compare results. Furthermore, as research indicates that masculinity is an evolving construct (Wade, 2015), some of the older measures used, that is, Spence et al. (1973) as used by Paramita et al. (2021), may not reflect current masculine norms. Consistent use of a recently validated measure such as the CMNI-30 (Levant et al., 2020) would provide better insight.

A further limitation relates to the samples used. Aside from Paramita et al. (2021) and Schermerhorn and Vescio (2023), all samples were predominantly White, U.S. males. This limits the cultural applicability of the present findings. Cross-cultural research has revealed that masculinity is conceptualized differently across cultures. For example, the concept of "machismo" common to South American cultures differs from Western concepts of masculinity (Walters & Valenzuela, 2020). As COVID-19 is a global issue, future research should examine whether the link between masculinity and COVID-19 precautions exists cross-culturally.

Systematic Review Strengths and Limitations

The present review has strengths to be acknowledged. Specifically, the review was preregistered through Prospero to ensure transparent research practice. In order to further maintain the transparency and scientific rigor of the review, the latest PRISMA guidelines were followed. This review does, however, have several limitations that should be considered.

Limitations include the restriction of the systematic search to four databases, which may not be sufficient to capture all extant research. Limiting the search to English language research excluded one study that may have been relevant (Vuković, 2021), and this may have limited the cross-cultural applicability of findings. Furthermore, as the COVID-19 pandemic is ongoing, more recent research may have emerged since this systematic search was conducted.

It is also important to acknowledge the high levels of heterogeneity that were present in the meta-analyses. These could be explained by the limitations of the extant literature (i.e., issues of measurement, issues of construct conceptualization, etc); however, due to small number of effects, we were unable to statistically explore this heterogeneity.

Recommendations for Future Research

Based on the present research, future researchers may wish to explore how masculinity could be used in psychoeducational campaigns. The present studies use measures that represent traditional masculinity (e.g., Spence et al., 1973). However, theorists have highlighted the emergence of positive masculinity (e.g., Kiselica et al., 2016). This construct of masculinity highlights men's capacity to protect others. Researchers have developed psychoeducation campaigns that promote positive masculinity in order to encourage health-related behavior such as help seeking for mental health concerns (Watkins et al., 2017, 2020) and the use of condoms (Gibbs et al., 2020). Future research should explore whether similar psychoeducation campaigns could be used to encourage mask wearing in men.

Future researchers may also explore whether the present findings extend to COVID-19 precautions that are not evidence based. The extant research has explored COVID-19 safety behaviors that are supported by the scientific community (e.g., face masks and handwashing). Research shows however that some members of the

public engage in nonevidence base measures such as taking Ivermectin and Hydroxychloroquine (Baker & Maddox, 2022). As Mahalik et al. (2021) has demonstrated that belief in conspiracy theory plays a moderating role in the relationship between masculinity and mask wearing, future research may also like to consider the role of masculinity in COVID-19 precautions beyond those recommended by the Centers for Disease Control and Prevention. This research could play an important role in preventing the ongoing spread of COVID-19.

Finally, it is worth noting that local and global preferences for what constitutes an adequate precaution against the spread of COVID-19 continues to evolve. For instance, in the early days of COVID-19, there was a strong preference for "staying at home" resulting in sometimes lengthy lockdowns around the world. However, as strategies for managing the pandemic evolve, this has become less favored to strategies focusing on vaccinations and handwashing (see Anderson et al., 2020; Politi et al., 2021). As such, it is worth interpreting the findings of these studies based on the time and location in which the data were collected and understanding that the findings should be contextualized appropriately if being compared to future findings.

Conclusion

As the COVID-19 pandemic continues to unfold, it is essential to gainan understanding of the barriers associated with the use of masks and other safety precautions. The quantitative research assessed by the present review provides evidence that, for men, greater adherence to masculine norms is related to negative attitudes toward and lower reported use of masks and to general COVID-19 precautions, which was supported by the findings from the qualitative research. There was, however, insufficient evidence to draw conclusions about other precautionary behaviors, such as vaccination, handwashing, and social distancing. The findings from the present review have implications for policy makers seeking to curb the spread of COVID-19. Consistent with research relating to the men's health gap (e.g., Wong et al., 2017), policy makers may like to explore the potential of psychoeducation campaigns that highlight positive masculinity to encourage mask wearing. Continued research should also explore the cross-cultural validity of the present findings. Ongoing research seeking to understand and overcoming men's barriers to mask wearing is a vital step in the fight against the continuing pandemic.

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