

Attitudes towards social distancing in response to COVID-19

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Abstract

Objectives: COVID-19 has highlighted differences in our engagement in health prevention behaviors. The Health Belief Model (HBM), personality traits (conscientiousness, extraversion, and neuroticism), and sociodemographic variables were used to evaluate social distancing during the first month of a state-mandated Stay At Home (SAH) order.

Design: A web-based convenience sample of 645 Ohioans was surveyed. Hierarchical linear regression and mediation analysis were used to examine predictors of social distancing attitudes and behaviors and whether health beliefs mediated the relationship between personality and social distancing.

Results: Most respondents agreed with and adhered to social distancing guidelines. HBM constructs were strong predictors of SAH attitudes, while personality accounted for little additional variance. Anxiety was indirectly related to overall social distancing attitudes and behavior through its relationship with health beliefs. However, violations of social distancing were best explained by situational factors (e.g., being an essential worker).

Conclusion: The results demonstrate the power of components of the HBM to explain attitudes and behaviors regarding the SAH order beyond any contribution from personality. By examining the role of personality and health beliefs on social distancing attitudes and behaviors, this research will benefit public health nurses and others tasked with communicating and promoting preventative health behavior.

KEYWORDS

COVID-19, health belief model, pandemic, personality traits, social distancing

1 | INTRODUCTION

1.1 | Background

In spring 2020, widespread awareness of the COVID-19 pandemic and emphasis on social distancing as a primary means for reducing the spread of COVID-19 provided an opportunity to examine individual differences in health beliefs and behaviors. In March and April of 2020, government orders prohibited gatherings of any size and closed most

nonessential businesses. Government websites called for a 6-foot distance from non-household members when engaging in essential activities, like going to the grocery store or receiving medical care (Ohio Department of Health, 2020).

The purpose of this study was to examine how personality, health beliefs, and sociodemographic characteristics influenced Ohioans' attitudes about social distancing and their social distancing behavior. Of special interest was whether personality was directly associated with health behavior, or whether health beliefs mediated this relationship.



1.2 | Social distancing

Given the time it takes to develop vaccines, encouraging community-wide social distancing may be an effective way to reduce the spread of infectious disease, especially as a first response during a pandemic (Scriven, 2011). However, there are obstacles to social distancing, even when it appears to be a logical solution (Scriven, 2011). In a computer simulation of an infectious disease epidemic, subjects initially indicated intentions to engage in social distancing in response to an outbreak, but ultimately demonstrated little social distancing, suggesting that it may be difficult for many individuals (Williams et al., 2015). Some factors may help predict who is likely to engage in recommended social distancing practices during an epidemic, and thus allow tailoring of communication to reach those who are reluctant to follow recommendations.

1.3 | Personality

Personality traits of conscientiousness, extraversion, and neuroticism (Costa & McCrae, 1995) are likely to be relevant for understanding adherence to social distancing recommendations. For example, conscientious individuals are dutiful rules-followers and conscientiousness is predictive of health behaviors such as medication adherence (Eustace et al., 2018; Molloy et al., 2014) and adherence to instructions during cancer treatment (Lima et al., 2018).

Extraverted individuals feel energized by time spent with others, and report less social isolation (Whaite et al., 2018). Loneliness and extraversion are inversely related, particularly in younger individuals (Buecker et al., 2020). However, extraversion is also inversely related to a preference for solitude, as introverted individuals seek out more alone time, and experience less boredom (Burger, 1995). Enforced solitude, particularly for younger individuals or those who are living alone during a social distancing mandate, might be particularly unpleasant for extraverts.

Finally, the anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability (Costa & McCrae, 1995) comprising neuroticism may be particularly salient during a pandemic. Because neuroticism is predictive of loneliness (Buecker et al., 2020) and a sense of social isolation (Whaite et al., 2018), individuals high on this dimension may find social distancing more difficult, especially considering relationships found between negative affect, limited self-reported health behaviors, and the belief that such behaviors are burdensome and less helpful (Sanford & Rivers, 2020).

1.4 | Health belief model (HBM)

The HBM, first proposed in the 1950s to understand individuals' likelihood to engage in health promoting behavior, is now one of the most widely used models in health behavior research (Champion & Skinner, 2008; Dempster et al., 2018; Shahrabani & Benzion, 2012). It has

been used to understand health behaviors intended to prevent infectious disease, including vaccinations for HPV (Schaefer Ziemer & Hoffman, 2013), H1N1 (Ashbaugh et al., 2013; Hilyard et al., 2014), and influenza (Shahrabani & Benzion, 2012). The initial model included four major constructs: perceived susceptibility to a threat, perceived severity, perceived benefits of engaging in the health behavior, and perceived barriers such as cost and inconvenience (Champion & Skinner, 2008). Additional constructs have been added, including cues to action, health motivation, knowledge, and self-efficacy, but their use is inconsistent across studies (Champion & Skinner, 2008; Fall et al., 2018).

The HBM is particularly useful in studying responses to widespread health risks, like pandemics, with recommended prevention behaviors. In a web survey evaluating intentions to receive the H1N1 vaccine, the perceived severity of H1N1 was the strongest predictor (Ashbaugh et al., 2013). In another survey using the HBM, among other models, strong predictors of an intention to get the H1N1 vaccine included age (i.e., older individuals had stronger intentions) and the perceived benefits of the vaccine (Myers & Goodwin, 2012). Similarly, perceived severity and perceived benefits were strongly associated with individuals' willingness to avoid crowded places during H1N1, although perceived susceptibility and perceived barriers were not (Durham et al., 2012). Both perceived susceptibility and perceived benefits were significant predictors of intentions to get the seasonal flu vaccine in a web survey of college students (Fall et al., 2018).

1.5 | Relationships between personality traits and the HBM

While few studies have simultaneously examined personality and health beliefs, there is evidence that health beliefs may mediate the relationship between personality and health behavior (Nowak et al., 2020; Sanford & Rivers, 2020; Yoshitake et al., 2019). Sanford and Rivers (2020) found a positive correlation between conscientiousness and following health-related instructions and guidelines. Additionally, individuals scoring higher in conscientiousness felt more strongly about the benefits of following health-related instructions, and perceived fewer or lesser burdens in following the guidelines, while those with a strong negative affect indicated significantly higher burdens and fewer benefits to engaging in the health behaviors (Sanford & Rivers, 2020).

Yoshitake et al. (2019) study of the health behaviors for preventing tuberculosis (TB) in Japan included dimensions of the HBM and personality (neuroticism and agreeableness), as well as a cultural "collectivistic orientation of interdependence, cooperation, and mutual sharing" (p. 2). They found that the HBM provided a good fit for the data, but when personality and personal/social concerns were added, they ultimately explained 21% of the variance in TB prevention behavior. Neuroticism was positively associated with individuals' perceptions of susceptibility, severity, and cues to action; and negatively associated with net benefits of TB preventative behaviors (perceived benefits minus perceived barriers) (Yoshitake et al., 2019).

1.6 | Sociodemographic variables

Health beliefs may also mitigate the relationship between sociodemographic variables and health behavior. For example, when including beliefs about H1N1 vaccination, the associations between sociodemographic variables such as race/ethnicity, age, and education, and H1N1 vaccination were no longer significant (Galarce et al., 2011). However, Black participants were least likely to perceive the H1N1 vaccine as safe (Galarce et al., 2011).

Due to the nature of social distancing requirements, employment status and living situations may have impacted individuals' attitudes toward and ability to comply with a Stay at Home (SAH) order. In Ohio, for example, jobs were classified as "essential" and "nonessential." While there was debate about these classifications, essential jobs generally included were those related to health care, food supply, and transportation (Ohio Department of Health, 2020). Those in nonessential jobs worked remotely, were furloughed, or lost their jobs. Noncompliance with social distancing guidelines may be a consequence of jobs requiring proximity with other individuals. Additionally, the degree of isolation and barriers to comply with social distancing guidelines likely varied based on whom one was sheltering with and one's ability to cope with isolation.

1.7 | Hypotheses

There is reason to predict that some individuals may have more favorable attitudes toward social distancing and may be more likely to comply with social distancing guidelines than others. In particular, this study evaluates the impact of conscientiousness, extraversion, and neuroticism on health beliefs as predictors of individuals' endorsement and compliance with orders to stay at home during the COVID-19 pandemic by addressing the following predictions:

1. Older, White, females will be more likely to agree with social distancing and more likely to comply with a social distancing order.
2. Conscientiousness will increase social distancing, while extraversion and neuroticism will negatively affect social distancing attitudes and behaviors.
3. Perceived barriers will decrease social distancing, while perceived benefits, perceived severity, and perceived susceptibility will positively affect social distancing attitudes and behaviors.
4. Conscientiousness, extraversion, and neuroticism will have an indirect effect on social distancing attitudes and behaviors. The relationship will be mediated by health beliefs.

2 | METHOD

2.1 | Sample

The population of interest was Ohio residents 18 and over living under the SAH order, which was in effect from March 23, 2020, to April 30,

2020 (Ohio Department of Health, 2020). The focus on residents from a single state ensured that all participants had been experiencing the same regulations. An initial email with a link to an online survey was sent to constituents of a small Midwestern Catholic liberal arts institution ($n = 4262$). The email included a request to share a link to the survey by email or social media with friends and family throughout the state. This resulted in an initial convenience sample, followed by snowball sampling. The survey and this sampling method were approved by the university's institutional review board.

2.2 | Measures

The survey assessed basic demographics and social distancing attitudes and behavior (written by the study authors), personality traits of conscientiousness, extraversion, and neuroticism (IPIP-NEO 60, Maples-Keller et al., 2017), and modified questions from the HBM (adapted from Fall et al., 2018). The survey was administered from March 31, 2020, to April 30, 2020, using Microsoft Forms.

2.2.1 | Social distancing

Participants were asked if they were familiar with the Ohio SAH order. They were then asked how they **felt** about following the basic guidelines using a 5-point scale (SDQ1). The scale provided text to anchor the endpoints only:

- 1 = I do not feel the guidelines are important at all. We should all be going about our normal lives as much as possible.
- 5 = I feel very strongly that the guidelines are important. We should all be following the guidelines strictly whenever possible—perhaps even going above and beyond what is required in order to practice social distancing.

Next, they were asked how well they thought they were **adhering** to it also using a 5-point scale (SDQ2). The scale provided text to anchor the endpoints only:

- 1 = I have not altered my behavior as a result of the SAH order. I am not trying to practice social distancing.
- 5 = I have been following the guidelines strictly whenever possible—perhaps even going above and beyond what is required in order to practice social distancing.

If they were social distancing, they were asked to indicate the date on which they started. They were then given a list of activities that may have reduced their social distancing (e.g., picking up food) and asked to select all that applied. Finally, they were asked to indicate the number of times they had come within 6 feet of individuals not in their household, either intentionally or unintentionally, in the last seven days. Non-numerical answers were recoded as numerical responses when

**TABLE 1** Reliability analysis and revision to Health Belief Model Components

Health belief component	Items after revision (factor loadings)	Cronbach's α following revision	Range	M (SD)
Benefits	Following social distancing guidelines will slow down the spread of Covid-19. (.76)	.75	3 to 15	13.8 (2.0)
	Following social distancing guidelines will protect others in my household from getting Covid-19. (.59)			
	Society has a lot to gain by following social distancing guidelines. (.69)			
Severity	The thought of getting Covid-19 scares me. (.74)	.66	3 to 15	11.6 (2.5)
	If I got Covid-19, it would be more serious than other diseases. (.66)			
	Getting Covid-19 would disrupt my family. (.55)			
Barriers	Following social distancing interferes with my daily activities. (.83)	.78	5 to 25	14.8 (4.6)
	Social distancing is not convenient for me. (.77)			
	In order to follow social distancing guidelines, I would have to give up quite a bit. (.73)			
	Following social distancing guidelines can be unbearable. (.69)			
	There are too many difficulties associated with following social distancing guidelines. (.53)			
Susceptibility	My chances of getting Covid-19 are good. (.82)	.76	2 to 10	6.3 (1.9)
	I feel the chances of getting Covid-19 in the future are good. (.79)			

possible (e.g., "5 to 10" became "7.5") and nonspecific high numbers (e.g., "too many to count," $n = 18$) were given a max value of 50.

2.2.2 | Personality domains

Extraversion, neuroticism, and conscientiousness were measured using the IPIP-NEO-60 (Maples-Keller et al., 2017), which represents six facets of each broad personality domain. Respondents were asked to rate on a 5-point Likert scale the degree to which each of the 36 statements is true of them. For the domains of interest, reliability coefficients in an online sample of 405 adults were strong (α 's = .87 to .89), as were convergent validity correlations (r 's = .79 to .87) (Maples-Keller et al., 2017). In the current sample, Cronbach's α coefficients were .80, .83, and .75 for neuroticism, extraversion, and conscientiousness, respectively.

2.2.3 | Health belief model

A modified version of the HBM originally used to measure college students' intentions to get the seasonal flu vaccine guided development of the HBM constructs (Fall et al., 2018). Our study focused on the four most commonly used components of the HBM: susceptibility, severity, benefits, and barriers. When appropriate, "flu" was replaced

with "COVID-19," and "getting the flu vaccine" with "following social distancing guidelines". For several items, such substitutions were not appropriate, so these were dropped (e.g., "I will get COVID-19 next year."). The items were rated on a 5-point Likert scale (from strongly disagree to strongly agree). All items were coded so that higher scores indicated higher levels of perceived dimensions.

The reliability of each HBM construct was assessed. Several scores were below the minimally acceptable value of .70 (Tavakol & Dennick, 2011); therefore, the factor structure of the modified HBM, using principle component factor analysis with varimax rotation, was used to determine which items might be problematic. Items with factor loadings below 0.5 were dropped, which improved the reliability of all four components (see Table 1).

2.3 | Analytic strategy

The data were entered into SPSS 26.0 for analysis. Beyond descriptive statistics, hierarchical linear regression was used to assess the degree to which sociodemographic factors, personality characteristics, and health beliefs explained variation in participants' attitudes and behaviors surrounding Ohio's SAH order and social distancing guidelines. The PROCESS macro for SPSS (Hayes, 2020) was used to assess the role of health beliefs as mediators from personality to attitude/behavior.

TABLE 2 Sociodemographic and descriptive statistics (SD) for social distancing questions

Variable		N (listwise)	How strongly do you feel... (SDQ1)	How well do you adhere... (SDQ2)	Mean days distancing before...	Mean encounters violating (capped at 50)
Age	M = 40.1 (SD = 14.8; 18 to 85 years)					
Geographic location						
Rural	19.0%	117	4.50 (0.74)	4.40 (0.72)	6.85 (5.46)	5.93 (11.15)
Suburban	48.8%	303	4.59 (0.76)	4.36 (0.72)	7.47 (6.99)	5.64 (11.11)
Urban	32.2%	201	4.68 (0.61)	4.39 (0.68)	6.41 (6.15)	5.39 (10.08)
Gender						
Male	22.8%	138	4.40 (0.86)	4.30 (0.74)	5.97 (8.30)	7.46 (13.83)
Female	76.6%	482	4.66 (0.67)	4.40 (0.70)	7.30 (5.82)	5.16 (9.86)
Race						
White	91.2%	571	4.61 (0.72)	4.38 (0.70)	7.08 (6.13)	5.54 (10.69)
Black and other ^a	8.8%	53	4.47 (0.68)	4.33 (0.74)	6.24 (9.19)	7.06 (12.94)
Employment status						
Essential worker	19.4%	117	4.41 (0.91)	4.15 (0.83)	5.92 (6.84)	16.89 (19.54)
Working from home	61.7%	390	4.69 (0.59)	4.45 (0.61)	7.50 (5.64)	2.83 (3.18)
Unemployed	18.9%	117	4.52 (0.84)	4.37 (0.80)	6.43 (8.24)	3.40 (6.63)

^a4.0% Black or African American, 2.3% multiple categories selected or mixed/biracial, 1.4% Asian or Pacific Islander, 1.1% other.

3 | RESULTS

A completed survey was submitted by 659 respondents, which was reduced to 645 after removing incomplete surveys ($n = 2$), surveys from those not living in Ohio ($n = 7$), and from those who provided a start date for their social distancing that was at least six months *before* the earliest estimates of COVID-19's arrival in Ohio ($n = 3$) or *after* the date the survey was submitted ($n = 2$). The sample was predominantly White, female, and most were working from home at the time of the survey (see Table 2).

3.1 | Social distancing measures

All participants indicated that they were aware of the SAH order. Generally, they felt strongly about following the order (SDQ1; $M = 4.6$, $SD = .72$). In fact, 93% gave a rating of 4 or 5, of which 75% percent were ratings of 5. Participants rated their actual social distancing slightly lower (SDQ2; $M = 4.38$, $SD = .70$), with 92% choosing a rating of 4 or 5. A rating of 5 was selected by 48% of the sample, indicating that they were perhaps even going above and beyond what was required.

Participants indicated a wide variety of reasons for breaking social distancing, with grocery shopping (81%), purchasing meals and other supplies (50%), and exercise (28%) as the most frequently indicated categories. When asked how many of these types of encounters they

experienced over the last seven days, participants gave a range of responses from 0 to 7,000 (with only six responses over 50). With 50 set as the maximum value, the average number of encounters in the last week was 5.67 ($SD = 10.9$). Because the distribution was significantly skewed, algorithmic transformation was applied for the remaining analyses.

Responses to social distancing questions were intercorrelated, indicating some consistency between individuals' attitudes and behavior. Overall, how strongly participants felt about the order (SDQ1) was predictive of their impressions about how well they were adhering to it (SDQ2; $r = .54$, $p < .001$) and inversely related to the number of encounters less than the recommended distance of 6 feet ($r = -.26$, $p < .001$). Similarly, perception of adhering to the order (SDQ2) also predicted encounters ($r = -.35$, $p < .001$).

3.2 | Personality and health beliefs

Table 3 shows the correlations between each personality broad domain and facet, with age and four HBM components. Relations with age are consistent with findings in the adult development literature, demonstrating increases in emotional stability and conscientiousness, and a relatively small decrease in aspects of extraversion (McCrae & Costa, 1994; Roberts & Mroczek, 2008). Most facets of neuroticism, extraversion, and conscientiousness were not predictive of perceived benefits and susceptibility.

**TABLE 3** Correlations between personality and four components of the Health Belief Model

Personality domain	Facet	Age	Health Belief Model			
			Barriers	Benefits	Susceptibility	Severity
Neuroticism	Broad domain	-.23**	.10*	.01	.02	.15**
	Anxiety	-.22**	.12**	.08*	.08*	.23**
	Anger	-.15**	.06	-.02	-.04	.03
	Depression	-.22**	.11**	-.01	.02	.08*
	Self-consciousness	-.18**	.02	-.03	-.00	.07
	Immoderation	-.03	.01	.01	.06	.08
	Vulnerability	-.04	.04	-.01	-.05	.06
Extraversion	Broad domain	-.04	.19**	.04	-.06	-.06
	Friendliness	.14**	.02	.05	-.05	.03
	Gregariousness	.04	.23**	-.03	-.02	-.04
	Assertiveness	.03	.01	.06	-.07	.01
	Activity level	-.11**	.21**	.04	-.03	-.02
	Excitement seeking	-.28**	.24**	-.04	-.08	-.15**
	Cheerfulness	.02	.01	.12**	.02	-.02
Conscientiousness	Broad domain	.09*	-.06	.08*	-.02	.01
	Self-efficacy	.07	-.01	.10*	-.00	.00
	Orderliness	.01	-.10*	.01	-.05	.06
	Dutifulness	.15**	-.03	.06	.02	.03
	Achievement striving	-.19**	.12**	.03	-.01	-.05
	Self-disciplined	.05	.00	.05	-.02	-.05
	Cautiousness	.23**	-.12**	.06	.01	.01

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

3.3 | Personality, health beliefs, and social distancing

For each hierarchical multiple regression, age, race, gender, number of people in the house, and employment were entered first, followed by the broad personality factors, and finally, the four revised components of the HBM. The analysis was run on participants' ratings of how they felt about the order (SDQ1), their judgment of how well they adhered to it (SDQ2), and finally, on the number of their encounters violating social distancing (log-transformed).

Regarding participants' feelings about the SAH order (SDQ1), the sociodemographic factors accounted for 10% of the variability in how strongly participants felt. Increasing age and being female were associated with stronger feelings about following the order, whereas being an essential worker was not. Adding the personality domains improved the fit slightly, adjusted $R^2 = .11$, $F(3, 626) = 3.61$, $p < .05$, an effect driven entirely by neuroticism. The addition of the components of the HBM improved the fit significantly, adjusted $R^2 = .48$, $F(4, 622) = 112.53$, $p < .001$ (see Table 4). Specifically, perceived benefits of social distancing, stronger beliefs in the severity of COVID-19, and one's susceptibility to it were predictive of stronger attitudes towards

the SAH order. Perceived barriers, however, was predictive of weaker attitudes.

Participants' judgments of how well they felt they were adhering to the order (SDQ2) were explained only by age and employment in the first step of the hierarchical regression, which accounted for 10% of the variability, $F(5, 629) = 14.59$, $p < .001$. While increasing age was associated with the perception of better adherence, being an essential worker, unsurprisingly, was not. Adding personality in the second step did not explain additional variance, but in the third step, the addition of components of the HBM model did, adjusted $R^2 = .24$, $F(4, 622) = 30.33$, $p < .001$. The perception of benefits of social distancing ($b = .085$) and concern about the severity of COVID-19 ($b = .056$) were associated with stronger beliefs that participants were adhering to the order, but no other health belief components contributed to the fit of the model.

With respect to the reported number of encounters (SDQ3) that were less than the recommended 6 feet, sociodemographic factors accounted for 23% of the variation, $F(5, 626) = 38.88$, $p < .001$ (see Table 5). Increased age and number of people in the house were predictive of fewer encounters, as expected, whereas being an essential worker was associated with more. Adding personality domains did

TABLE 4 Hierarchical regression results for how strongly participants felt about following the Stay At Home order

Variable	B	95% CI for B		SEB	β	adjustedR ²	ΔR^2
		LL	UL				
Step 1						.097	.104**
(Constant)	4.031	3.745	4.318	.146			
Age	.012***	.008	.016	.002	.244		
Gender	.231***	.103	.358	.065	.134		
Race	.021	-.169	.211	.097	.008		
People in house	-.047	-.128	.035	.041	-.044		
Employment	-.184**	-.321	-.047	.070	-.101		
Step 2						.11	.015 [†]
(Constant)	3.285	2.512	4.059	.394			
Age	.013***	.009	.017	.002	.275		
Gender	.199**	.071	.328	.066	.116		
Race	.015	-.176	.206	.097	.006		
People in house	-.039	-.120	.042	.041	-.036		
Employment	-.172 [†]	-.309	-.035	.070	-.094		
Neuroticism	.013**	.005	.022	.004	.138		
Extraversion	-.001	-.009	.007	.004	-.006		
Conscientiousness	.006	-.005	.017	.006	.049		
Step 3						.48	.370**
(Constant)	1.15	.495	1.804	.33			
Age	.004**	.001	.008	.002	.092		
Gender	.067	-.032	.167	.051	.039		
Race	.013	-.160	.134	.075	-.005		
People in house	-.037	-.099	.025	.032	-.035		
Employment	-.028	-.136	.079	.055	-.016		
Neuroticism	.006	.000	.013	.003	.064		
Extraversion	-.001	-.007	.005	.003	-.011		
Conscientiousness	.002	-.006	.010	.004	.017		
Barriers	-.018***	-.028	-.008	.005	-.111		
Benefits	.179***	.155	.203	.012	.487		
Susceptibility	.035**	.012	.057	.011	.092		
Severity	.052***	.033	.072	.010	.182		

* $p < .05$.** $p < .01$.*** $p < .001$.

not explain additional variability in social distancing, although, as predicted, extraversion was associated with more encounters ($b = .005$, $p = .03$). The addition of HBM components improved the fit modestly, adjusted $R^2 = .25$, $F(4, 619) = 4.79$, $p < .01$, adding perceived severity as a predictor ($b = -.016$, $p < .05$). While components of the HBM appeared to be the strongest predictors of how strongly participants felt about the order and how well they believed they were adhering to it, they appeared to play less of a role in predicting actual reported behavior relative to the order.

Anxiety correlated with several components of the HBM, and it was predictive of how strongly participants felt about the SAH order before the HBM was taken into account, so a mediation analysis was run. Specifically, the PROCESS macro for SPSS (Hayes, 2020) was used to assess whether the anxiety facet of neuroticism impacted social distancing attitudes/behaviors indirectly through individuals' health beliefs (i.e., parallel mediation, Kane & Ashbaugh, 2017). For this analysis, a single social distancing score was calculated by converting each dependent measure in the above regression analyses to z scores and

TABLE 5 Hierarchical regression results for number of encounters violating social distancing

Variable	B	95% CI for B		SEB	β	adjusted R ²	ΔR^2
		LL	UL				
Step 1						.231	.237***
(Constant)	.806	.654	.958	.077			
Age	-.005***	-.007	-.003	.001	-.171		
Gender	-.054	-.121	.013	.034	-.055		
Race	.004	-.098	.106	.052	.003		
People in house	-.067**	-.110	-.024	.022	-.111		
Employment	.447***	.375	.520	.037	.429		
Step 2						.234	.007
(Constant)	.679	.270	1.089	.209			
Age	-.005***	-.007	-.003	.001	-.168		
Gender	-.054	-.122	.015	.035	-.055		
Race	-.002	-.105	.101	.052	-.001		
People in house	-.072**	-.115	-.029	.022	-.119		
Employment	.441***	.369	.514	.037	.423		
Neuroticism	.000	-.005	.004	.002	-.001		
Extraversion	.005*	.001	.009	.002	.087		
Conscientiousness	-.001	-.007	.004	.003	-.020		
Step 3						.252	.025**
(Constant)	.862	.413	1.310	.228			
Age	-.003**	-.005	-.001	.001	-.117		
Gender	-.031	-.099	.038	.035	-.031		
Race	-.008	-.110	.095	.052	-.005		
People in house	-.069**	-.112	-.026	.022	-.114		
Employment	.414***	.341	.488	.038	.397		
Neuroticism	.001	-.003	.004	.002	.021		
Extraversion	.005*	.000	.009	.002	.084		
Conscientiousness	-.001	-.006	.005	.003	.010		
Barriers	.004	-.003	.011	.003	.047		
Benefits	-.017	-.033	.000	.008	-.079		
Susceptibility	.005	-.011	.020	.008	.022		
Severity	-.016*	-.029	-.002	.007	-.097		

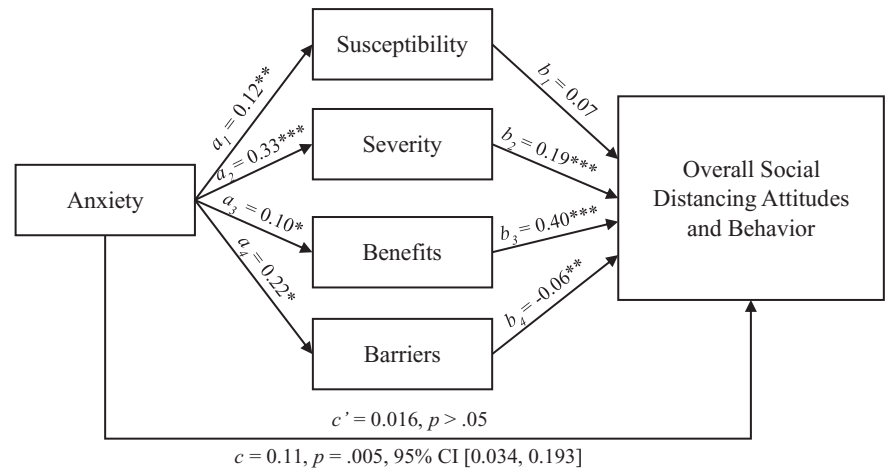
* $p < .05$.** $p < .01$.*** $p < .001$.

summing them (note: the z score for number of encounters was multiplied by -1 so that a higher score reflects fewer encounters and greater adherence to social distancing). The analysis controlled for age, gender, and employment as covariates (not shown in the figure), and used severity, susceptibility, benefits, and barriers as mediating variables.

The total effect of anxiety on overall social distancing attitude and behavior, with the covariates taken into account, was significant, $b = 0.11$, $p = .005$, 95% CI [0.034, 0.193], but with the mediating variables included, the direct effect was no longer significantly indicative of

full mediation (see Figure 1). Anxiety was indirectly related to overall social distancing attitudes and behavior through its relationship with health beliefs. As the anxiety facet of neuroticism increased, so did the perception of each dimension of the HBM. Subsequently, increased perception of severity of the virus and benefits to social distancing were predictive of stronger attitudes and social distancing behavior, whereas increasing perceived barriers worked against social distancing. A 95% confidence interval based on 5,000 bootstrap samples indicated that the indirect effects of anxiety through perceived severity

FIGURE 1 Parallel mediation analysis of anxiety on Stay-At-Home (SAHO) attitude through components of the HBM. *Note.* All presented effects are unstandardized coefficients; a_i is effect of anxiety on dimensions of the health belief; b_i is effect of dimensions of health belief on overall social distancing attitudes and behavior; c' is direct effect of anxiety on social distancing attitudes and behavior; c is the total effect of anxiety on social distancing attitudes and behavior. * $p < .05$. ** $p < .01$. *** $p < .001$



($b = 0.06$, 95% CI [0.035, 0.096]), perceived benefits ($b = 0.04$, 95% CI [0.004, 0.080]), and perceived barriers ($b = -0.01$, 95% CI [-0.027, -0.002]) were entirely above zero, whereas the path through susceptibility was not ($b = 0.008$, 95% CI [-0.001, 0.022]).

4 | DISCUSSION

The results provide insight into who is more likely to follow social distancing guidelines, information that may be crucial when thinking about how public health nurses can best communicate prevention measures such as new quarantine guidelines, social distancing practices, or vaccination. Younger male or female adults who were essential workers were the least likely to agree and comply with social distancing. Age, as predicted, had a significant effect on feelings towards and compliance with social distancing guidelines even after controlling for personality and health beliefs. While there were significant correlations between most measures of social distancing, there was no difference between genders in those relationships.

It is not surprising that health beliefs exerted an influence on attitudes toward social distancing and perceived adherence to the SAH order. We found continued support for the HBM as a model that explains health behavior (Ashbaugh et al., 2013; Champion & Skinner, 2008; Yoshitake et al., 2019), even during a time of widespread concern and extremely restrictive orders. Our results support that the HBM constructs of severity, susceptibility, barriers, and benefits can be useful tools to guide public health nurses in risk communication about COVID-19 in a context of high uncertainty (Carico et al., 2020). Like Durham et al. (2012), we found that perceived severity and perceived benefits were the strongest predictors of attitudes about the order and perceived adherence. However, perceived severity was the only HBM factor that significantly predicted social distancing behavior.

We expected that personality, particularly conscientiousness, would have a direct effect on attitudes toward social distancing and adherence to the SAH order (Eustace et al., 2018; Lima et al., 2018; Molloy et al., 2014); however, it did not. This may be reflective of the intensity of media coverage and widespread concern in the early days of the COVID-19 pandemic. Thus, situational variables in the early days

of the order may have exerted a more powerful effect on health beliefs than did personality. However, anxiety, a component of neuroticism, did affect feelings about social distancing indirectly via factors in the HBM. Our finding suggests that anxiety feeds beliefs about the seriousness of COVID-19, and belief in the benefits of staying at home and social distancing. These individuals, however, are also more likely to see barriers that work against their social distancing intentions. While anxiety was also predictive of feeling susceptible to the virus, this indirect path did not appear.

4.1 | Limitations

Several limitations are worth noting. Starting with a convenience sample at an academic institution and then snowball sampling for additional participants could not ensure a sample that was representative of the population. The low response rates from men and minorities were similar to a study of racial differences in web-based survey responses (Jang & Vorderstrasse, 2019), finding Non-Hispanic Whites were more likely to complete the survey than Blacks. Our findings may not generalize to Black and other minorities who disproportionately encounter circumstances regarding employment, public transportation, and crowded living (Gaylord-Harden et al., 2020). Under such conditions, one's own personality and beliefs may be less relevant predictors of social distancing attitudes and behaviors than the conditions themselves. Additionally, our respondents' strong agreement with social distancing may reflect, in part, selection bias, with those who felt strongly more likely to respond to the survey. There may be a ceiling effect when measuring adherence behaviors with little differentiation between those scoring at the higher end of the scale (Sanford & Rivers, 2020).

4.2 | Directions for future research

During the early days of the COVID-19 pandemic, an overwhelming majority of respondents felt that social distancing was important, reported that they were adhering to the order, and complied with the



order as demonstrated in the lack of “breaches” in social distancing. While the mandate to engage in social distancing continues to change, this understanding of preventative health behavior during the COVID-19 pandemic may help predict a willingness to comply with mask wearing and to get the vaccine.

Our research did not examine how attitudes and behaviors changed over time. As the pandemic progressed and a greater understanding of the virus emerged, it appears that attitudes and behaviors became increasingly varied, and for a variety of reasons, more polarized. Future research should consider changes over time. Personality and HBM factors might be more predictive of increased variation. Additional research should further examine the interplay of personality, health beliefs, and health behavior. Such research will benefit public health personnel, government officials, and other policy makers tasked with communicating and promoting preventative health behavior.

4.3 | Implication for public health nursing

Public health nurses, while already playing a key role in the COVID-19 crisis, remain an undervalued and thus often underfunded contributor to the health and safety of our society (Edmonds et al., 2020). Yet they are well positioned to assess and remove barriers that individuals face regarding vaccination, masking, and other protective behaviors. The indirect effects that dispositional anxiety may have on individuals’ perceptions of severity, benefits, and barriers could be particularly important as researchers evaluate the toll that this pandemic has taken on mental health. Additionally, more research is needed to understand how barriers are experienced by individuals across diverse and vulnerable populations.

CONFLICT OF INTEREST

We have no conflict of interest to disclose.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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