ORIGINAL ARTICLE

The relationship between fear of COVID-19 infection, fear of COVID-19 vaccination and Big Five personality traits: a mediation model

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BACKGROUND
The primary objective of our correlational, cross-sectional study was to determine the relationship between fear of COVID-19 infection and fear of COVID-19 vaccination and the role of the Big Five personality traits in this relationship.

PARTICIPANTS AND PROCEDURE
The study sample consisted of 462 participants, including 286 women and 176 men, aged 18 to 75, recruited from the general population. The Big Five personality traits were diagnosed using the Polish version of the Ten-Item Personality Inventory. We used an 11-point numerical rating scale to measure the intensity of fear of COVID-19 infection as well as fear of COVID-19 vaccination.

RESULTS
The results indicate that fear of infection has a weak positive correlation with fear of vaccination. Both types of fear have a weak negative correlation with emotional stability and openness to experience. People diagnosed with COVID-19 have significantly higher levels of fear of vaccination and lower levels of emotional stability compared to those without a COVID-19 diagnosis. Fear of infection proves a good predictor of fear of vaccination and a likely mediator between emotional stability and fear of vaccination against COVID-19.

CONCLUSIONS
The results may increase our understanding of the role of personality traits, such as emotional stability, in the fear of infection and COVID-19 vaccination hesitancy.

KEY WORDS
Big Five; personality; fear of COVID-19 infection; fear of COVID-19 vaccination

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BACKGROUND

COVID-19 is a serious disease that has rapidly spread around the world, posing a significant threat to human health and life. In addition to its medical and societal effects, the COVID-19 pandemic has led to increased psychological distress, such as anxiety and depression (Dong et al., 2021). In our study, we use the term 'fear', rather than the more common term 'anxiety', to describe peoples' feelings about COVID-19 infection and COVID-19 vaccination. As defined in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), published by the American Psychiatric Association (2013), 'Fear is the emotional response to real or perceived imminent threat, whereas anxiety is anticipation of future threat' (p. 189). Fear therefore applies to both real infection and vaccination (fear of side effects or fear of injection).

Many studies have indicated that fear of COVID-19 infection has broad demographic, economic, social and psychological determinants. For example, psychological factors include intolerance of uncertainty and general risk aversion (Millroth & Frey, 2021), anxiety about one's health and the health of family members (Oniszczenko, 2021), regular use of media and social media (Pimenta et al., 2020) and limited knowledge about COVID-19 (Cerda & García, 2022). The factors that have determined the level of emotional distress in individuals during the pandemic include experiencing stress, anger and fear (Kabasawa et al., 2021), health anxiety (Nürnberger et al., 2022) and, for professionals directly involved in patient care, the risk of contact with infected patients and the experience of quarantine (Sirosis & Owens, 2021).

However, little is known about the role of personality traits in individuals' fear of COVID-19 infection. Some studies have examined the importance of the personality traits included in the Big Five model in relation to COVID-19. For example, Aschwanden et al. (2021) have found a relationship between the traits of neuroticism, extraversion, and conscientiousness and pandemic behaviour, such as expressing anxiety or undertaking preparations (see also Kohút et al., 2021). Zacher and Rudolph (2021) found that emotional stability was associated with a low level of perceived COVID-19 stressfulness, while extraversion was associated with a high level of perceived stressfulness. Fernández et al. (2020) reported that neuroticism significantly influenced the level of distress experienced by women in quarantine conditions. An association between neuroticism and overall pandemic anxiety was also established by Kumar and Tankha (2022). Moreover, Ikizer et al. (2022) suggested that neuroticism may be a good predictor for stress associated with the pandemic. However, the analysis by Fink et al. (2021) indicated that personality traits, including neuroticism, have only a small effect on behaviour related to the COVID-19 pandemic.

Several studies have shown that personality traits can contribute to attitudes about COVID-19 vaccination. For example, a study by Yanto et al. (2021) revealed that vaccination readiness may be related to higher levels of agreeableness and neuroticism. Similarly, Lin and Wang (2020) observed a relationship between high levels of agreeableness, conscientiousness and emotional stability and favourable attitudes towards COVID-19 vaccination (see also Salerno et al., 2021).

Many researchers have indicated that unwillingness to vaccinate against COVID-19 may be due to an individual's level of fear of COVID-19 infection. Low or no fear of COVID-19 infection is associated with rejection of vaccination (Sekizawa et al., 2022). Similarly, Scrima et al. (2022) found that fear of COVID-19 infection reduces the reluctance to vaccinate; however, fear aroused by COVID-19 conspiracy theories and inadequate knowledge of the disease prevents vaccination. Bendau et al. (2021) reported that fear of COVID-19 infection promotes acceptance of vaccination, but at the same time fear of the social and economic aftermath of the pandemic weakens vaccination readiness. According to Mertens et al. (2022), while fear of COVID-19 infection increases vaccine readiness, the perceived risk of vaccination reduces vaccine readiness. On the other hand, Lee and You (2022) suggested that acceptance of vaccination may be due to perceived susceptibility to infection as well as the perceived benefits of vaccination.

STUDY OBJECTIVES

The primary objective of our correlational, cross-sectional study was to determine the relationship between fear of COVID-19 infection and fear of vaccination against COVID-19. We also wanted to investigate the role of the personality traits postulated by the Big Five model in this relationship. Given the functional importance of the Big Five personality traits, we expected that both fear of COVID-19 infection and fear of COVID-19 vaccination would be negatively correlated with emotional stability. We also assumed that fear of infection would mediate the relationship between emotional stability and fear of COVID-19 vaccination. Furthermore, we postulated that a high level of extraversion, openness to experience, and conscientiousness would be associated with a low level of fear of vaccination.

PARTICIPANTS AND PROCEDURE

PARTICIPANTS

The study sample consisted of 462 participants aged 18 to 75, with a mean age of 32.22 years (SD = 12.58).

Participants were recruited from the general population and included 286 women and 176 men. Detailed characteristics of the entire study sample are presented in Table 1.

The study participants were divided into two groups for the statistical analysis. The first group included people with a previous COVID infection, and the second group included people without a previous COVID-19 infection. It should be recalled that the population from which the study participants were recruited consisted of two different groups: people who had previously been infected with COVID-19, and people who had not had such an experience.

PROCEDURE

All data were collected using an online recruitment platform between November 2021 and February 2022, that is, during the fourth wave and the beginning of the fifth wave of the COVID-19 pandemic in Poland. Participation in the study was anonymous and fully voluntary. Participants were not remunerated for their participation. All participants received information about the purpose of the study, the confidentiality of collected data, and the possibility of withdrawing from the study at any time without giving a reason. The research procedure strictly followed ethical principles for human research and was approved by the Research Ethics Committee at the Faculty of Psychology at the University of Warsaw (ref: 16-11-2020).

MEASURES

The Big Five personality traits. The Polish version of the Ten-Item Personality Inventory (TIPI; Gosling et al., 2003; Sorokowska et al., 2014) was used to assess the Big Five personality traits. Cronbach's α coefficients for the current study were as follows: emotional stability (.73), extraversion (.75), openness to experience (.44), agreeableness (.63) and conscientiousness (.72).

COVID-19-related fear. An 11-point numerical rating scale was used to measure the intensity of participants' fear of the COVID-19 infection as well as their fear of vaccination against COVID-19 (Fitzpatrick et al., 2020; Sigorski et al., 2020). Participants rated the severity of their fears on a scale from 0 (*I feel absolutely no fear*) to 10 (*I feel unimaginable fear*).

STATISTICAL ANALYSIS

All computations were performed using IBM SPSS Statistics (Version 27). The relationships among variables were examined with Pearson product-moment coefficients. The differences between COVID-19 groups with diagnosed prior infection and no diagnosed prior

Table 1

Sociodemographic variables in the studied sample (N = 462)

Variables	n (%)
Education	
Higher	210 (45.5)
Secondary	222 (48.1)
Primary	30 (6.5)
Marital status	
Single	200 (43.3)
Married/partnered	249 (53.9)
Divorced	13 (2.8)
Place of residence	
Rural areas	139 (30.1)
Small towns	136 (29.5)
Large cities	187 (40.5)
Diagnosed with COVID-19	
Yes	198 (42.9)
No	264 (57.1)
Vaccinated against COVID-19	
Yes	345 (74.7)
No	117 (25.3)

infection were computed using independent two-sample *t*-tests. Predictions of fear of vaccination against COVID-19 based on the previous COVID-19 infection, the fear of COVID-19 infection and Big Five personality traits were estimated using multivariate linear regression analysis in the entire sample. The mediation analyses were conducted via the PROCESS macro for SPSS (Version 3.5), Model 4 (Hayes, 2018). A bootstrapping procedure with 5,000 sample draws and bias-corrected standard errors was used to estimate the direct and indirect effects (Preacher & Hayes, 2008).

RESULTS

Table 2 presents the Pearson *r* correlation coefficients among COVID-19-related fear, fear of COVID-19 vaccination, the Big Five personality traits, and age.

As shown in Table 2, almost all correlation coefficients are small to medium. Positive correlations with COVID-19-related fear were found for fear of COVID-19 vaccination and age, while negative correlations were found for emotional stability, openness to experience, and agreeableness. Fear of COVID-19 vaccination correlated negatively with emotional sta-

Table 2

Pearson r correlations for the study variables (N = 462)

Variables	1	2	3	4	5	6	7	8
1. COV fear	–							
2. VAC fear	.17***	–						
3. Emotional stability	−.17***	−.16***	–					
4. Extraversion	−.05	−.03	.46***	–				
5. Openness	−.11*	−.11*	.19***	.35***	–			
6. Agreeableness	−.11*	−.06	.32***	.39***	.35***	–		
7. Conscientiousness	.02	−.02	.28***	.33***	.19***	.36***	–	
8. Age	.19***	−.04	.18***	.09	−.06	.12*	.31***	–

Note. COV fear – COVID-19-related fear; VAC fear – fear of COVID-19 vaccines; *p < .05, ***p < .001.

Table 3

Means, standard deviations, and t-test statistics for the study variables in the group of individuals with previous COVID-19 infection (N = 198) and the group of individuals without previous COVID-19 infection (N = 264)

Variables	Previous COVID-19 infection		t(460)	p	Cohen's d
	Yes (n = 198) M (SD)	No (n = 264) M (SD)			
COV fear	3.99 (2.64)	4.12 (2.69)	−0.49	.626	−.05
VAC fear	4.30 (3.63)	3.19 (3.27)	3.55	< .001	.33
Emotional stability	8.10 (3.17)	8.72 (3.30)	−2.06	.040	−.19
Extraversion	10.08 (3.11)	10.05 (3.24)	0.12	.906	.01
Openness	8.95 (2.21)	9.34 (2.39)	−1.80	.073	−.17
Agreeableness	10.97 (2.49)	10.97 (2.54)	0.04	.970	.00
Conscientiousness	10.35 (2.76)	10.43 (3.03)	−0.29	.775	−.03
Age	31.96 (10.95)	32.41 (13.70)	−0.38	.705	−.04

Note. COV fear – COVID-19-related fear; VAC fear – fear of COVID-19 vaccines.

bility and openness to experience. Means, standard deviations, and *t*-test statistics for the study variables in the diagnosed and undiagnosed COVID-19 groups are displayed in Table 3.

According to the *t*-test values, there were statistically significant differences between the groups regarding fear of COVID-19 vaccines and emotional stability. For participants who had previously been infected with COVID-19, the fear of COVID-19 vaccines was significantly higher than for participants who had not been infected with COVID-19. Those diagnosed with COVID-19 were also less emotionally stable compared with undiagnosed individuals and were less open to experience (not significant).

To determine the extent to which previous COVID-19 infection, COVID-19-related fear and the Big Five personality traits can be viewed as predic-tors of fear of COVID-19 vaccination, we performed a multivariate linear regression analysis. Based on the regression coefficients, previous COVID-19 infection (β = −.15, *p* < .001), COVID-19-related fear (β = −.13, *p* = .004) and emotional stability (β = −.17, *p* = .002) were found to be significant predictors of fear of COVID-19 vaccination (adjusted R^2 = .06). The results are summarized in Table 4.

We conducted an analysis using a bootstrapping procedure, with fear of COVID-19 as the mediator between emotional stability and fear of COVID-19 vaccination in the studied group. The analysis showed a significant indirect effect of emotional stability on fear of COVID-19 vaccination through the mediator of fear of COVID-19 (effect = −.02, *SE* = .01, 95% CI [−.05, −.01]). The individual pathways in the mediation analysis are displayed in Figure 1.

Table 4

Multivariate linear regression analysis of previous COVID-19 infection, COVID-19-related fear and the Big Five traits as predictors of fear of vaccine against COVID-19 in the whole sample (N = 462) with variance inflation factor (VIF)

Variables	B	SE	β	Semipartial correlation	VIF	Tolerance
Previous COVID-19 infection	−.97	.31	−.15***	−.14	1.02	.98
COVID-19-related fear	.17	.06	.13**	.13	1.05	.95
Emotional stability	−.17	.05	−.17**	−.14	1.35	.77
Extraversion	.09	.06	.08	.07	1.50	.67
Openness	−.13	.07	−.09	−.08	1.22	.82
Agreeableness	−.01	.07	−.01	−.01	1.38	.73
Conscientiousness	.02	.06	.02	.02	1.24	.81

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

DISCUSSION

The results of our study showed a positive correlation between fear of infection and fear of COVID-19 vaccination. Both fears were negatively correlated with emotional stability and openness to experience, while agreeableness was negatively correlated only with fear of COVID infection. A comparison of individuals with a previously diagnosed COVID infection and those without a previously diagnosed infection showed that those with a prior COVID infection have a higher level of fear of vaccination, are less emotionally stable and less open to experience (not significant). Among personality traits, emotional stability was the best predictor of fear of COVID vaccination and probably fear of COVID infection may serve as a mediator in the relationship between emotional stability and fear of vaccination.

We found that fear of COVID-19 infection was positively correlated with fear of COVID-19 vaccination. Yeşiltepe et al. (2021) reported a similar result, finding a positive correlation between fear of COVID-19 and COVID-19 vaccine hesitancy. The reasons for hesitancy were concerns about the side effects of vaccination in the absence of evidence about its effectiveness and reliability. The results of some studies indicate that the fear of vaccination against COVID-19 may be associated not only with anticipated short-term side effects of vaccination, such as allergic reactions, but also with long-term effects such as autoimmune and neurological reactions (Holzmann-Littig et al., 2022; see also Tahir et al., 2021).

Our result contrasted with Sekizawa et al. (2022), who reported that a low level of fear of COVID-19 in individuals was associated with unwillingness or indecision regarding being vaccinated against COVID-19. In our study, as demonstrated in Table 3,

Figure 1

The mediating effect of fear of COVID-19 infection in the relationship between emotional stability and fear of COVID-19 vaccination
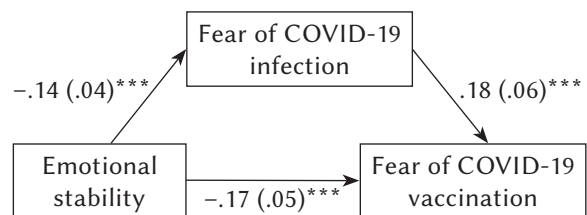
Note. Unstandardized coefficients are reported, with standard errors in parentheses. ***$p < .001$.

participants with a prior COVID-19 infection had a significantly higher level of fear of vaccination compared with participants without a prior COVID-19 infection, suggesting that previously infected individuals are less motivated to accept the vaccine than their never-infected counterparts. Some researchers have suggested that fear of vaccination may arise among hesitant people because of their anxiety and depression as well as concerns about vaccine efficacy, including vaccines in general and vaccine side effects (Nguyen et al., 2022). Scrima et al. (2022) showed that fear of COVID-19 infection reduces hesitancy and reluctance to vaccinate; however, the fear aroused by COVID-19 conspiracy theories and inadequate knowledge of the disease prevents vaccination. Yang et al. (2021) noted that only conspiracy theories about the vaccines themselves, not COVID-19 in general, were relevant to the decision to abstain from vaccination. Our findings suggest that individuals who have already had a COVID-19 infection are likely to

develop beliefs about their lack of control over the epidemic and about vaccine ineffectiveness (see also Malesza & Kaczmarek, 2021). Peoples' awareness of the limited COVID-19 treatment options, belief in conspiracy theories and moderate confidence in government communications that encourage vaccination and emphasise the safety of COVID-19 vaccines may also be significant here (see also Paul et al., 2021). It is noteworthy that Freeman et al. (2021) described a less-known risk factor for COVID-19 vaccine hesitancy: blood-injection-injury phobia, which could explain approximately 10% of COVID-19 vaccine hesitancy cases.

We believe that the positive correlation between fear of infection and fear of vaccination may be due to two slightly different mechanisms, namely 'emotional' and 'cognitive'. Fear of becoming infected with COVID-19 comes from knowing the dangers of contracting the SARS-CoV-2 virus or its mutations, up to and including death. However, even if a significant proportion of the population judges that the risk of contamination is relatively low, those with conspiratorial thinking (e.g., the refusal to participate in a 'large genetic experiment' based on mRNA technology), low trust in social institutions and certain religious beliefs will favour vaccine rejection (Stamm et al., 2022). Some authors have pointed to the excess of misinformation on the Internet, especially regarding the misrepresentation of vaccine side effects, as causing fear of vaccination (Fieselmann et al., 2022; see also Ganie & Mukhter, 2022). According to Zhou et al. (2022), fear of COVID-19 may be an important mediating factor between the negative media influence on attitudes towards vaccination and COVID-19 vaccine hesitancy.

We theorise that the Big Five personality traits may be significant factors contributing to the increase in fear about the vaccine. As correlative data showed (see Table 2), fear of COVID-19 infection and fear of vaccination negatively correlated with emotional stability and openness to experience. We found that participants previously infected with COVID-19 were less emotionally stable than those with no prior infection.

The relationship between neuroticism and the level of fear of COVID-19 infection and fear of vaccination is well known (Fernández et al., 2020; Ikizer et al., 2022; Kumar & Tankha, 2022; Troisi et al., 2021; Zacher & Rudolph, 2021). Our research showed that people previously diagnosed with COVID-19 have significantly higher levels of neuroticism (i.e., they are less emotionally stable) compared to people without a prior COVID-19 diagnosis. While statistically significant, the difference between the two groups is small, and it is possible that this result is due to the TIPI construction used in our study and discussed by some researchers (DeBell et al., 2022). Nevertheless, individuals diagnosed with COVID-19 may experi-ence severe stress and initiate ineffective ways of coping with stress, exacerbated by inadequate social support and social isolation, during the disease. This situation causes an increase in the level of neuroticism, analogous to some survivors of natural disasters who experience an increase in another personality (temperament) trait, such as emotional reactivity, that is, the tendency to respond intensely to stressful stimuli (Zawadzki et al., 2009).

Neuroticism, as a personality trait, can increase the degree to which fear becomes generalized (Garcia & Zoellner, 2017). In our study, the fear of COVID-19 infection could be generalized to fear of vaccination due to neuroticism.

Openness to experience was the second feature of the Big Five model that we found to be weakly related to the fear of COVID-19 infection and vaccination against COVID. The relationship between openness to experience and the COVID-19 pandemic is ambiguous. Nikčević et al. (2021) found a link between the traits of neuroticism and openness to experience and COVID-19-related anxiety and COVID-19-related anxiety syndrome. The results of the Proto and Zhang (2021) study suggested that a high level of both openness to experience and extraversion contributed to the deterioration of mental health during the COVID-19 pandemic, whereas Mo et al. (2021) reported that a high level of openness to experience was positively associated with a high willingness to be vaccinated against COVID-19. The results of our multivariate linear regression analysis demonstrated that both COVID-19-related fear and emotional stability were predictors of fear of being vaccinated against COVID-19. Together, both COVID-19 fear and emotional stability accounted for approximately 4% of the variance in fear of COVID-19 vaccination. Although personality traits may be associated with perception of situations, in the case of the COVID-19 threat, personality may have less influence on human behaviour compared to other factors, such as when individuals believe conspiracy theories and perceive the pandemic as a deception (Hettich et al., 2022).

The mediation analysis showed that emotional stability may directly and indirectly influence the fear of COVID-19 vaccination. The relationship between emotional stability and fear of vaccination is likely mediated by fear of COVID-19 infection.

As Barlow et al. (2014) indicated, fear is one of the negative emotions that is considered an integral part of neuroticism. In an experimental study, Kumari et al. (2007) described a positive correlation between neuroticism and the fear of shock. Additionally, Reynaud et al. (2012), in a study based on psychophysiological research, suggested that fear may be influenced by neuroticism. Thus, it is possible that fear and neuroticism, being related to each other, can serve as both independent variables and as mediators.

Our results from the mediation analysis were based on a one-time correlation study and therefore should be interpreted with caution, as the findings may reflect mediating or confounding factors (MacKinnon et al., 2000). We believe that these results require verification in future research.

LIMITATIONS

Our study has some limitations. We did not control for disease severity, when the COVID-19 infection was diagnosed, duration of disease or when it ended and whether it was a one-time or a repeated infection. We also did not collect data on comorbidities that could have impacted the fear of infection and fear of vaccination. We did not control for factors other than the fear of infection that could influence the fear of vaccination, such as having children or infections among loved ones. Given this context, we recommend a future study using mixed quantitative and qualitative methods to better elucidate the relationships being analysed.

Despite our relatively large sample, its representativeness may be limited, as it included primarily women and younger people (those aged 60 years or over accounted for 4.54% of the entire sample). Potential older participants may not have been connected to the Internet or may have had limited access. Our study was based on a cross-sectional design, which significantly limited the possibility of determining causal relationships between the studied variables. The results of our study's mediation analysis also require further verification.

CONCLUSIONS

In this study, we found a positive link between fear of COVID-19 infection and fear of the COVID vaccine. Both types of fear were also negatively correlated with emotional stability and openness to experience. People diagnosed with COVID-19 had significantly higher levels of fear of the vaccine and lower levels of emotional stability compared to those who had not been infected. COVID-19-related fear and emotional stability were good predictors of fear of the COVID vaccine, and fear of COVID-19 infection likely serves as a mediator between emotional stability and fear of vaccination against COVID-19. This relationship should be further examined in future studies.

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References

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). APA

Aschwanden, D., Strickhouser, J. E., Sesker, A. A., Lee, J. H., Luchetti, M., Stephan, Y., Sutin, A. R., & Terracciano, A. (2021). Psychological and behavioural responses to coronavirus disease 2019: The role of personality. *European Journal of Personality, 35*, 51–66. https://doi.org/10.1002/per.2281

Barlow, D. H., Ellard, K. K., Sauer-Zavala, S., Bullis, J. R., & Carl, J. R. (2014). The origins of neuroticism. *Perspectives on Psychological Science, 9*, 481–496. https://doi.org/10.1177/1745691614544528

Bendau, A., Plag, J., Petzold, M. B., & Ströhle, A. (2021). COVID-19 vaccine hesitancy and related fears and anxiety. *International Immunopharmacology, 97*, 107724. https://doi.org/10.1016/j.intimp.2021.107724

Cerda, A. A., & García, L. Y. (2022). Factors explaining the fear of being infected with COVID-19. *Health Expectations, 25*, 506–512. https://doi.org/10.1111/hex.13274

DeBell, M., Maisel, N., Brader, T., Wilson, C., & Jackman, S. (2022). Improving the measurement of "Big Five" personality traits in a brief survey instrument. *European Journal of Psychological Assessment, 38*, 150–161. https://doi.org/10.1027/1015-5759/a000653

Dong, F., Liu, H. L., Dai, N., Yang, M., & Liu, J. P. (2021). A living systematic review of the psychological problems in people suffering from COVID-19. *Journal of Affective Disorders, 292*, 172–188. https://doi.org/10.1016/j.jad.2021.05.060

Fernández, R. S., Crivelli, L., Guimet, N. M., Allegri, R. F., & Pedreira, M. E. (2020). Psychological distress associated with COVID-19 quarantine: Latent profile analysis, outcome prediction and mediation analysis. *Journal of Affective Disorders, 277*, 75–84. https://doi.org/10.1016/j.jad.2020.07.133

Fieselmann, J., Annac, K., Erdsiek, F., Yilmaz-Aslan, Y., & Brzoska, P. (2022). What are the reasons for refusing a COVID-19 vaccine? A qualitative analysis of social media in Germany. *BMC Public Health, 22*, 846. https://doi.org/10.1186/s12889-022-13265-y

Fink, M., Bäuerle, A., Schmidt, K., Rheindorf, N., Musche, V., Dinse, H., Moradian, S., Weismüller, B., Schweda, A., Teufel, M., & Skoda, E. M. (2021). COVID-19-fear affects current safety behavior mediated by neuroticism-results of a large cross-sectional study in Germany. *Frontiers in Psychology, 12*, 671768. https://doi.org/10.3389/fpsyg.2021.671768

Fitzpatrick, K. M., Harris, C., & Drawve, G. (2020). Fear of COVID-19 and the mental health consequences in America. *Psychological Trauma, 12*, S17–S21. https://doi.org/10.1037/tra0000924

Freeman, D., Lambe, S., Yu, L. M., Freeman, J., Chadwick, A., Vaccari, C., Waite, F., Rosebrock, L., Petit, A., Vanderslott, S., Lewandowsky, S., Larkin, M., Innocenti, S., McShane, H., Pollard, A. J., & Loe, B. S. (2021). Injection fears and COVID-19 vaccine hesitancy. *Psychological Medicine.* https://doi.org/10.1017/S0033291721002609

Ganie, A., & Mukhter, I. (2022). Misinformation induced anxieties and fear affecting vaccination programs: Challenge for COVID-19 vaccination program. *Journal of Family Medicine and Primary Care, 11*, 405–406. https://doi.org/10.4103/jfmpc.jfmpc_1520_21

Garcia, N. M., & Zoellner, L. A. (2017). Fear generalisation in individuals with high neuroticism: Increasing predictability is not necessarily better. *Cognition & Emotion, 31*, 1647–1662. https://doi.org/10.1080/02699931.2016.1259160

Gosling, S., Rentfrow, P., & Swann, W., Jr. (2003). A very brief measure of the Big Five personality domains. *Journal of Research in Personality, 37*, 504–528. https://doi.org/10.1016/S0092-6566(03)00046-1

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: a regression-based approach* (2nd ed.). Guilford Press.

Hettich, N., Beutel, M. E., Ernst, M., Schliessler, C., Kampling, H., Kruse, J., & Braehler, E. (2022). Conspiracy endorsement and its associations with personality functioning, anxiety, loneliness, and sociodemographic characteristics during the COVID-19 pandemic in a representative sample of the German population. *PloS One, 17*, e0263301. https://doi.org/10.1371/journal.pone.0263301

Holzmann-Littig, C., Frank, T., Schmaderer, C., Braunisch, M. C., Renders, L., Kranke, P., Popp, M., Seeber, C., Fichtner, F., Littig, B., Carbajo-Lozoya, J., Meerpohl, J. J., Haller, B., Allwang, C., & on behalf of the CEOsys Consortium (2022). COVID-19 vaccines: Fear of side effects among German health care workers. *Vaccines, 10*, 689. https://doi.org/10.3390/vaccines10050689

Ikizer, G., Kowal, M., Aldemir, İ. D., Jeftić, A., Memisoglu-Sanli, A., Najmussaqib, A., Lacko, D., Eichel, K., Turk, F., Chrona, S., Ahmed, O., Rasmussen, J., Kumaga, R., Uddin, M. K., Reynoso-Alcántara, V., Pankowski, D., & Coll-Martín, T. (2022). Big Five traits predict stress and loneliness during the COVID-19 pandemic: Evidence for the role of neuroticism. *Personality and Individual Differences, 190*, 111531. https://doi.org/10.1016/j.paid.2022.111531

Kabasawa, K., Tanaka, J., Komata, T., Matsui, K., Nakamura, K., Ito, Y., & Narita, I. (2021) Determination of specific life changes on psychological distress during the COVID-19 pandemic. *PLoS One, 16*, e0256481. https://doi.org/10.1371/journal.pone.0256481

Kohút, M., Kohútová, V., & Halama, P. (2021). Big Five predictors of pandemic-related behavior and emotions in the first and second COVID-19 pandemic wave in Slovakia. *Personality and Individual Differences, 180*, 110934. https://doi.org/10.1016/j.paid.2021.110934

Kumar, V. V., & Tankha, G. (2022). The relationship between personality traits and COVID-19 anxiety: a mediating model. *Behavioral Sciences, 12*, 24. https://doi.org/10.3390/bs12020024

Kumari, V., Ffytche, D. H., Das, M., Wilson, G. D., Goswami, S., & Sharma, T. (2007). Neuroticism and brain responses to anticipatory fear. *Behavioral Neuroscience, 121*, 643–652. https://doi.org/10.1037/0735-7044.121.4.643

Lee, M., & You, M. (2022). Direct and indirect associations of media use with COVID-19 vaccine hesitancy in South Korea: Cross-sectional web-based survey. *Journal of Medical Internet Research, 24*, e32329. https://doi.org/10.2196/32329

Lin, F. Y., & Wang, C. H. (2020). Personality and individual attitudes toward vaccination: a nationally representative survey in the United States. *BMC Public Health, 20*, 1759. https://doi.org/10.1186/s12889-020-09840-w

MacKinnon, D. P., Krull, J. L., & Lockwood, C. M. (2000). Equivalence of the mediation, confounding and suppression effect. *Prevention Science, 1*, 173–181. https://doi.org/10.1023/a:1026595011371

Malesza, M., & Kaczmarek, M. C. (2021). Predictors of anxiety during the COVID-19 pandemic in Poland. *Personality and Individual Differences, 170*, 110419. https://doi.org/10.1016/j.paid.2020.110419

Mertens, G., Lodder, P., Smeets, T., & Duijndam, S. (2022). Fear of COVID-19 predicts vaccination willingness 14 months later. *Journal of Anxiety Disorders, 88*, 102574. https://doi.org/10.1016/j.janxdis.2022.102574

Millroth, P., & Frey, R. (2021). Fear and anxiety in the face of COVID-19: Negative dispositions towards risk and uncertainty as vulnerability factors. *Journal of Anxiety Disorders, 83*, 102454. https://doi.org/10.1016/j.janxdis.2021.102454

Mo, P. K., Luo, S., Wang, S., Zhao, J., Zhang, G., Li, L., Li, L., Xie, L., & Lau, J. (2021). Intention to receive the COVID-19 vaccination in China: Application of the diffusion of innovations theory and the moderating role of openness to experience. *Vaccines, 9*, 129. https://doi.org/10.3390/vaccines9020129

Nguyen, K. H., Chen, S., Morris, K., Chui, K., & Allen, J. D. (2022). Mental health symptoms and association with COVID-19 vaccination receipt and intention to vaccinate among adults, United States. *Preventive Medicine, 154*, 106905. https://doi.org/10.1016/j.ypmed.2021.106905

Nikčević, A. V., Marino, C., Kolubinski, D. C., Leach, D., & Spada, M. M. (2021). Modelling the contribution of the Big Five personality traits, health anxiety, and COVID-19 psychological distress to generalised anxiety and depressive symptoms during the COVID-19 pandemic. *Journal of Affective Disorders, 279*, 578–584. https://doi.org/10.1016/j.jad.2020.10.053

Nürnberger, P., von Lewinski, D., Rothenhäusler, H. B., Braun, C., Reinbacher, P., Kolesnik, E., & Baranyi, A. (2022). A biopsychosocial model of severe fear of COVID-19. *PloS One, 17*, e0264357. https://doi.org/10.1371/journal.pone.0264357

Oniszczenko, W. (2021). The association between BIS/BAS and fear of COVID-19 infection among women. *Current Issues in Personality Psychology, 9*, 237–245. https://doi.org/10.5114/cipp.2021.106139

Paul, E., Steptoe, A., & Fancourt, D. (2021). Attitudes towards vaccines and intention to vaccinate against COVID-19: Implications for public health communications. *The Lancet Regional Health – Europe, 1*, 100012. https://doi.org/10.1016/j.lanepe.2020.100012

Pimenta, I., de Sousa Mata, Á. N., Braga, L. P., de Medeiros, G., de Azevedo, K., Bezerra, I., de Oliveira Segundo, V. H., de França Nunes, A. C., Santos, G. M., Grosseman, S., Nicolás, I. M., & Piuvezam, G. (2020). Media and scientific communication about the COVID-19 pandemic and the repercussions on the population's mental health: a protocol for a systematic review and meta-analysis. *Medicine, 99*, e23298. https://doi.org/10.1097/MD.0000000000023298

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavioral Research Methods, 40*, 879–891. https://doi.org/10.3758/BRM.40.3.879

Proto, E., & Zhang, A. (2021). COVID-19 and mental health of individuals with different personalities. *Proceedings of the National Academy of Sciences of the United States of America, 118*, e2109282118. https://doi.org/10.1073/pnas.2109282118

Reynaud, E., El Khoury-Malhame, M., Rossier, J., Blin, O., & Khalfa, S. (2012). Neuroticism modifies psychophysiological responses to fearful films. *PloS One, 7*, e32413. https://doi.org/10.1371/journal.pone.0032413

Salerno, L., Craxì, L., Amodio, E., & Lo Coco, G. (2021). Factors affecting hesitancy to mRNA and viral vector COVID-19 vaccines among college students in Italy. *Vaccines, 9*, 927. https://doi.org/10.3390/vaccines9080927

Scrima, F., Miceli, S., Caci, B., & Cardaci, M. (2022). The relationship between fear of COVID-19 and intention to get vaccinated. The serial mediation roles of existential anxiety and conspiracy beliefs. *Personality and Individual Differences, 184*, 111188. https://doi.org/10.1016/j.paid.2021.111188

Sekizawa, Y., Hashimoto, S., Denda, K., Ochi, S., & So, M. (2022). Association between COVID-19 vaccine hesitancy and generalized trust, depression, generalized anxiety, and fear of COVID-19. *BMC Public Health, 22*, 126. https://doi.org/10.1186/s12889-021-12479-w

Sigorski, D., Sobczuk, P., Osmola, M., Kuć, K., Walerzak, A., Wilk, M., Ciszewski, T., Kopeć, S., Hryń, K., Rutkowski, P., Stec, R., Szczylik, C., & Bodnar, L. (2020). Impact of COVID-19 on anxiety levels among patients with cancer actively treated with systemic therapy. *ESMO Open, 5*, e000970. https://doi.org/10.1136/esmoopen-2020-000970

Sorokowska, A., Słowińska A., Zbieg A., & Sorokowski, P. (2014). *Polska adaptacja testu Ten Item Personality Inventory (TIPI) – TIPI-PL* [Polish adaptation of the Ten Item Personality Inventory (TIPI) – TIPI-PL]. WrocLab.

Sirois, F. M., & Owens, J. (2021). Factors associated with psychological distress in health-care workers during an infectious disease outbreak: a rapid systematic review of the evidence. *Frontiers in Psychiatry, 11*, 589545. https://doi.org/10.3389/fpsyt.2020.589545

Stamm, T. A., Partheymüller, J., Mosor, E., Ritschl, V., Kritzinger, S., & Eberl, J. M. (2022). Coronavirus vaccine hesitancy among unvaccinated Austrians: Assessing underlying motivations and the effectiveness of interventions based on a cross-sectional survey with two embedded conjoint experiments. *The Lancet Regional Health – Europe, 17*, 100389. https://doi.org/10.1016/j.lanepe.2022.100389

Tahir, A. I., Ramadhan, D. S., Taha, A. A., Abdullah, R. Y., Karim, S. K., Ahmed, A. K., & Ahmed, S. F. (2021). Public fear of COVID-19 vaccines in Iraqi Kurdistan region: a cross-sectional study. *Middle East Current Psychiatry, 28*, 46. https://doi.org/10.1186/s43045-021-00126-4

Troisi, A., Nanni, R. C., Riconi, A., Carola, V., & Di Cave, D. (2021). Fear of COVID-19 among health-care workers: The role of neuroticism and fearful attachment. *Journal of Clinical Medicine, 10*, 4358. https://doi.org/10.3390/jcm10194358

Yang, Z., Luo, X., & Jia, H. (2021). Is it all a conspiracy? Conspiracy theories and people's attitude to COVID-19 vaccination. *Vaccines, 9*, 1051. https://doi.org/10.3390/vaccines9101051

Yanto, T. A., Octavius, G. S., Heriyanto, R. S., Ienawi, C., Nisa, H., & Pasai, H. E. (2021). Psychological factors affecting COVID-19 vaccine acceptance in Indonesia. *The Egyptian Journal of Neurology, Psychiatry and Neurosurgery, 57*, 177. https://doi.org/10.1186/s41983-021-00436-8

Yeşiltepe, A., Aslan, S., & Bulbuloglu, S. (2021). Investigation of perceived fear of COVID-19 and vaccine hesitancy in nursing students. *Human Vaccines & Immunotherapeutics, 17*, 5030–5037. https://doi.org/10.1080/21645515.2021.2000817

Zacher, H., & Rudolph, C. W. (2021). Big Five traits as predictors of perceived stressfulness of the COVID-19 pandemic. *Personality and Individual Differences, 175*, 110694. https://doi.org/10.1016/j.paid.2021.110694

Zawadzki, B., Kaczmarek, M., & Strelau, J. (2009). Re-aktywność emocjonalna a nasilenie objawów za-burzenia stresowego pourazowego (PTSD) u ofiar powodzi: efekt patoplastyczności, spektrum, po-datności czy komplikacji? [Emotional reactivity and the severity of symptoms of post-traumatic stress disorder (PTSD) in flood victims: Pathoplas-ticity, spectrum, susceptibility or complications?] In J. Strelau, B. Zawadzki, & M. Kaczmarek (Eds.), *Konsekwencje psychiczne traumy. Uwarunkowania i terapia* [Psychological consequences of trauma. Conditions and therapy] (pp. 77–104). Wydawnic-two Naukowe Scholar.

Zhou, L., Ampon-Wireko, S., Xu, X., Quansah, P. E., & Larnyo, E. (2022). Media attention and vac-cine hesitancy: Examining the mediating effects of fear of COVID-19 and the moderating role of trust in leadership. *PloS One, 17*, e0263610. https://doi.org/10.1371/journal.pone.0263610