

Pandemic prevention and personality psychology: Gender differences in preventive health behaviors during COVID-19 and the roles of agreeableness and conscientiousness

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ABSTRACT

One of the greatest public health crises in recent times, the COVID-19 pandemic, has come with a myriad of challenges in terms of health communication and public cooperation to prevent the spread of the disease. Understanding which are the key determinants that make certain individuals more cooperative is key in effectively tackling pandemics and similar future challenges. In the present study ($N = 800$), we investigated whether gender differences in compliance with preventive health behaviors (PHB) at the onset of the COVID-19 pandemic could be established, and, if so, whether the personality traits of *agreeableness* and *conscientiousness* could help explain this presumed relationship. Consistent with our theorizing, we found women to score higher than men on agreeableness and conscientiousness, and to be more willing to comply with a set of PHB. Importantly, both personality traits were found to mediate the gender-compliance link. This means that women's greater compliance levels with PHB could, at least in part, be attributed to their higher agreeableness and conscientiousness scores. A greater understanding of the determinants of PHB in terms of gender and associated personality traits may help identify options for developing more effective communication campaigns, both in terms of communication channel selection and message content.

1. Introduction

The COVID-19 pandemic has been discussed as one of the greatest public health crises [1–3]. Millions of people have been infected by the coronavirus, with a series of costly consequences emerging across the globe. Unsurprisingly, there has been a huge scientific effort to stop the spread of this infectious disease, and scholars from a wide array of disciplines have sought to contribute with novel knowledge aimed at achieving this overarching goal.

From a psychological perspective, several studies have found that certain personality traits and other individual differences are associated with individuals' compliance with preventive health behaviors (PHB), such as social distancing, personal hygiene, and wearing a face mask (e.g., [4,5]). Specifically, among the frequently discussed five broad personality traits, commonly referred to as the Big Five, conscientiousness and agreeableness have been shown to be important predictors of attitudinal and behavioral responses to the COVID-19 pandemic [6–10], with these specific facets of human personality often found to be more influential than the other three Big Five traits [11–14].

Gender differences have also been documented with respect to compliance rates during the pandemic, with women exhibiting greater compliance levels than their male counterparts on a series of preventive health measures [15–18]. Several studies, including large-scale investigations and multi-national collaborations, have demonstrated robust gender differences in agreeableness and conscientiousness. With women typically scoring higher on these personality traits than men [19–24], the present study examined whether gender differences in compliance with PHB could be established during the earlier phase of the COVID-19 pandemic (i.e., in April 2020), and, if so, whether differences in the aforementioned personality traits could help explaining this potential interplay. More formally stated, we tested the following four key hypotheses.

- H1: In terms of personality traits, women score higher than men on agreeableness.
- H2: In terms of personality traits, women score higher than men on conscientiousness.
- H3: In terms of compliance with PHB, women score higher than men on such preventive measures.

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H4: The link between gender and compliance with PHB was mediated by agreeableness and conscientiousness, such that women's higher scores on these personality traits could explain why they were more willing to comply with preventive measures.

2. Method

The data for this study were collected within the frames of a larger project, which investigated effective ways to address challenges associated with the COVID-19 pandemic [25–27]. The study was conducted in accordance with international standards for responsible conduct of research involving human subjects. Eight hundred participants were recruited from the online panel Prolific. As a first step, we used the same exclusion criteria as those described in detail in Otterbring et al. [25]. Moreover, given the purpose of the current study, we excluded five additional participants who did not identify with either the male or the female gender, leaving a final sample of 738 participants (51.5% female; $M_{age} = 30$ years). Given our one-tailed hypotheses, this sample size had a statistical power greater than 0.80 for detecting effect sizes as small as $r = 0.10$, assuming a conventional alpha level of 0.05 [28].

Participants who gave their consent to take part in the study were asked to indicate their level of compliance with a set of PHB in terms of their willingness to 1) isolate from others, 2) wear a face mask, and 3) frequently wash their hands (1 = not at all willing, 5 = extremely willing; [29]). These items were averaged to generate a composite index of compliance with PHB ($\alpha = 0.66$). Participants were subsequently asked to fill out a short version of the Big-Five personality traits inventory [30]. Both agreeableness and conscientiousness were measured using two 7-point agreement items (1 = strongly disagree; 7 = strongly agree), with one of the items reverse-coded per trait. The scores of the two items per trait were averaged to achieve the final scores, with higher values reflecting higher levels of agreeableness and conscientiousness, respectively. We varied the scale properties with respect to scale formats and scale points to mitigate common method bias [31–33]. Because message framing (positive vs. negative) and disease type (the Asian Disease vs. COVID-19) were also varied across participants, these factors were used as covariates in our analysis to control for potential confounds. See the Appendix for details about our experimental conditions and the variables included for the purpose of the current project.

3. Results

Table 1 shows the zero-order correlations between gender, agreeableness, conscientiousness, and compliance with PHB. As evidenced from the table, all correlations are significant and positive (Fig. 1).

To test H1–H3, we initially ran three independent sample *t*-tests, with gender (male vs. female) as the independent variable and agreeableness, conscientiousness, and compliance with PHB, respectively, as the

Table 1
Zero-order correlations between the focal variables.

Variables	1	2	3	4
1. Gender	1.00			
2. Agreeableness	0.18**	1.00		
3. Conscientiousness	0.10*	0.21**	1.00	
4. Compliance with PHB	0.20**	0.17**	0.17**	1.00

Note. * $p < .01$; ** $p < .001$.

dependent variable. Supporting H1–H3, women were significantly more agreeable ($\bar{X} = 4.86$; $S = 1.10$ vs. $M = 4.48$; $SD = 1.04$), $t(736) = 4.83$, $p < .001$, $\eta^2 = 0.03$, more conscientious ($M = 5.17$; $SD = 1.20$ vs. $M = 4.93$; $SD = 1.10$), $t(736) = 2.80$, $p = .005$, $\eta^2 = 0.01$, and more willing to comply with PHB compared to men ($M = 4.63$; $SD = 0.49$ vs. $M = 4.40$; $SD = 0.66$), $t(736) = 5.39$, $p < .001$, $\eta^2 = 0.04$; see Fig. 2.

Finally, we conducted a parallel mediation analysis (Model 4; [34]) to test our proposed mediation hypothesis (H4). Gender (male = 0, female = 1) served as the predictor, agreeableness and conscientiousness (both continuous) served as the two parallel mediators, and compliance with PHB (continuous) served as the outcome variable. We included framing (positive vs. negative) and disease type (Asian Disease vs. COVID-19) as covariates in our analysis to control for the influence of these potential confounds, but the nature and significance of our findings remained unchanged if these factors were excluded. The tested model explained approximately 8 percent of the variance in participants' compliance levels ($R^2 = 0.077$). Crucially, the results revealed that the effect of gender on compliance with PHB was mediated through both agreeableness ($b = 0.04$; 95% CI = [0.012, 0.073]) and conscientiousness ($b = 0.03$; 95% CI = [0.007, 0.056]), thus indicating that female (vs. male) participants were more inclined to comply with PHB at least in part because they were more conscientious and more agreeable than their male counterparts. As such, H4 was supported.

4. Discussion

In the present research, we investigated potential gender differences in individuals' compliance with a set of preventive health measures (i.e., social distancing, wearing a face mask, hand hygiene), as introduced during the COVID-19 pandemic. Further, we examined whether the personality traits of agreeableness and conscientiousness mediated the role of the hypothesized gender differences in shaping compliance responses. Consistent with our theorizing and previous related research, we found women to score higher than men on agreeableness and conscientiousness, and to be more willing to comply with the preventive health measures studied herein. Importantly, both personality traits were found to mediate the gender-compliance link. Thus, women's greater compliance levels within the realm of preventive health measures during a public

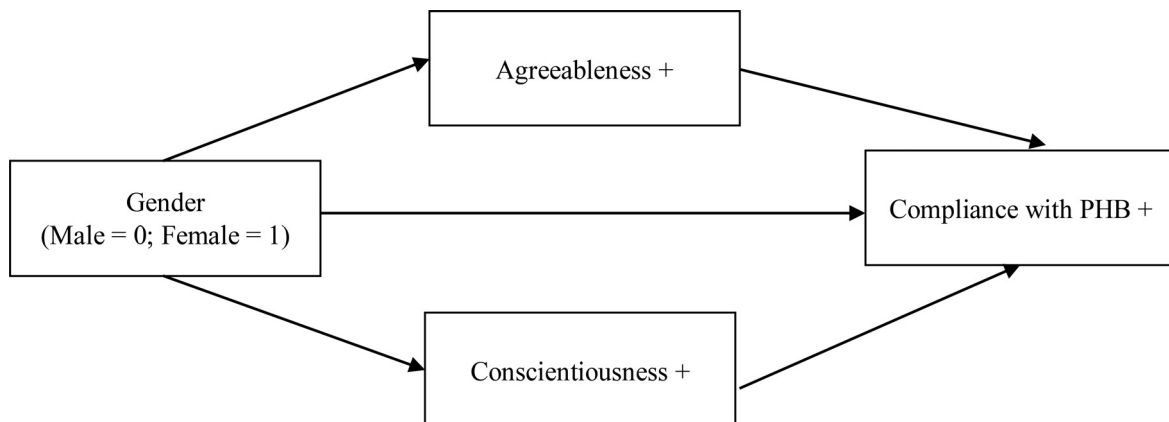


Fig. 1. Conceptual model.

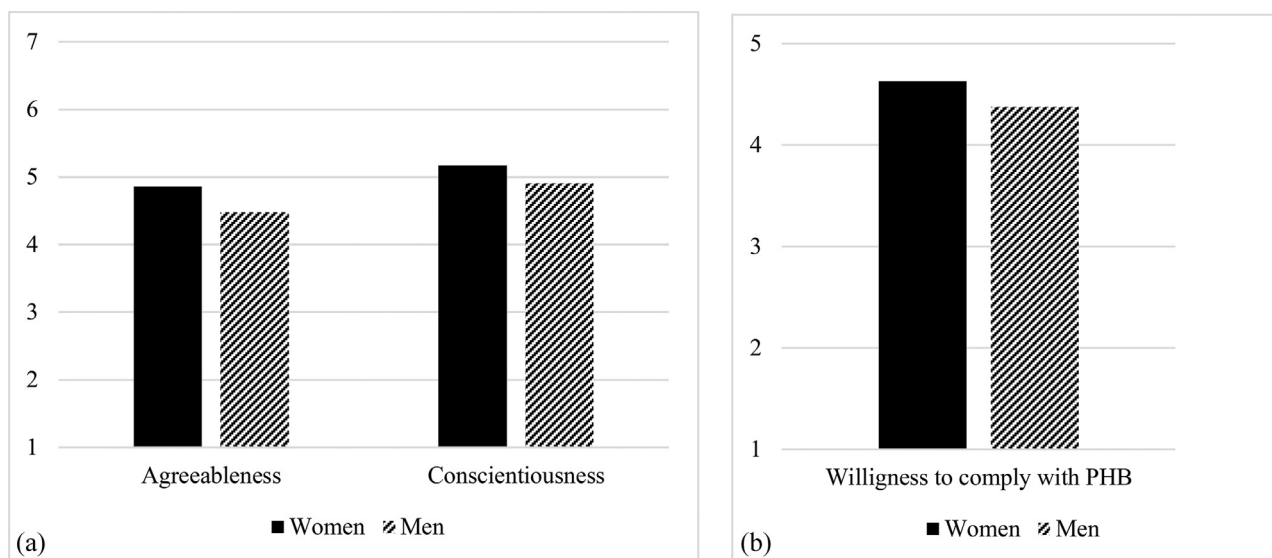


Fig. 2. Gender differences in agreeableness, conscientiousness, and compliance with PHB.

health crisis can, at least in part, be attributed to their higher agreeableness and conscientiousness scores.

Previous research has consistently reported that men appear to be less compliant with multiple PHB. Accordingly, they are generally less likely to engage in self-care techniques when they are sick (e.g., staying in bed), less likely to have regular screenings and check-ups (e.g., for cholesterol, blood pressure, cancer), and less likely to follow preventive treatments (e.g., take medicine for blood pressure), just to name a few examples (for a review, see [35]). There are numerous theories as to why such gender-differentiated patterns emerge, including traditional gender roles and men's perceived invulnerability to risk [36,37]. Building on previous studies reporting gender differences in agreeableness and conscientiousness [19–24], our study indicates that such differences in personality could at least partially explain behavioral patterns of this type. Indeed, agreeableness is a dimension associated with maintenance of positive interpersonal relations and conflict avoidance [38], and characteristics that might explain a tendency to perform normative behaviors (e.g., compliance with preventive behaviors). As for conscientiousness, certain self-regulatory processes associated with this personality trait (e.g., the ability to control one's behavior and to perform a given task) could aid the performance of otherwise aversive behaviors, including compliance with health behaviors [39], as examined herein.

Although our obtained effect sizes were typically small to moderate by conventional standards [40,41], our results may still have practical implications. In fact, the strengths of our relationships are at least as strong as the link between extraversion test scores and success in sales or between antihistamine use and reduced sneezing [42]. Thus, multiply our obtained gender differences by the number of men and women in the world and bear in mind the ease with which brief measures of personality traits can be collected, and it should become evident why the current findings are relevant [43]. For example, a greater understanding of the determinants of PHB in terms of gender and associated personality traits may help identify options for developing more targeted communication campaigns, both in terms of communication channel selection and message content [44,45].

One suggestion for future research, which could not be addressed in the current investigation given our country characteristics, is to test whether the gender difference in compliance would be greater in more gender egalitarian countries. Because the gender equality paradox indicates that the greatest gender differences in personality traits and other important aspects of social life exist in the most gender egalitarian cultures [22,23,46–52], future research could test whether such find-

ings also extend to compliance with preventive health measures during global health crises.

In closing, some potential limitations should be acknowledged. The present study recruited participants through a crowdsourced online platform without asking questions about participants' educational, occupational, or socioeconomic status. While a critic may therefore question the representativeness and quality of our data, it should be noted that online panel studies are typically 1) *more* representative than studies based on other common sample types [53–56], and 2) often yield comparable or *higher* data quality when compared to that obtained through traditional samples [57–60]. Moreover, Prolific participants frequently outperform other online panels in terms of data quality on aspects such as attention, comprehension, and reliability [61]. In fact, even non-probabilistic online panel responses have been shown to generate data quality comparable to face-to-face survey responses by means of reliability and validity [62]. Recent meta-analytic evidence further indicates that online panel data have similar psychometric properties with respect to internal reliability estimates for scales and effect size estimates for the relationships between independent and dependent variables, while simultaneously producing “criterion validities that generally fall within the credibility intervals of existing meta-analytic results from conventionally sourced data” ([63], p. 425). Nevertheless, future studies should optimally collect data on participants' educational, occupational, and socioeconomic status to ensure generalizability of our results.

Conflicts of Interest statement

The authors do not have any conflicts of interest to disclose.

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Appendix. Experimental Conditions and Measures

Experimental Conditions

Below, we specify the conditions used in the 2 (framing: positive vs. negative) \times 2 (disease type: real = COVID-19 vs. hypothetical = Asian disease) between-subjects design, with framing and disease type treated

as covariates in the current research. We used the Asian disease as the hypothetical disease, just as in the original framing studies by Tversky and Kahneman (1981) [64].

Positive Framing, COVID-19: Your country is preparing for another outbreak of the Coronavirus, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:

- If Program A is adopted, 200 people will be saved;
- If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved.

Negative Framing, COVID-19: Your country is preparing for another outbreak of the Coronavirus, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:

- If Program C is adopted 400 people will die;
- If Program D is adopted there is 1/3 probability that nobody will die, and 2/3 probability that 600 people will die.

Positive Framing, Asian Disease: Imagine that your country is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:

- If Program A is adopted, 200 people will be saved;
- If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved.

Negative Framing, Asian Disease: Imagine that your country is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:

- If Program C is adopted 400 people will die;
- If Program D is adopted there is 1/3 probability that nobody will die, and 2/3 probability that 600 people will die.

Measures

Apart from the control variables described above and participants' gender and age, the following key measures were used for the purpose of the current research, structured according to their respective constructs.

Personality Traits [30]

Here are a number of personality traits that may or may not apply to you. Please indicate the extent to which you agree or disagree with each of these statements. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

Agreeableness

- 1 Critical, quarrelsome (1 = strongly disagree; 7 = strongly agree; reverse coded)
- 2 Sympathetic, warm (1 = strongly disagree; 7 = strongly agree)

Conscientiousness

- 1 Dependable, self-disciplined (1 = strongly disagree; 7 = strongly agree)
- 2 Disorganized, careless (1 = strongly disagree; 7 = strongly agree; reverse coded)

Compliance with Preventive Health Behaviors (cf. Taylor et al., 2009)

This program requests co-operation from the public in a number of ways. Please indicate ...:

- 1 How willing would you be to isolate yourself from others? (1 = not at all willing; 5 = extremely willing)
- 2 How willing would you be to wear a face mask? (1 = not at all willing; 5 = extremely willing)
- 3 How willing would you be to frequently wash your hands? (1 = not at all willing; 5 = extremely willing)

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