

Being Nice or Being Scared? Personality Traits, Beliefs and Threat of COVID-19 as Predictors of Non-Normative Health Behaviors during Second Wave of Pandemic



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The COVID-19 pandemic highlighted the need to examine factors related to questionable health behavior, such as avoiding recommended preventive guidelines. This paper aimed to explore whether behavior reflecting active avoidance of preventive measures against COVID-19 (curfew regulations, hygiene, facial masks, and social distancing) was best predicted by personality traits (Big Five), health beliefs, or feelings of threat. Thousand and twenty-four adults (486 men, 536 women) aged between 18 – 81 years participated in the study, which was run in early November 2020, when the second wave in Slovakia started to gain momentum and a strict lockdown was issued. Results showed that health threat was connected with having fewer questionable health beliefs, while economic threat was connected with having more questionable health beliefs, and together these factors were the strongest predictors of avoiding preventive regulations. From personality traits, higher Extraversion and lower Agreeableness predicted questionable health behavior, but together they added only 2.4% of explained variance. Our results highlight the fact that one year after the outbreak, the COVID-19 pandemic is no longer only (if it ever was) a health threat. The shift from health focus to the economic and socio-political threat should not be taken lightly, as it has implications for adherence to preventive measures against COVID-19 and people's beliefs regarding the pandemic.

Key words: Big Five, feelings of threat, questionable beliefs, health behavior, COVID-19

Questionable health practices, such as refusing standard medical treatment in favor of ineffective pseudoscientific remedies, can lead to serious consequences such as health complications or even death (Barbacariu, 2014; Boström & Rössner, 1990; Farrington et al., 2018; Johnson et al., 2018; Robbins, 2010; Saint-Victor & Omer, 2013). While medical doctors and researchers have been aware of this problem for a long time, with the rise of

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the COVID-19 pandemic in 2020 the issue of questionable health practices and beliefs has gained new relevance. Thousands of people across many countries succumbed to beliefs that undermined the effective measures aimed at containing the spread of the disease (e.g., refusing to wear facial masks, non-compliance with social distancing measures) and/or propagated questionable health practices for prevention and treatment of the disease (e.g., wearing ginger, injecting disinfectants). This paper aims to explore some of the predictors that lead people to avoid preventive measures against COVID-19 (i.e., curfew regulations, hygiene, facial masks, and social distancing). The adherence to preventive measures against COVID-19 are associated with many questionable beliefs (most predominantly various conspiracy beliefs, for review, see van Mulukom et al., 2021), but here we focus on two other – rather unexamined – instances of questionable beliefs: COVID-19 pseudoscientific beliefs and beliefs in the efficacy of some alternative treatments.

Since the beginning of the pandemic, studies have examined various psychological factors behind the willingness to adhere to preventive measures (Díaz & Cova, 2021; Erceg et al., 2020; Farias & Pilati, 2021; Freeman et al., 2020; Pavela Banai et al., 2021; Plohl & Muslim, 2021; Soveri et al., 2021; Teovanović et al., 2021), however, only a few focused on examining more factors at once. For example, one of the most examined factors contributing to beliefs and behavior related to prevention against COVID-19 (whether evidence-based or questionable), was the perceived threat of the disease (Ranjit et al., 2021; Vacondio et al., 2021). However, as the acute health threat subsided (and probably metamorphosed into a more diverse and chronic feeling of threat) the willingness to follow preventive measures decreased. This could have opened more space for other – more stable than situational – fac-

tors that influence people's choices related to their health such as personality traits or demographic factors, which have been shown to be related to beliefs and attitudes with implications for health and health-related behavior (e.g., Boutin et al., 2000; Deary et al., 2010; Han, 2021; Majima, 2015). The aim of this paper, therefore, is to examine the way questionable health behavior is associated with pseudoscientific beliefs, personality traits, demographic factors, and more differentiated feelings of threat during the second wave of the COVID-19 pandemic.

The Role of Personality Traits, Demographic Factors, and Beliefs in Questionable Health Behavior

There are numerous studies associating personality traits with physical and mental health and other relevant life outcomes (for review see Deary et al., 2010; Han, 2021). One of the proposed mechanisms, by which personality affects health, is that some personality traits, especially Conscientiousness and Neuroticism, (for review see Aschwanden et al., 2021) are related to more health-promoting behavior. This explanation was supported by literature as well; high Conscientiousness was consistently related to more health-promoting behaviors such as healthy diet and exercise and less health-adverse behaviors such as alcohol abuse and smoking (Bogg & Roberts, 2004; Strickhouser et al., 2017). Moreover, Strickhouser et al. (2017) also highlight the importance of Agreeableness, which predicted health and wellbeing to nearly the same degree as Conscientiousness and Neuroticism, but received much less attention. DeYoung (2006) labeled these three traits (Conscientiousness, Agreeableness, and Neuroticism) as “stability” traits that are stronger predictors of health outcomes than the other two traits (Extraversion and Openness), which he

views as more “plastic”. Low Conscientiousness paired with high Neuroticism seemed to be a risk factor for uncontrolled behavior (Hoffmann & Risse, 2020; Tucker et al., 2006), therefore, it seems reasonable to expect that during a pandemic high Conscientiousness should be associated with rule-adhering behavior. This proved to be the case in some studies (Aschwanden et al., 2021; Bogg & Milad, 2020; Carvalho et al., 2020), while others did not observe this relationship (Kohút et al., 2021). Beside Conscientiousness, higher Neuroticism was also associated with more concerns about COVID-19 and more pessimistic estimates about the duration of the pandemic (Aschwanden et al., 2021). From other personality traits, Disintegration was associated with greater use of pseudoscientific practices and lesser use of recommended health behaviors, and higher Honesty was related to recommended health behaviors (Lazarević et al., 2021).

However, some of the recommended guidelines – increased handwashing, mask-wearing, and social distancing – were easier to control and/or follow than others, thus, other personality traits came into the picture as well. In light of Strickhouser et al.’s (2017) distinction between stable and plastic traits, during the pandemic, Extraversion was associated with less adherence to social distancing measures (Carvalho et al., 2020; Ludeke et al., 2021), and more optimistic estimates on the duration of the pandemic (Aschwanden et al., 2021), while Openness was associated with recommended behavior (Bogg & Milad, 2020; Lazarević et al., 2020; Ludeke et al., 2020).

The association between Openness and adherence to recommended health behavior seems surprising in the light of previous studies, which showed that Openness is related to questionable or pseudoscientific health practices (Dubois et al., 2019; Honda & Jacobson, 2005; Sirois & Purc-Stephenson, 2008; Smith

et al., 2008). Most studies examining the connection between personality traits and questionable health practices focused on the use of complementary and alternative medicine (CAM). For example, Honda and Jacobson (2005) found that Openness was positively associated with the use of all types of CAM except manipulative body-based methods. Users of CAM in their study were also more neurotic and experienced strain from social ties. Interestingly, Extraversion was associated with lower use of body-mind therapies. Similarly, Sirois and Purc-Stephenson (2008) found that Openness and Agreeableness were linked to various dimensions of CAM use. Specifically, Openness was linked with the variety of CAM providers participants tried, while Agreeableness was linked both with breadth and frequency of CAM consultations. However, Olchowska-Kotala (2013) in a study with cancer patients found that people high in Extraversion and Neuroticism, and low in Openness were more likely to use CAM. While the finding related to Openness is somewhat surprising, it is important to note that her study was done with only 49 patients. On the other hand, Extraversion and Neuroticism were found to be predictors of willingness to CAM use in other more high-powered studies (Foltz et al., 2005; Lo-Fo-Wong et al., 2012; Maskarinec et al., 2000; Toivonen et al., 2018).

Although demographic factors influencing CAM use have been extensively examined, their role in other questionable health behavior during a pandemic is less clear, we therefore decided to add these factors to our analyses. For example, numerous studies have shown that women are more prone to believe pseudoscience (Majima, 2015; Šrol et al., 2021) and use CAM more often (Boutin et al., 2000; Lee et al., 2000; MacLennan et al., 2002, 2006; Xue et al., 2007). In contrast with some other questionable beliefs, having higher education (Astin, 1998; MacLennan

et al., 2006; McFarland et al., 2002) and religiousness (Čavojová & Ersoy, 2020) has also been found to be associated with increased CAM use.

Apart from CAM use, however, numerous studies from health psychology found that men take less care about their health and engage in riskier health behavior (such as smoking and alcohol intake) (Dawson et al., 2016; Rehman et al., 2018). One study (Sloan et al., 2015) even found that masculinity in both men and women predicted worse health behaviors, although these relationships were more numerous and stronger for men. Similarly, in regards to the COVID-19 pandemic, several studies showed that women tended to take a more preventive approach than men (Clark et al., 2020; Kowalik & Lewandowski, 2021; Schmeisser et al., 2021) even though COVID-19 imposes a larger health threat for men (Chang, 2020). However, some authors (Verhoef et al., 2005) pointed out that there is a difference between the use of CAM and actual belief in its efficacy. For example, Bryden et al. (2018) found that vaccination skepticism was predicted by pro-CAM attitude rather than CAM use, and similarly, in Čavojová and Ersoy's (2020) study, scientific reasoning predicted belief in CAM, but not use of CAM. Therefore, we included pseudoscientific beliefs in our study. A recent review of the effect of COVID-19 conspiracy theories (van Mulukom et al., 2021) showed that these kinds of questionable beliefs can have many negative consequences (e.g., refusal of vaccination and safeguarding behavior). Although conspiracy theories are the most prevalent example of questionable beliefs, they often exploit pseudoscientific narratives and are strongly interlinked with other types of dubious beliefs, such as pseudoscientific beliefs, paranormal or receptivity to bullshit (Čavojová et al., 2020; Lobato et al., 2014; Pennycook et al., 2015). Questionable beliefs such

as these have been connected with lower education (van Prooijen, 2017), conservative political outlook (Lobato et al., 2020), and religiousness (Bronstein et al., 2018; Čavojová & Ersoy, 2020; Pennycook, 2014), therefore, we also included these predictors in this study.

Moreover, while belief in CAM can be connected with certain personality traits or spiritual outlooks, in situations when a person feels uncertain or threatened (e.g., when diagnosed with threatening diagnosis or during a pandemic), even people less disposed to questionable beliefs might come to endorse pseudoscientific beliefs or practices due to their intuitive appeal (Miton & Mercier, 2015). In this way, pseudoscientific beliefs may serve as a more modern representation of magical thinking to regain control over uncontrollable events in people's lives.

The Role of Threat in Questionable Health Beliefs and Behavior

According to the theory of compensatory control (Kay et al., 2009), when people are confronted with situations that threaten their sense of control and psychological need to see the world as nonrandom, several compensatory processes are employed to restore the sense of order and meaning. Among these compensatory processes are seeing illusory patterns and correlations (Whitson & Galinsky, 2008), increasing faith in institutions or interventionist God (Kay et al., 2009, 2010) and they often use conspiratory explanations to cement their beliefs in order to make sense of threatening events and stimuli (Lewandowsky, Gignac, et al., 2013; Lewandowsky, Oberauer, et al., 2013; Van Prooijen, 2019; van Prooijen & Douglas, 2017). This applies also to the COVID-19 pandemic, which due to its threat to health and existence leads people to believe "simplistic and unscientific misrepresentations about medications and

devices which are claimed to prevent, treat or cure disease" (Freckelton, 2020, p. 1). Several studies from the recent period found a link between feelings of threat and questionable health beliefs and practices (usually connected to prevention and cure of the coronavirus) (Knowles & Olatunji, 2021; Ranjit et al., 2021; Šrol et al., 2021; Vacondio et al., 2021; Yıldırım et al., 2021).

Moreover, Boyer and Parren (2015) found that threat-related information was intuitively judged as more competent and knowledgeable – the factor that may underlie the spread of questionable and pseudoscientific beliefs during the pandemic as well. Some authors even argue that some pseudoscientific beliefs are so intuitively compelling because of they evoke distant threats (through harm avoidance and disgust) (Blancke et al., 2015; Miton & Mercier, 2015).

Perception of threat, on the other hand, might make people more cautious when it comes to health behavior and adherence to safety measures. For example, worry and perception of severity for self and others were related to social distancing and hygiene behavior in the height of the COVID-19 pandemic in the US (Magnan et al., 2021). Similar results were found in Poland: more worried participants were more willing to adhere to strict hygiene and social distancing regulations; on the other hand, those who were more worried about personal restrictions were also less willing to adhere to preventive regulations (Sobkow et al., 2020). The perceived threat also played a role in vaccination intention (at least at the beginning of the pandemic), with those considering COVID-19 as a severe disease having higher vaccination intentions (Karlsson et al., 2021). Consequently, when feelings of threat subsided, adherence to safety measures decreased, too (Kohút et al., 2021).

However, it is important to note that a pandemic does not pose a threat only to health,

it is connected also to threats to personal and national economy (Mann et al., 2020) and crises can be associated with political and social upheavals as well (Brezina, 2021). Adamus and Grežo (2021) in their study from the beginning of the pandemic in Slovakia showed that Neuroticism is connected with perceived financial threat and greater willingness to change consumption patterns. Thus, in this study, we asked participants about their perception of COVID-19 threat in various domains of their life to help us distinguish the influence of various kinds of threats on questionable health beliefs and behavior.

Current Study

The present study aimed to examine demographic factors, beliefs, Big Five personality traits, and the threat of COVID-19 pandemic as predictors of questionable health behaviors conceptualized as avoiding preventive measures against the COVID-19.

We expected people with higher Conscientiousness to report less avoidance of preventive measures (Aschwanden et al., 2021; Bogg & Milad, 2020; Carvalho et al., 2020) and people higher in Extraversion to adhere less to preventive measures related to social distancing (Carvalho et al., 2020; Ludeke et al., 2021). We also expected that Agreeableness might be associated with less avoidance of preventive regulations (Strickhouser et al., 2017).

Although pseudoscientific beliefs about COVID-19 were given much less attention than COVID-conspiracy beliefs, we expected that health behavior will be associated with COVID-pseudoscientific beliefs (van Mulukom et al., 2021) and probably also with beliefs in the efficacy of CAM (Čavojevová, Šrol, & Ballová Mikušková, 2020).

We also expected the feelings of threat to one's health to positively relate to adherence to preventive measures (Magnan et al., 2021).

On the other hand, we expected people with a higher perception of an economic or socio-political threat of the pandemic to endorse more pseudoscientific beliefs about COVID-19 and thus be more prone to avoiding preventive measures (Sobkow et al., 2020).

Lastly, we controlled for gender, age, education, political and religious beliefs: women tend to score higher in Agreeableness (Lehmann et al., 2013) and engage more in health-promoting behavior (Clark et al., 2020; Dawson et al., 2016; Kowalik & Lewandowski, 2021; Rehman et al., 2018), while lower education, conservative political outlooks, and higher religiousness tend to be connected with more questionable beliefs (Bronstein et al., 2018; Čavojová & Ersoy, 2020; Lobato et al., 2020; van Prooijen, 2017) that are, in turn, connected with more questionable health practices (Teovanović et al., 2021). Older people were more threatened by the pandemic, but in some studies, they were not more willing to adhere to regulations (Clark et al., 2020; Daoust, 2020). Thus, we examined these factors as the first step in our analyses and our main aim was to explore the unique contribution of beliefs (entered at the 2nd step), personality (entered at the 3rd step), and threat factors (entered at the 4th step) to questionable health behavior.

Method

Participants and Procedure

The sample consisted of 1024 participants (486 men, 536 women) who filled in the online survey created in Qualtrics through an invitation from a participant recruitment agency which used quotas to ensure that the sample was representative of the Slovak general population in terms of gender and age distribution. Participants were aged between 18 – 81 years ($M = 44.17$, $SD = 15.33$).

The data collection was run between 2nd and 6th November 2020, when the second wave in Slovakia started to gain momentum and a strict lockdown was issued. This time was also marked by the first national antigen testing of COVID-19, which had strong opposition from some scientists and the president, while it was seen as a pass from the strict lockdown measures by the Prime minister and others.

Materials

Demographic variables: Besides asking for age and gender (1 = *male*, 2 = *female*, 3 = *prefer not to disclose*), we included questions about education, political ideology, and the importance of religion. Participants indicated their highest attained education by selecting one of the options (1 = elementary school, 2 = secondary school without a degree exam, 3 = secondary school with a degree exam, 4 = Bachelor's degree, 5 = Master's degree, 6 = PhD or equivalent). Then they indicated their political ideology on the scale from 1 (*very conservative*) to 7 (*very liberal*) and the importance of religion in their life on the scale from 1 (*not important at all*) to 7 (*very important*).

Personality traits: We used a short 30-item form of the Big Five Inventory (BFI-2-S, Soto & John, 2017) to assess participants' personality traits of Agreeableness, Extraversion, Conscientiousness, Negative emotionality, and Open-mindedness. There were six items for every dimension, participants rated their agreement with the statements on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*).

The threat of COVID-19: Feeling the threat of the COVID-19 pandemic was assessed using six questions. Participants rated the extent to which the COVID-19 pandemic threatened various aspects of their lives on a 7-point scale (1 = *I do not feel threatened at all*; 7 = *I feel very threatened*): personal health, health

of loved ones, quality of life, economic threat to self, economic threat to the country, socio-political threat.

COVID-19 pseudoscientific beliefs: Four items were used to assess pseudoscientific beliefs about the COVID-19 pandemic, specifically, the notion that COVID-19 is not more dangerous than common flu, that the spread of the pandemic is influenced by the spread of the 5G network, the dangerousness of wearing facemasks and of testing for COVID-19. Participants rated their agreement on a 5-point scale (1 = *completely disagree*, 5 = *completely agree*).

Belief in the efficacy of CAM: Beliefs regarding questionable health practices were measured with four items (homeopathy, reiki, alternative treatment of cancer, use of Master mineral solution) mostly taken from Šrol (2021). Participants rated their agreement on a 5-point scale (1 = *completely disagree*, 5 = *completely agree*).

Avoiding prevention measures against COVID-19: We asked participants about their behavior related to specific examples of breaking the recommendations or misusing exceptions related to preventive measures against the COVID-19 pandemic – seven related to curfew, four related to hygiene, three related to mask-wearing, and three related to social distancing. We scored them so that for each behavior breaking rules or misusing regulation (“yes” answer) participants received a point and then we calculated the mean score for avoiding the COVID-19 preventive measures.

Results

Descriptive statistics, as well as correlations with demographic variables, are in Table 1. The data are available at: <https://osf.io/jqr79/>.

The results show that, in general, questionable beliefs correlate mainly with lower

education, being more conservative, and being more religious. On the other hand, questionable behavior correlated more with being younger and male, being less educated, and being more liberal.

To examine the expected relationships of personality traits and feelings of threat with questionable health practices (pseudoscientific beliefs and avoiding preventive measures during COVID-19 pandemic) we performed a correlation analysis (Table 2).

Extraversion correlated positively with less strict mask-wearing and avoiding social distancing recommendations. Among other personality traits, only Agreeableness was negatively correlated with all questionable behavior, i.e., more agreeable people washed their hands, wore masks, and avoided crowded spaces more frequently. People higher in Neuroticism tended to follow rules of social distancing more than people scoring lower in Neuroticism. Lastly, people more open to experience tended to avoid the rules regarding hygienic recommendations less often than people less open to experience.

Health threat was also associated with less avoiding preventive measures. Threat to a personal economic situation was negatively (but weakly) associated only with avoiding hygiene regulations and avoiding social distancing.

Both COVID-pseudoscientific beliefs, as well as beliefs in efficacy of CAM, correlated positively with avoiding preventive measures, although belief in the efficacy of CAM showed only very weak correlations with avoiding preventive regulations against COVID-19.

Predicting Questionable Health Behavior

Lastly, we were interested in the relative explained variance of questionable health behavior by demographic factors, beliefs, personality traits, and feelings of threat.

Table 1 Descriptive statistics and correlations with demographics

	<i>M</i>	<i>SD</i>	α	age	gender	education	politics	religion
<i>Personality traits</i>								
1. Extraversion	3.22	0.68	.66	.04	-.00	.04	.06	.00
2. Agreeableness	3.69	0.66	.69	.17	.14	.08	.00	.11
3. Conscientiousness	3.70	0.65	.70	.10	.01	.10	-.06	.02
4. Negative emotionality	2.75	0.77	.77	-.09	.16	-.07	.03	.05
5. Openness	3.39	0.65	.64	.10	.06	.12	.03	.07
<i>Threat</i>								
6. Personal health	3.87	1.84	--	.08	.14	.04	.01	.13
7. Health of close ones	4.59	1.84	--	-.08	.18	.10	.09	.08
8. Quality of life	4.56	1.70	--	-.01	.11	.05	-.01	.08
9. Personal economic	4.64	1.84	--	-.08	.10	-.04	-.04	.07
10. Economic country	5.62	1.46	--	.06	.15	.07	.02	.02
11. Social & political country	5.12	1.62	--	.09	.12	.08	-.05	.03
<i>Questionable beliefs</i>								
12. COVID pseudoscientific beliefs	1.98	1.00	.82	.09	.01	-.24	-.21	.10
13. Beliefs in the efficacy of CAM	2.53	0.84	.71	-.02	.05	-.23	-.12	.14
<i>Avoiding preventive measures</i>								
14. Avoiding curfew regulations	0.28	0.22	.50	-.05	-.15	-.11	-.01	-.04
15. Avoiding hygiene regulations	0.29	0.25	.39	-.09	-.15	.01	-.05	-.10
16. Avoiding facial masks	0.34	0.36	.66	.02	-.11	-.05	-.05	-.02
17. Avoiding social distancing	0.35	0.38	.73	-.12	-.10	-.04	.03	-.10
18. Avoiding regulations (total)	1.26	0.84	.60	-.09	-.17	-.06	-.03	-.10

Note. Gender: 1 = men, 2 = women. All correlations above .06 are significant at $p < .05$. The correlations significant at $p < .05$ are marked in bold.

Therefore, we conducted hierarchical linear regression analysis (enter method) with demographic factors (age, gender, education, political ideology, and importance of religion) entered in Step 1, beliefs entered in Step 2, personality traits entered in Step 3, and feelings of threat entered in Step 4, and a composite score for questionable health behaviors as a dependent variable (Table 3). (For regression analyses with specific instances of avoiding regulations, see Tables A.1 – A.2 in the online supplementary materials.)

From the block of demographic variables, questionable health behavior was best pre-

dicted by younger age and being male, even after other variables were entered into the model, and they explained 5% of the total variance. Not surprisingly, COVID-19 pseudoscience beliefs emerged as a strong predictor of questionable health behavior, adding 10.4% of the explained variance; the belief in the efficacy of other CAM was not significant. From personality traits, higher Extraversion and lower Agreeableness predicted questionable health behavior, but together they added only 2.4% of explained variance. Lastly, lower perceived threat to the health of self or loved ones, together with higher personal econom-

Table 2 *Correlations between measured variables*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
<i>Personality traits</i>													
1. Extraversion	–												
2. Agreeableness	.19	–											
3. Conscientiousness	.40	.46	–										
4. Negative emotionality	-.44	-.39	-.51	–									
5. Openness	.39	.33	.41	-.30	–								
<i>Feelings of threat by COVID</i>													
6. Personal health	-.12	-.01	-.07	.20	-.07	–							
7. Health of close ones	-.11	.00	-.06	.20	-.06	.77	–						
8. Quality of life	-.04	-.05	-.05	.23	-.03	.62	.59	–					
9. Personal economic	-.01	-.07	-.05	.20	-.01	.38	.32	.56	–				
10. Economic country	.04	.06	.05	.13	.07	.24	.28	.45	.51	–			
11. Social & political country	.08	.02	.04	.13	.09	.22	.21	.40	.45	.69	–		
<i>Questionable beliefs</i>													
12. COVID pseudoscientific beliefs	.07	-.04	.02	-.03	.02	-.27	-.40	-.10	.07	.03	.11	–	
13. Beliefs in efficacy of CAM	.04	-.02	-.02	-.01	-.02	-.03	-.10	-.04	.14	.07	.08	.40	–
<i>Avoiding preventive measures</i>													
	.10	-.17	-.06	-.04	-.05	-.39	-.38	-.18	-.08	-.01	-.00	.31	.08

Note. All r 's > .12 are significant at $p < .001$, all r 's > .09 are significant at $p < .01$, all r 's > .07 are significant at $p < .05$.

ic threat, predicted more questionable health behavior, adding 9% of explained variance. Altogether, the model containing demographic factors, beliefs, personality traits, and threat accounted for 25.5% of explained variance, with COVID-pseudoscientific beliefs and lower threat to one's health being the strongest predictors of questionable health behavior.

Discussion

Our main aim was to examine what role personality traits, pseudoscientific beliefs, demographic factors, and feelings of threat play in the endorsement of questionable health behavior during the second wave of the COVID-19 pandemic. We found that Extraversion and Agreeableness were the most important personality factors that predicted questionable health behavior, but their effect was relatively weak. Both COVID-pseudoscientific beliefs and feelings of threat were stronger predictors of avoidance of preventive measures.

Perhaps the most surprising result of our study was that Conscientiousness did not predict adherence to any of the preventive measures. It seems that the situation at the beginning of the second wave in Slovakia was marked by frustration, disillusion, and doubt that the government knows what they are doing (data collection took place only a couple of weeks after the former prime minister introduced mandatory nationwide testing for COVID-19¹, which was met with criticism from the experts and the President²). Moreover, the curfew regulations were introduced before All Saints Day to ban traditional gatherings at cemeteries, which was also met with huge disapproval, and some illegal protests against the government occurred³, but the ban on gatherings during lockdown was not enforced. Therefore, it is likely that other than

¹ <https://spectator.sme.sk/c/22512665/the-state-prepares-across-the-board-coronavirus-testing.html>

² <https://www.bbc.com/news/world-europe-54747022>

³ <https://www.reuters.com/article/uk-health-coronavirus-slovakia-protests-idUKKBN27X2N7>

Table 3 Results of hierarchical linear regression predicting avoiding health regulations

Predictor	Avoiding health regulations	
	β	95% CI
<i>Demographic information</i>		
	$\Delta R^2 = 0.050^{**}$	
Age	-0.09	[-0.15, -0.03]
Gender	-0.11	[-0.17, -0.05]
Education	0.01	[-0.05, 0.06]
Conservative (1) – liberal (7)	0.00	[-0.06, 0.06]
Importance of religion	-0.05	[-0.10, 0.01]
<i>Beliefs</i>		
	$\Delta R^2 = 0.104^{***}$	
COVID–19 pseudoscience	0.21	[0.14, 0.27]
Belief in CAM	-0.02	[-0.08, .04]
<i>Big Five personality domains</i>		
	$\Delta R^2 = 0.024^{***}$	
Extraversion	0.10	[0.03, 0.16]
Agreeableness	-0.11	[-0.17, -0.04]
Conscientiousness	-0.06	[-0.13, 0.01]
Negative emotionality	-0.01	[-0.08, 0.06]
Openness	-0.05	[-0.11, 0.01]
<i>Threat factors</i>		
	$\Delta R^2 = 0.090^{***}$	
Personal health	-0.25	[-0.34, -0.16]
Health of close ones	-0.14	[-0.23, -0.04]
Quality of life	0.07	[-0.01, 0.15]
Personal economic	0.11	[0.03, 0.19]
Economic country	-0.05	[-0.12, 0.02]
Social & political	0.01	[-0.07, 0.08]
<i>Full model</i>		
	$adj. R^2 = 0.255^{***}$	

Note. The table shows the results of a hierarchical linear regression analysis predicting avoiding facial masks and social distancing measures. The columns represent the standardized coefficients for every predictor taken from the final regression model. ΔR^2 represents the change in R^2 at the first, second, and third steps of the model. Values significant at $p < 0.05$ are presented in bold.

Gender: men were coded as 1 and women as 2.

* $p < .05$, ** $p < .01$, *** $p < .001$, † $p = .053$

personality factors played a more important role in rule-abiding behavior. This speculation could be supported by anecdotal evidence about secret open bars and other providers of services (e.g., fitness, hairdressers, tailors, etc.) that operated illegally to avoid bankruptcy. On the other hand, this is in line with a longitudinal study by Kohút et al. (2021), who similarly found a very low effect of personality traits during the second wave of the pandemic in Slovakia. Moreover, although they found associations between some personality traits (Agreeableness, Conscientiousness) and following recommendations during the first wave of the pandemic, the average amount of variance added by personality traits was quite low even then (and decreased further in the second wave). Also, other authors examining the effect of personality traits concluded that the way people perceived the situation explained more variance in compliance with restrictions than personality traits (Zajenkowski et al., 2020). For example, Lazarević et al. (2021) found that Disintegration (i.e., tendency to see connections between unrelated events) predicted engagement in pseudoscientific behavior.

Another explanation for the relatively weak role of personality traits in health behavior related to COVID-19 is that, possibly, "darker" traits might be more predictive of non-normative behavior and Big Five factors may not predict this behavior as adequately as Dark Triad measures (Blagov, 2021; Nowak et al., 2020; Triberti et al., 2021; Zajenkowski et al., 2020).

It is important to note that the Cronbach's alphas were not very high, but they were all in an acceptable range and comparable with other studies using the Slovak adaptation of short versions of BFI (Kohút et al., 2020). Relatively lower alphas were caused by the brevity of the used scale with only three items per facet, but it was shown that, despite this,

part-whole correlations are strong and correlations with other constructs are comparable to the longer versions (Gosling et al., 2003; Kohút et al., 2020; Rammstedt & John, 2007). The effect sizes for the personality traits were similarly modest also in previous studies in Slovak (Kohút et al., 2021) as well as international context (Clark et al., 2020). On the other hand, it is important to keep in mind that the use of very short measures of personality may result in underestimation of the role that personality plays and overestimation of other factors (Credé et al., 2012).

People high in Agreeableness tended to follow hygiene recommendations and wear facial masks more often than people low in Agreeableness, while people high in Extraversion (not surprisingly) tended to avoid curfew regulations, wearing masks, as well as social distancing measures more often than people low in Extraversion. On the other hand, people high in Negative Emotionality tended to adhere to social distancing measures. These results seem to corroborate the previous findings that Neuroticism and Agreeableness are associated with health outcomes and normative/recommended health behavior (Bogg & Roberts, 2004; Strickhouser et al., 2017). Interestingly, people high in Openness tended to follow more hygienic recommendations, such as increased washing hands, disinfecting surfaces touched by other people, staying home even with slight symptoms of respiratory diseases, and not faking illness to avoid some duties, although when other variables were taken into account this relationship disappeared.

With regards to the relationship between personality and COVID-19 pseudoscientific beliefs, only Extraversion correlated very weakly with these beliefs. While we may speculate that extraverts tend to have wider social circles and interact more with people and thus come into contact with more disinformation

(and eventually come to trust some of it) – a finding that has some support in the literature (e.g., Swami et al., 2012, found that extroverts believe more in human-related myths) – we should take this result with caution, as it can be significant only due to our large sample and in light of other factors seems to be rather inconsequential. Altogether, similarly to Kohút et al.'s findings (2021), it seems that personality played a very small role during the second wave of the pandemic, especially when feelings of threat were taken into account.

In general, threat in our study was a stronger factor that played a role both in the endorsement of pseudoscientific beliefs and adherence to government-issued regulations. However, our novel contribution was to measure separately perceived threat to health (to self or loved ones) and threat to wellbeing and economy (self or at the country level), which brought some interesting findings. For example, while the perceived health threat to self and loved ones was associated with having fewer questionable beliefs (both about COVID-19 and CAM), perceived economic threat, and especially perceived threat to social and political consequences for the country, was associated with having more questionable beliefs (especially about COVID-19). These findings lend further support to the theory of compensatory control (Kay et al., 2009), which suggests that pseudoscientific and magical beliefs may serve as psychological protection against threatening events and as a way to regain control over the unpredictable environment. This was especially the case in Slovakia when unpredictability and lack of control during the second wave of the pandemic were no longer fueled mostly by worries of one's health but predominantly by the incompetence of people who should be responsible for containing the crisis (i.e., government).

Perceived health threat predicted more normative behavior (i.e., less avoiding preventive measures), while perceived economic threat predicted avoiding health regulations. This is in line with other studies from this period. For example, Sobkow et al. (2020) also found that there is a difference between participants who worry about health and those who worry more about their personal restrictions in their willingness to follow the preventive regulations, such as masks wearing and strict social distancing. Similar differences in the sources of the worry were found in a German study, in which participants with more virus-related worries reported higher acceptance of preventive measures, while those with more economic worries viewed the preventive measures as more unnecessary and thus less willing to follow them. However, this relationship was moderated by the perception that the government is doing quite well in containing the pandemic and reducing the negative effects of preventive measures (Rosman et al., 2021). Lower trust in government-issued regulations was connected to less willingness to follow health preventive measures in another study as well (Šrol et al., 2022).

We also explored the role of demographic factors in questionable health behavior during the second wave of the pandemic. In general, women tended to follow government-issued regulations (except social distancing) more than men, which is not so surprising as they also scored higher on Agreeableness and Negative Emotionality traits, as well as a perceived threat, that were all associated with adherence to preventive measures. Similarly, older participants tended to adhere more to regulations regarding hygiene and social distancing, which made sense as they also scored higher in all personality traits (except Extraversion) and the risk of COVID-19 related complications increased with age, which was reflected also in the higher perceived threat

of older participants. Similarly, as in Šrol et al. (2021), being older was associated with having more pseudoscientific beliefs, but this relationship was rather weak and could be attributed to a heightened feeling of threat and risk in older participants (Bruine de Bruin, 2021; Schweda et al., 2021; but see Bidzan-Bluma et al., 2020).

Conclusion

Our results highlight the fact that one year after the outbreak, the COVID-19 pandemic is no longer only (if it ever was) a health threat. The shift from health focus to the economic and socio-political threat should not be taken lightly, as it has implications for adherence to preventive measures against COVID-19 and people's beliefs regarding the pandemic. Health threat was connected with having fewer questionable health beliefs, while the economic threat was connected with having more questionable health beliefs, and together these factors were the strongest predictors of avoiding the preventive regulations. Our results also have strong implications for the communication of the importance of preventive measures. For example, authorities need to understand that they should take into account the economic, social, and psychological impacts of any issued preventive measures, besides focusing strictly on health implications, if they want them to be successfully implemented. Ignoring the doubts and feelings of the threat of the public can backfire in the form of the spread of conspiracy and pseudoscientific explanations that undermine the willingness to take collective preventive actions, especially in people that are predisposed to conform less.

Disclosure

This study is based on the data collected as a part of a larger project examining epistem-

ically suspect beliefs (generic and related to COVID-19), their cognitive predictors (preprint: <https://psyarxiv.com/xahdj/>) and association with non-normative social action (Šrol et al., 2022) during the COVID-19 pandemic in Slovakia. All materials and data for this study are available at: <https://osf.io/jqr79/>.

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