

WHEN WE ARE WORRIED, WHAT ARE WE THINKING? ANXIETY, LACK OF CONTROL, AND CONSPIRACY BELIEFS AMIDST THE COVID-19 PANDEMIC

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ABSTRACT

Societal crises and stressful events are associated with an upsurge of conspiracy beliefs that may help people to tackle feelings of lack of control. In our study ($N = 783$), we examined whether people with higher feelings of anxiety and lack of control early in the COVID-19 pandemic endorse more conspiracy theories. Our results show that a higher perception of risk of COVID-19 and lower trust in institutions' response to the pandemic were related to feelings of anxiety and lack of control. Feeling the lack of control, but not anxiety, independently predicted COVID-19 conspiracy theory endorsement. Importantly, COVID-19 conspiracy beliefs were strongly correlated with generic conspiracy and pseudoscientific beliefs, which were likewise associated with the feeling of lack of control and lower trust in institutions. The results highlight that considering people's emotional responses to the COVID-19 pandemic is crucial for our understanding of the spread of conspiracy and pseudoscientific beliefs.

Keywords: conspiracy beliefs, COVID-19, anxiety, lack of control, epistemically suspect beliefs

INTRODUCTION

In the early spring of 2020, the COVID-19 pandemic entered the lives of people around the world, leading to serious crises in many countries, such as Italy, UK, and Spain. However, the news about the novel danger spread even more rapidly than the virus itself, bringing about feelings of anxiety and powerlessness, as the available information at that time were often both disturbing and conflicting and even the doctors and scientists did not yet have enough reliable information about the new coronavirus. Such explicit danger paired with uncertainty is known to be associated with increased anxiety and safety behavior urge (Reuman et al., 2015), and the COVID-19 pandemic proved to be no exception in this regard (Sher, 2020). Unsurprisingly, people felt anxious, and without any control of what was to come. Such feelings may prompt sense-making mechanisms focused on reducing anxiety and regaining a sense of control, which have been shown to lead to a higher susceptibility to various conspiracy explanations of the events taking place (e.g., Douglas et al., 2019; van Prooijen, 2019; van Prooijen & Douglas, 2017). In the present study, we examined whether the feelings of anxiety and lack of control about the COVID-19 pandemic were associated with the endorsement of conspiracy beliefs about the origin, spread, and potential cure of the coronavirus. Importantly, we also aimed to establish the role of COVID-19 risk perception and trust in institutions' response to the pandemic in the increased levels of coronavirus-specific conspiracy beliefs, as well as to examine whether the endorsement of COVID-19 conspiracy beliefs would further be associated with adopting more generic epistemically suspect (i.e. paranormal, conspiracy, and pseudoscientific) beliefs.

The COVID-19 pandemic struck many countries unprepared leading to quickly growing numbers of infected people and fatalities all around the world, which has made people feeling justifiably anxious about this new threat. Sorokowski et al. (2020) showed that mere exposure to information about COVID-19 was associated with higher anxiety levels. In a Polish study, it

has been documented that the levels of perceived threat, anxiety, and hopelessness did significantly increase right after the first fatalities were reported (Cypryańska & Nezlek, 2020). A survey conducted in March 2020 showed that nearly half of American people felt anxious about the coronavirus, becoming seriously ill, or about their relatives getting COVID-19 (American Psychiatric Association, 2020). In Slovakia, where the present study was conducted, almost 40% of a representative sample reported feeling very threatened by the COVID-19, with higher levels of perceived threat reported especially by women and older people (MNFORCE et al., 2020). A survey with Slovak teachers reported an overall increase in negative feelings (e.g. feeling upset, scared, afraid) during the COVID-19 pandemic period (Ballová Mikušková & Verešová, n.d.). A recent meta-analysis shows the prevalence of anxiety during the COVID-19 pandemic to be almost 32% (Salari et al., 2020) based on samples from all over the world. Such feelings of threat, hopelessness, and anxiety are known to be associated with a higher tendency to endorse conspiracy beliefs (for reviews, see Douglas et al., 2019; van Prooijen & Douglas, 2017; van Prooijen & van Vugt, 2018), which may be exactly why the COVID-19 pandemic is associated with such a proliferation of conspiracy theories regarding the origin, spread, and the potential cure of the new coronavirus (e.g. van Mulukom et al., 2020).

Societal crises and stressful events – e.g. natural disasters, disease outbreaks, or stock market crashes – are known to lead to an increased belief in conspiracy theories by evoking feelings of anxiety and lack of control (van Prooijen, 2019; van Prooijen & Douglas, 2017). Conspiracy theories try to explain important social or political events as the results of plots that involve powerful actors (influential people, organizations, governments) that work in secret to achieve some sinister goal (e.g. Douglas et al., 2019; Swami et al., 2016). As such, they take a complex event – e.g. an outbreak of a deadly virus – and provide an explanation of the event and someone to blame for it (Kofta et al., 2020). This is how conspiracy theories may satisfy important epistemic motives, i.e. the need to understand what is happening around us, as well as existential

motives to regain the feeling of control, security, and meaning in the world after encountering some threatening event (e.g., Douglas et al., 2017, 2019). For example, believing that a certain country (such as China or the USA) created the virus intentionally in a laboratory to use as a bioweapon, despite there being no evidence for such a claim, gives people a clear and simple explanation of the origin of COVID-19 and an unambiguous actor to blame the pandemic on. In comparison, the official account of the origin of the COVID-19 may be a source of strong feelings of anxiety and lack of control resulting from the realization that such a large and negative event as a COVID-19 pandemic could be a consequence of something seemingly so insignificant and random (and thus, uncontrollable) as a transmission of a certain virus from an animal to human.

There is ample evidence for the role of anxiety and lack of control in higher belief in conspiracy theories (for reviews, see Douglas et al., 2019; van Prooijen & Douglas, 2017; van Prooijen & van Vugt, 2018). As argued by Landau et al. (2015), people are strongly motivated to preserve the sense of control of their lives, to see the world as a structured place that can be understood. Thus, lacking personal control is associated with heightened anxiety and compensatory control efforts are aimed at reducing this anxiety (Kay et al., 2009). Adopting conspiracy beliefs can be seen as an effort to regain control over one's environment, although this strategy is not effective according to the available evidence which actually suggests that exposure to conspiracy theories leads to a decreased sense of autonomy and control (Douglas et al., 2017, 2019). Nevertheless, it has been shown that strengthening people's sense of control seems to reduce beliefs in conspiracy theories (Study 1, van Prooijen & Acker, 2015), while the threats to personal control and feelings of powerlessness have been associated with the more pronounced perception of patterns in random stimuli (Whitson & Galinsky, 2008), higher endorsement of popular specific conspiracy theories (Abalakina-Paap et al., 1999; Study 2, van

Prooijen & Acker, 2015), and higher generic conspiracy mentality (Bruder et al., 2013; although see Stojanov & Halberstadt, 2020).

Similar findings are also available regarding the links between feelings of anxiety, trait anxiety, and stress with the higher endorsement of conspiracy theories (e.g., Grzesiak-Feldman, 2013; Newheiser et al., 2011; Swami et al., 2016). People with anxious attachment, who are overly sensitive to personal threats, are more susceptible to adopt both specific conspiracy theories as well as general conspiracy motives even when accounting for other well-known predictors (Green & Douglas, 2018). The effect of anxiety-provoking situations on higher conspiratorial thinking was also reported by Grzesiak-Feldman (2013), although with somewhat mixed evidence. However, this might be because the study examined a connection between anxiety in general (i.e. people in high-anxiety condition were told they are going to take an exam) and the endorsement of conspiracy beliefs that were not related to the sources of that anxiety. In our study, we focus on people's feelings of anxiety and lack of control resulting from the COVID-19 outbreak and their relationship to the conspiracy beliefs specifically about the new coronavirus. For this reason, we hypothesize that people who feel both higher anxiety and lack of control about their life because of the COVID-19 pandemic will be more prone to adopt coronavirus-specific conspiracy beliefs as a means of compensating for the threat to personal control and reducing the feelings of anxiety.

A further open question is whether threatening events prompt people to adopt conspiracy beliefs pertaining to that specific situation or whether they are associated with people endorsing more epistemically suspect beliefs in general. The term „epistemically suspect beliefs“ is used to refer to categories of beliefs which are based on claims that either cannot be empirically tested, are unsupported, or disproven by modern science. These are mainly thought to comprise various paranormal, conspiracy, and pseudoscientific beliefs (Čavojová et al., 2020; Lobato et al., 2014; Pennycook et al., 2015; Šrol, 2020). Previous research showed that people who believe in a

specific conspiracy theory are very prone to hold also other non-related and even contradictory conspiracy beliefs (Miller, 2020; Wood et al., 2012), and they are much more likely to accept also various paranormal and pseudoscientific claims (e.g., Čavojová, Šrol, & Jurkovič, 2020; Lobato et al., 2014; Šrol, 2020). A study by Lewandowsky, Oberauer, and Gignac (2013; however, see Landrum & Olshansky, 2019) shows that conspiracist ideation – the tendency to explain complex societal and/or political events through conspiracy theories – may be the key factor in explaining the rejection of well-established scientific findings, and subsequently, the endorsement of pseudoscientific beliefs. Based on this evidence, we wanted to examine whether people with stronger feelings of anxiety and lack of control concerning the COVID-19 pandemic will only endorse more coronavirus-specific conspiracy beliefs, or whether these feelings will be associated with reporting more generic (i.e. not coronavirus-related) conspiracy, paranormal and pseudoscientific beliefs as well.

To help us better understand the roles of feelings of anxiety and lack of control in the increased belief in conspiracy theories about the coronavirus, we have included two additional variables in our study – coronavirus risk perception and trust in the institutions' response with regard to the COVID-19 pandemic. Concerning the risk perception, Van Prooijen and Van Dijk (2014) showed that events with more serious consequences invoke more conspiracy beliefs compared to inconsequential events. More threatening and harmful events have a higher potential to increase people's feelings of anxiety and lack of control, which can then result in a higher tendency to adopt conspiracy beliefs. This is important since COVID-19 may not be equally threatening to all people. For example, older individuals may feel more at risk since the infection is much more dangerous to them (Zhou et al., 2020). Also, women have been shown to report higher levels of the perceived threat of the COVID-19 pandemic in comparison with men (MNFORCE et al., 2020). We expect that the higher perception of risk associated with the

COVID-19 infection will likely lead to stronger feelings of anxiety and lack of control and these will subsequently predict the endorsement of coronavirus-specific conspiracy beliefs.

Trust in institutions' response to the coronavirus outbreak may likewise be an important variable related to the feelings of anxiety and lack of control. Since people themselves can do relatively little about the pandemic, they have to rely on the appropriate institutions – governments, WHO, doctors, and scientists – to tackle the virus. Indeed, trust in the authorities is a crucial factor for an effective response to the pandemic (e.g. Falcone et al., 2020), as it may influence people's adherence to the recommended prevention behaviors, the extent to which they follow the official information about the COVID-19, and whether they will accept the vaccine when it is available. If people do not trust these authorities or are thinking that the authorities are not doing enough to stop the COVID-19 pandemic, this may be crucial for developing strong feelings of anxiety and lack of control. Additionally, conspiracy beliefs are known to be negatively associated with the trust in one's government (e.g., van Prooijen & Acker, 2015), as well as with interpersonal trust in general (Green & Douglas, 2018). Indeed, it is the very nature of conspiracist ideation to be paranoid when it comes to authorities and distrustful of scientists, governments, or international organizations (Landrum & Olshansky, 2019). This is why we expected the trust in institutions to negatively predict people's feelings of anxiety and lack of control and be associated with an increase in coronavirus-specific conspiracy beliefs.

METHODS

Participants

The data collection was a part of a larger survey on psychological responses to the COVID-19 outbreak in Slovakia (Čavojová, Šrol, & Ballová Mikušková, 2020). Data were collected

through queries on social media as well as through participant recruitment agency, which distributed our online survey among Slovak participants quota sampled to represent the Slovak population in the distribution of gender, age, and education¹. In total, we received data from 976 people, who read the informed consent and agreed to take part in the study, however, 193 did not pass the attention check controls and their data were omitted from all analyses. The final sample consisted of 783 participants (417 female, 363 male, 3 preferred not to disclose their gender), who filled in the questionnaire between the 13th and 22nd of March 2020². Participants were aged between 18 – 84 years ($M = 42.00$, $SD = 16.84$). Most of the sample reported having a high school diploma (38.2%), a bachelor's degree (10.6%), a master's degree (39.5%), or a doctoral degree (4.5%). The rest of the participants either finished high school without a diploma (4.7%) or attained elementary education (2.6%).

Materials

¹ However, the distribution of gender and age in our whole sample is similar to the overall distribution of these demographic factors in the Slovak population as shown in the report by Statistical office of the Slovak Republic from 2019 (Podmanická et al., 2019).

² During this period, there were 32 – 185 confirmed cases of the COVID-19 in Slovakia. In Slovakia, the first confirmed case of COVID-19 was reported on 6th of March. Other European countries, including some states bordering Slovakia (e.g. Austria), were already experiencing a much steeper rise of confirmed cases. Very soon after the first confirmed case, the municipality of the capital city of Bratislava recommended shutting down schools and employees in many companies and government branches were allowed to work from home. Then, on the 16th of March, the Slovak government initiated strict preventive actions, which gradually started to take place. These included limiting all personal foreign travel, compulsory quarantine for people who came from abroad, closing of schools and most non-essential shops and services. Meanwhile, various misinformation about the coronavirus started to spread, mainly on social media. At first, the most common topic of misinformation was that COVID-19 is either a hoax, that it is something akin to the common flu, or that it is much less dangerous than the media reports. Subsequently, especially after a quick and sharp rise in cases in Italy, the topics of misinformation started to deal more with the origin of the coronavirus and whether it was created intentionally, as well as with various alternative cures for the virus, such as drinking strong liquor, chewing or wearing ginger, etc.

Feelings of anxiety and lack of control associated with the COVID-19 pandemic. Participants indicated their agreement with 12 statements reflecting feeling anxious or lacking control as the result of the COVID-19 pandemic. Six of the statements pertained to feeling anxious about the spread of the COVID-19 (e.g. reverse-scored: “*I believe that the new coronavirus is nothing to be scared of*”) and the other six were related to feeling a lack of control over one’s life or health as a result of the COVID-19 pandemic (e.g. “*I am afraid that the new coronavirus has already spread so much that we will no longer be able to stop it*”). Participants rated the statements on a seven-point scale from 1 (*completely disagree*) to 7 (*completely agree*). Two items for anxiety and lack of control scales (four items in total) were negatively worded and their ratings were reverse-scored before all analyses. Average ratings on the respective six items were used to measure the feelings of anxiety ($M = 4.32$, $SD = 1.17$, $\alpha = .69$) and lack of control ($M = 3.47$, $SD = 1.08$, $\alpha = .67$) with regard to the new coronavirus.

Perceived risk of COVID-19. Participants rated three items about the perceived infectiousness, severity, and overall dangerousness of the new coronavirus. Their average rating on a seven-point scale was used as a measure of the perceived risk of COVID-19 ($M = 5.65$, $SD = 1.07$, $\alpha = .86$).

Trust in institutions’ response to the COVID-19 pandemic. Three items were used to measure participants’ trust in institutions’ response. Using a seven-point scale, participants rated the degree to which they trusted that the Slovak government, World Health Organization, and doctors and researchers took the appropriate actions and preventive measures to tackle the COVID-19 pandemic. The average rating on the three items was 4.89 ($SD = 1.20$, $\alpha = .62$).

COVID-19 conspiracy beliefs. Participants were given 10 statements pertaining to the coronavirus and were asked to rate the extent to which they believed the respective statements. The statements described various conspiracy theories or typical conspiracist ideas concerning the outbreak, spread, and potential cure of the new coronavirus (e.g., “*SARS-CoV-2*”).

(coronavirus) is a biological weapon created to eliminate the overcrowded human population”). However, preliminary analyses showed that one of the items (“*COVID-19 (coronavirus) is only a fabrication, it is an ordinary flu which pharmaceutical companies rebranded to increase the sales of drugs*”) showed opposite patterns of relationships with the key variables in our study in comparison with the remaining nine items (i.e. this item was associated with lower risk perception of COVID-19 and lower anxiety). We thus excluded this one conspiracy theory from all subsequent analyses presented in the main manuscript, however, detailed analyses regarding this item are included in Section B of the Supplementary material). The average rating on the remaining nine items was used as the endorsement of coronavirus-specific conspiracy beliefs ($M = 2.11$, $SD = 0.92$, $\alpha = .90$).

Generic epistemically suspect beliefs. To measure the endorsement of generic epistemically suspect beliefs, we used a questionnaire taken from Šrol (2020). For the purpose of our study, we selected 6 items for paranormal, 6 items pertaining to conspiracy, and 7 items measuring pseudoscientific beliefs. Participants were asked to rate their agreement with the statements on a 5-point scale. Two paranormal and two pseudoscientific belief items were negatively worded and their ratings were reverse-scored before further analyses (see Šrol, 2020). We used average ratings on the respective scales as the measure of the endorsement of paranormal ($M = 2.85$, $SD = 0.80$, $\alpha = .69$), conspiracy ($M = 2.20$, $SD = 0.92$, $\alpha = .86$), and pseudoscientific beliefs ($M = 2.50$, $SD = 0.68$, $\alpha = .72$).

RESULTS

First, we examine the relationships among the main variables in the study through correlation analysis. We inspect the correlations between feelings of anxiety and lack of control resulting from COVID-19 pandemic, coronavirus-specific conspiracy beliefs, and generic paranormal,

conspiracy, and pseudoscientific beliefs, as well as COVID-19 risk perception, trust in institutions' response to the COVID-19 pandemic, and demographic factors. Next, to disentangle the roles of intended predictors of coronavirus-specific conspiracy beliefs, we present a mediation model where anxiety and lack of control resulting from the spread of COVID-19 mediate the relationships between COVID-19 risk perception and trust in institutions' response to the pandemic and coronavirus-specific conspiracy beliefs. Finally, we examine whether the factors related to COVID-19 (feeling of anxiety, lack of control, risk perception, and trust in institutions' response) are associated only with coronavirus-specific conspiracy theories, or whether they show up as independent predictors also in regressions with generic paranormal, conspiracy, and pseudoscientific beliefs as outcomes.

Correlates of the coronavirus-specific and generic epistemically suspect beliefs

The average endorsement rate – i.e. the average proportion of people who either “agreed” or “strongly agreed” with the nine COVID-19 conspiracy theories included in our study – was 15.5%. However, various conspiracy beliefs were endorsed to quite different extents by the participants in our sample, as is evidenced by the endorsement rates for the particular conspiracy theory items, which ranged between 5.4 – 23.7% (see Table S1 in Section A of the Supplementary material). The most popular conspiracy theories about COVID-19 in our study, which were endorsed by more than a fifth of our sample, were that COVID-19 is a biological weapon, or that the pandemic could have been stopped right at the beginning were it not for the large companies which decided to make a profit out of it.

Correlations among the main variables are presented in Table 1. First, we focus on the key question of whether anxiety and lack of control caused by the spread of the COVID-19 are related to the increased endorsement of coronavirus-specific conspiracy theories and epistemically suspect beliefs in general. Both feelings of anxiety and lack of control resulting from the COVID-19 pandemic are consistently positively related to the endorsement of

coronavirus-specific conspiracy beliefs, as well as generic paranormal, conspiracy, and pseudoscientific beliefs. While the feeling of lack of control seems to exhibit slightly stronger associations than anxiety, both of the main predictors show weak to moderate correlations with all of the epistemically suspect belief variables.

Table 1. Correlations among demographic variables, feelings of anxiety and lack of control, risk perception, trust in institutions' response and coronavirus-specific and generic epistemically suspect beliefs

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. age	1										
2. gender (1 = male, 2 = female)	-.32	1									
3. education	.03	.01	1								
4. COVID-19 anxiety	.09	.08	.01	1							
5. COVID-19 lack of control	.13	.08	-.07	.57	1						
6. COVID-19 risk perception	.30	.03	-.06	.55	.37	1					
7. trust in institutions' response to the COVID-19 pandemic	-.02	.06	-.00	-.11	-.22	.02	1				
8. COVID-19 conspiracy beliefs	.11	.02	-.23	.19	.28	.18	-.18	1			
9. generic paranormal beliefs	.08	.15	-.19	.18	.19	.17	-.06	.45	1		
10. generic conspiracy beliefs	.15	-.01	-.23	.15	.23	.13	-.17	.81	.54	1	
11. generic pseudoscientific beliefs	.08	.10	-.26	.12	.17	.13	-.10	.59	.63	.68	1

Note. Correlations are based on 783 observations. All correlations above $r = .07$ are significant at $p < .05$, above $r = .10$ are significant at $p < .01$, and above $r = .12$ are significant at $p < .001$. Significant correlations ($p < .05$) are presented in bold.

As could be expected, a higher perception of risk of the coronavirus is strongly related to feelings of anxiety and also moderately correlated with the lack of control resulting from the

spread of COVID-19. Interestingly, COVID-19 risk perception shows correlations, albeit weak, not only with coronavirus-specific, but also generic paranormal, conspiracy, and pseudoscientific beliefs. The same is true for the trust in the institutions' response to the COVID-19 pandemic, it correlates with all epistemically suspect belief variables except for generic paranormal claims. Also, participants with higher trust in institutions exhibited slightly less anxiety and a lack of control from the coronavirus pandemic.

Several demographic factors showed up to have a noteworthy role in regard to the present analyses. Age was correlated with a slightly higher endorsement of coronavirus-specific conspiracy beliefs, as well as generic paranormal, conspiracy, and pseudoscientific beliefs. More importantly, older people had a higher COVID-19 risk perception and felt more anxiety and lack of control associated with the spread of COVID-19. This is understandable since age is a very important risk factor associated with suffering a worse course of the COVID-19 infection (Zhou et al., 2020). Concerning gender, females also felt slightly more anxious and lacking control because of the COVID-19 pandemic and endorsed more generic paranormal and pseudoscientific beliefs than men. This latter finding is in line with some past research, which has already shown that women are slightly less likely to reject epistemically suspect beliefs than men (e.g. Lobato et al., 2014). Higher education was consistently negatively related to endorsement of coronavirus-specific as well as generic epistemically suspect beliefs, which is in line with many previous studies (e.g., Aarnio & Lindeman, 2005; Lindeman, 2011; Ståhl & van Prooijen, 2018; van Prooijen, 2017).

Finally, it should be mentioned that there was a moderate negative correlation between participants' age and gender, which shows that male participants were on average older than female participants in our sample. To statistically account for this difference, we included gender and age as covariates in all of the key analyses presented below.

The mediating role of COVID-19 anxiety and lack of control in the endorsement of coronavirus-specific conspiracy beliefs

To help us better understand the role of COVID-19 risk perception and trust that the key institutions made the appropriate response to the pandemic, we examined them as mutual predictors of coronavirus-specific conspiracy beliefs through mediating roles of anxiety and lack of control associated with COVID-19. Specifically, we tested a mediation model (Figure 1) which included COVID-19 risk perception (X_1) and trust in institutions' response to COVID-19 pandemic (X_2) as predictors of coronavirus-specific conspiracy beliefs (Y) with people's feelings of anxiety (M_1) and lack of control (M_2) stemming from the COVID-19 pandemic as mediators of these relationships. Additionally, we included participants' age, gender, and education as covariates, since all of these demographic factors were meaningfully related to some of the main variables included in the mediation model (see Table 1). The mediation analysis was carried out using *lavaan* package (Rosseel, 2012) in R statistical software. Standard errors were calculated from 10,000 bootstrap samples.

As can be seen from Figure 1, both higher COVID-19 risk perception and lower trust in institutions' response to the pandemic were related to feelings of anxiety and lack of control with regard to the spread of COVID-19. However, while the feeling of lack of control further predicts the endorsement of coronavirus-specific conspiracy beliefs, anxiety did not predict these beliefs independently of other predictors in the model. This is likely because even though both anxiety and lack of control are correlated with coronavirus-specific conspiracy beliefs, they also are strongly mutually interrelated, therefore, after their mutual inclusion in the model, only the stronger independent predictor, i.e. lack of control, remained as significant.

Interestingly, lower trust in institutions' response and COVID-19 risk perception were also directly associated with coronavirus-specific conspiracy beliefs, albeit to a relatively weak extent. This finding likely reflects the fact that trust in institutions is central to most conspiracy

motives and has been shown to negatively predict the endorsement of various popular conspiracy theories (van Prooijen & Acker, 2015). Therefore, while the distrust in the institutions' effort to stop the outbreak does lead to higher anxiety and lack of control associated with the coronavirus, it is also directly related to the endorsement of conspiracy beliefs about the COVID-19 pandemic. The finding that COVID-19 risk perception directly predicts the endorsement of coronavirus-specific conspiracy theories is likely because many such theories describe the new coronavirus as even more dangerous than it actually is – for example, by suggesting it is an intentionally created bioweapon.

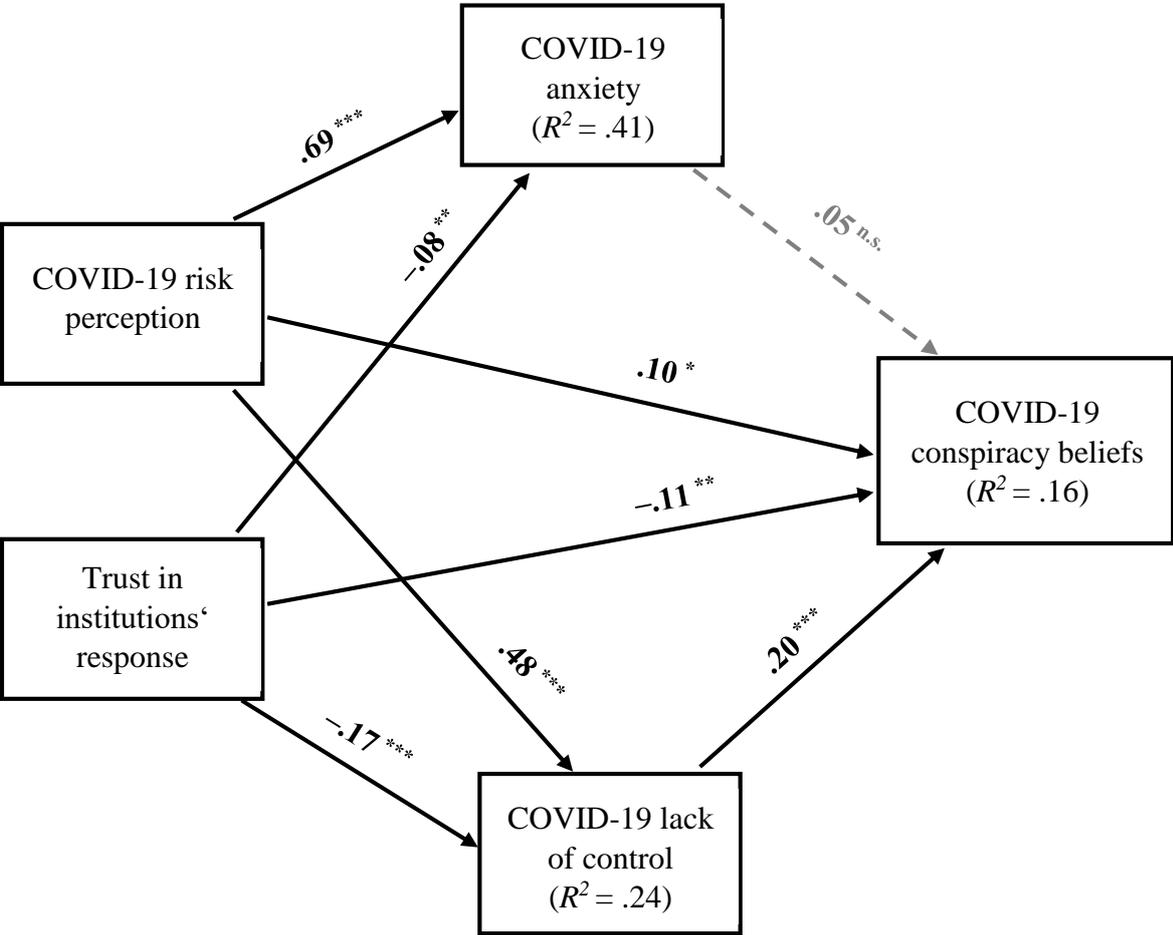


Figure 1. Standardized path coefficients for the mediation model with COVID-19 risk perception and trust in institutions' response to the pandemic as predictors of coronavirus-specific conspiracy beliefs with COVID-19 anxiety and lack of control as mediators. The model includes age, gender, and education as covariates. **All of the variables in the model were observed (i.e. not latent) variables.** Paths that are not statistically significant ($p > .05$) are presented with gray dashed arrows. * $p < .05$; ** $p < .01$; *** $p < .001$

Finally, regarding the role of demographic factors, as can be seen from parameter estimates (Table 2), education did also play a role in the endorsement of coronavirus-specific conspiracy beliefs, as it showed up as a substantial protective factor in this regard. Interestingly, while the correlational analysis showed that older people report feeling more anxiety and lack of control about the COVID-19 pandemic, they actually showed less anxiety in comparison with younger people once other variables – presumably especially risk perception – were controlled for. This suggests that those older people who do not perceive the risk of COVID-19 as higher feel less anxiety about the current pandemic situation than do younger people.

Table 2. Parameter estimates for the mediation model with COVID-19 risk perception and trust in institutions’ response to the pandemic as predictors of coronavirus-specific conspiracy beliefs with mediating roles of anxiety and lack of control

Predictors	COVID-19 anxiety ($R^2 = .41$)		COVID-19 lack of control ($R^2 = .24$)		COVID-19 conspiracy beliefs ($R^2 = .16$)	
	estimate (<i>SE</i>)	standardized estimate	estimate (<i>SE</i>)	Standardized estimate	estimate (<i>SE</i>)	standardized estimate
COVID-19 anxiety	–	–	–	–	0.04 (.04)	.05
COVID-19 lack of control	–	–	–	–	0.16 (.04)	.20***
COVID-19 risk perception	0.68 (.03)	.69***	0.42 (.03)	.48***	0.07 (.04)	.10*
Trust in institutions’ response	–0.08 (.03)	–.08**	–0.15 (.03)	–.18***	–0.08 (.03)	–.11**
Age	–0.01 (.00)	–.07*	0.00 (.00)	.05	0.00 (.00)	.07
Gender	0.01 (.06)	.01	0.06 (.06)	.04	–0.02 (.05)	–.01
Education	0.04 (.03)	.04	–0.05 (.03)	–.05	–0.16 (.03)	–.20***

Note. The table shows parameter estimates, their standard errors (*SE*), and standardized estimates for the mediation model (Figure 1) extracted from *lavaan* (Rosseel, 2012). The model included age, gender, and education as covariates. Gender was coded as 1 = “male”, 2 = “female”. Standard errors are based on 10,000 bootstrap samples. * $p < .05$; ** $p < .01$; *** $p < .001$

COVID-19 related factors (anxiety, lack of control, risk perception, and trust in institutions’ response) as predictors of generic epistemically suspect beliefs

Lastly, we wanted to examine whether the factors associated with the COVID-19 pandemic (feeling of anxiety, lack of control, risk perception, and trust in institutions’ response) predict only the coronavirus-specific conspiracy theories endorsement, or whether they are associated

also with more generic epistemically suspect beliefs. To this end, we run three separate regression analyses to examine these variables as potential independent predictors of paranormal, conspiracy, and pseudoscientific beliefs not specifically related to the COVID-19 pandemic. Age, gender, and education were again included as covariates in these analyses because of their associations with generic epistemically suspect beliefs.

Table 3. Regression with predictors of generic paranormal, conspiracy, and pseudoscientific beliefs

	Paranormal beliefs (adj. $R^2 = .10$)		Conspiracy beliefs ($R^2 = .13$)		Pseudoscientific beliefs ($R^2 = .11$)	
	<i>b</i> (<i>SE</i>)	β	<i>b</i> (<i>SE</i>)	β	<i>b</i> (<i>SE</i>)	β
Intercept	2.20 (.23)	–	2.47 (.26)	–	2.47 (.20)	–
Age	0.01 (.00)	.11**	0.01 (.00)	.14***	0.00 (.00)	.10**
Gender	0.29 (.06)	.18***	0.05 (.07)	.03	0.19 (.05)	.14***
Education	–0.13 (.02)	–.19***	–0.18 (.03)	–.23***	–0.15 (.02)	–.26***
COVID-19 anxiety	0.05 (.03)	.08	0.03 (.04)	.03	0.01 (.03)	.02
COVID-19 lack of control	0.05 (.03)	.07	0.12 (.04)	.14**	0.05 (.03)	.08 ^a
COVID-19 risk perception	0.04 (.03)	.05	0.01 (.04)	.01	0.03 (.03)	.04
Trust in institutions' response	–0.03 (.02)	–.04	–0.11 (.03)	–.14***	–0.04 (.02)	–.08*
	$F(7,772) = 13.3, p < .001$		$F(7,772) = 16.9, p < .001$		$F(7,772) = 14.9, p < .001$	

Note. The table shows unstandardized (*b*) regression coefficients with standard errors (*SE*) and standardized regression coefficients (β) for the three regression models examining the predictors of generic paranormal, conspiracy, and pseudoscientific beliefs. Gender was coded as 1 = “male”, 2 = “female”. ^a $p = .052$, * $p < .05$; ** $p < .01$; *** $p < .001$

As can be seen from Table 3, generic conspiracy and pseudoscientific beliefs showed patterns of associations with predictors that are very similar to the results observed with COVID-19 conspiracy theories endorsement. Specifically, higher generic conspiracy and pseudoscientific beliefs were predicted by older age, lower education and lower trust in institutions' response to the COVID-19 pandemic, as well as with higher feelings of lack of control associated with COVID-19, although this relationship was only marginally significant in case of pseudoscientific beliefs ($\beta = .08, p = .052$). While older age and lower education were also associated with higher endorsement of generic paranormal beliefs, neither of the variables related to the COVID-19 pandemic showed up as significant predictors in this regard. Also, even after controlling for other variables, women did endorse more generic paranormal and

pseudoscientific beliefs in comparison with men (see also Lobato et al., 2014). The results show that it is not just that the feelings of anxiety and lack of control stemming from the COVID-19 pandemic increase specific conspiracy beliefs associated with the coronavirus, but they are related to other and more generic epistemically suspect beliefs as well.

DISCUSSION

The present study shows that people who feel anxious and lacking control over their lives amidst the ongoing pandemic adopt more conspiracy beliefs related to the origin and spread of COVID-19. As such, our results fit well with the existing theoretical accounts (e.g., Douglas et al., 2019; van Prooijen & Douglas, 2017; van Prooijen & van Vugt, 2018), **and complement the existing studies on the associations between the belief in conspiracy theories and feelings of powerlessness, lack of control, and anxiety (e.g., Grzesiak-Feldman, 2013; Swami et al., 2016; van Prooijen & Acker, 2015; Whitson & Galinsky, 2008).** While some of those studies used fictitious situations or asked participants about how much they feel anxious in general to examine these associations, an interesting aspect of our research was that we examined a real-life threatening situation, the spread of the COVID-19, and studied conspiracy beliefs specifically related to it.

Importantly, we showed that the feeling of lack of control as the result of the COVID-19 pandemic is not only associated with higher endorsement of coronavirus-specific conspiracy theories but stands out as an independent predictor of generic conspiracy and pseudoscientific beliefs as well. This is likely because of the strong interrelationships among various types of epistemically suspect beliefs (e.g., Lewandowsky, Oberauer, et al., 2013; Lobato et al., 2014; Šrol, 2020). People who adopt some conspiracy beliefs about COVID-19 are more likely to adopt other epistemically suspect beliefs as well and this seems to happen particularly when

they experience strong feelings of anxiety and/or lack of control. Alternatively, people who endorse more generic conspiracy and pseudoscientific beliefs feel more anxious and lacking control amidst the COVID-19 pandemic, and all these factors contribute to their higher endorsement of COVID-19 conspiracy theories.

Although both feelings of anxiety and lack of control were correlated with the endorsement of conspiracy theories about COVID-19 (and generic epistemically suspect beliefs), only lack of control showed up as an independent predictor of having more COVID-19 conspiracy beliefs, generic conspiracy beliefs, and marginally more pseudoscientific beliefs, when all other variables were taken into account. There are a couple of reasons why anxiety did not independently predict these outcomes. Firstly, one of the primary ways in which threatening events, such as the COVID-19 pandemic, create anxiety is by making people **realize** that they are not in control of their environment (e.g., van Prooijen & Douglas, 2017). In this sense, the feeling that one lacks control can be seen as more central to adopting conspiracy theories, as it may give rise to anxiety, which in leads to sense-making efforts (Kay et al., 2009) that may ultimately result in higher conspiracy belief endorsement (Landau et al., 2015). Also, while feelings of powerlessness and lack of control are well-established to be associated with the endorsement of specific conspiracy theories (Abalakina-Paap et al., 1999; van Prooijen & Acker, 2015; although not generic conspiracy motives, see Stojanov & Halberstadt, 2020), the evidence is more mixed with regard to feelings of anxiety (Swami et al., 2016), and anxiety-inducing situations (Grzesiak-Feldman, 2013). But still, it should be mentioned that since both feelings of lack of control and anxiety related to the COVID-19 pandemic were substantially correlated in the present study, it is not surprising that only the stronger one of the predictors emerged as significant in the regression analysis.

However, not all conspiracy theories regarding COVID-19 are associated with higher anxiety. Feelings of anxiety are related to higher adoption of some conspiracy theories (Grzesiak-

Feldman, 2013; Newheiser et al., 2011), especially when these revolve around the idea that some powerful actors are working in secret to hurt us, which was also the case with conspiracy theories that present COVID-19 as a bioweapon or intentionally created for some financial/political gain. However, one of the main COVID-19 conspiracy theories claims that it is either a hoax (i.e. there is no new coronavirus at all) or that it is no worse than the common flu (van Mulukom et al., 2020), which can be seen as a denial to reduce anxiety. Indeed, it was also shown in this study – people who believed that COVID-19 is a fabrication or ordinary flu had lower COVID-19 risk perception and felt less anxious about the pandemic (see Section A and B in the Supplementary material). Similar results were found in a recent study (Imhoff & Lamberty, 2020) – people believing the COVID-19 hoax conspiracy theory felt less threatened by COVID-19 and differed in their patterns of prevention behaviors from those who believed that COVID-19 was intentionally human-made. This calls further attention to the importance of exploring various COVID-19 conspiracy theories and their potential item-level associations with regard to their antecedents and potential consequences (van Mulukom et al., 2020).

Recently, two other studies conducted at a similar time as our own research showed the association between COVID-19 conspiracy beliefs and higher anxiety among university students in Jordan (Sallam et al., 2020) and stronger feelings of powerlessness in a large online sample consisting predominately of the UK and US participants (Biddlestone et al., 2020). Moreover, Jutzi et al. (2020) showed that the manipulation of threat salience of COVID-19 led to higher fear (behavioral inhibition), which was in turn associated with people endorsing more COVID-19 conspiracy theories. These studies complement our results and suggest that the findings presented here do not hold only for Slovak people, but are generalizable across other countries with different epidemiological as well as political/social situation (see also van Mulukom et al., 2020).

We have also examined participants' perception of risk associated with the COVID-19 infection and conspiracy theories. While the cognitive perception of risk of the COVID-19 was associated with stronger feelings of anxiety and lack of control, it also directly predicted endorsing more conspiracy beliefs about the COVID-19. This suggests that the emotional (feeling of anxiety and lack of control about the COVID-19) and the cognitive (COVID-19 risk perception) aspects both could play a role in engaging in the sense-making mechanisms that result in higher adoption of conspiracy theories after witnessing a threatening event.

Additionally, we have also found that people who did not trust formal institutions to handle the pandemic exhibited a stronger feeling of anxiety and lack of control with regard to the COVID-19 pandemic, and had more COVID-19 conspiracy beliefs. Trust in institutions and authorities such as one's government, WHO, or scientists was recently also shown to be negatively associated with COVID-19 conspiracy theories in a study by Freeman et al. (2020). Our findings, however, have shown that trust in institutions' response to the pandemic was also negatively associated with the endorsement of generic conspiracy and pseudoscientific beliefs. This is likely because of the nature of such beliefs, which are often based around the distrust in the actions of the government, scientists, and other authorities since these were also central themes of the items used to measure generic epistemically suspect beliefs here. The results suggest that the endorsement of various epistemically suspect beliefs, both related to COVID-19 pandemic and generic ones, is associated with eroded trust in official institutions. This is important since trust in institutions is key for an effective response in crises such as the COVID-19 pandemic (Falcone et al., 2020).

At this point, we would like to mention some of the limitations of the present study. Firstly, the predictors we included in our models explained a relatively low amount of variance in epistemically suspect belief variables. This points to the fact that while feelings of anxiety and lack of control may represent immediate emotional responses to the pandemic which contribute

to the endorsement of COVID-19 and generic epistemically suspect beliefs, there are other known and more stable personality, social, and cognitive variables, which are also known to contribute to the endorsement of such beliefs (e.g., Šrol, 2020; van Mulukom et al., 2020). Secondly, while in this study, we focused on examining immediate feelings related to the threat of the COVID-19 pandemic, i.e. feelings of anxiety and lack of control, for future research it could be useful to also measure these variables in a form of a more stable propensity to experience such feelings, such as trait anxiety and locus of control. This would allow to specifically disentangle the effects of both trait and state levels of anxiety and lack of control on the endorsement of COVID-19 and generic epistemically suspect beliefs.

Despite the mentioned limitations, a strong point of our study was that we examined people's immediate emotional responses to the COVID-19 outbreak when uncertainty due to the novelty of the virus was high and thus the feelings of threat, anxiety, and lack of control were likely to be felt by many. As we have shown, people who experienced higher anxiety and lack of control adopted more conspiracy beliefs about the origin, spread, and cure of the COVID-19, and also endorsed more conspiracy and pseudoscientific beliefs in general. This is particularly important as we already have the evidence that COVID-19 conspiracy theory endorsement is negatively associated with health-protective behaviors, vaccination intentions, and can likewise be at the bottom of negative social consequences in the form of prejudice, discrimination, or support for violence (for a review, see van Mulukom et al., 2020). Therefore, the understanding of how emotional factors contribute to the endorsement of conspiracy and pseudoscientific beliefs is crucial for the effective communication of strategies on how to contain the pandemic and gain support for adopting the necessary preventive measures.

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