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Original article

Mental health and COVID-19: The moderating role of neuroticism and conscientiousness

Santé mentale et COVID-19: le rôle modérateur du névrosisme et de la conscienciosité

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ABSTRACT

Introduction: Empirical research has established that fear and perceived threat of COVID-19 are associated with anxiety and depression in the general population. Is unclear how personality traits may act as moderators, thus the present study explored these relationships.
Objectives: This study aimed to investigate the moderating role of neuroticism and conscientiousness on the relationship between (1) the perceived threat of COVID-19 and anxiety and depression separately and (2) the fear of COVID-19 and anxiety and depression separately.
Method: This cross-sectional study was based on a community sample of 295 adults (M_{age} = 37.2, SD_{age} = 11.9) from Romania who participated online.
Results: Neuroticism and conscientiousness moderated the relationship between perceived threat and mental health outcomes. Specifically, those with higher neuroticism evidenced a stronger association between the perceived threat of COVID-19 and both anxiety and depression, whereas those high in conscientiousness evidenced a weaker relationship between fear of COVID-19 and depression.
Conclusion: This study highlights the importance of considering personality traits to understand mental health outcomes during the COVID-19 pandemic.

RÉSUMÉ

Introduction: Les recherches empiriques ont établi que la peur et la menace perçue de la COVID-19 sont associées à l'anxiété et à la dépression dans la population générale. Le rôle modérateur des traits de personnalité n'est pas clair, c'est pourquoi la présente étude a exploré ces relations.
Objectifs: Cette étude visait à exainerle rôle modérateur du névrosisme et de la conscienciosité sur la relation entre (1) la menace perçue de la COVID-19 et l'anxiété et la dépression séparément et (2) la peur de la COVID-19 et l'anxiété et la dépression séparément.
Méthodes: Cette étude transversale a été réalisée auprès d'un échantillon communautaire de 295 adultes (Mage = 37,2, SDage = 11,9) de Roumanie qui ont participé en ligne.
Résultats: Le névrosisme et la conscienciosité ont modéré la relation entre la menace perçue et les résultats de santé mentale. Plus précisément, chez les participants à haut névrosisme l'association entre la menace perçue de la COVID-19 et l'anxiété et la dépression était plus forte, tandis que chez les participants à haute conscienciosité la relation entre la peur de la COVID-19 et la dépression était plus faible.
Conclusion: Cette étude souligne l'importance de prendre en compte les traits de personnalité pour comprendre les résultats de santé mentale pendant la pandémie de COVID-19.

Mots-clés:
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Mental health and COVID-19: the moderating role of neuroticism and conscientiousness

On 31 December 2019 the World Health Organization (WHO) China Country Office was informed of the unknown aetiology of pneumonia detected in Wuhan City, Hubei Province, China. The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), known as coronavirus disease 2019 (COVID-19), started to spread quickly on a global scale, and in March 2020, the WHO officially declared COVID-19 to be a pandemic (World Health Organization, 2020), and humanity has made progress in managing the disease (e.g. medical treatment, vaccines, protective measures).

Romania, a European country with a population of over 19 million (Worldometer, 2020), faced numerous challenges in managing the spread of COVID-19 and mitigating the impact of the disease. The authorities were able to prevent a surge in cases due to the rapid implementation of control measures during the early stages of the epidemic (Dascalu, 2020). In 2021, the national vaccination campaign led to a decrease in daily infections from approximately 4,300 cases in December 2020 (Strategic Communication Group, 2020) to 2,700 in February 2021 (Strategic Communication Group, 2021). This demonstrates the importance of ongoing scientific research to improve crisis responses and adapt swiftly to pandemic threats. Behavioural science plays a crucial role in managing public health, prompting scientists to study underlying psychological mechanisms from various perspectives (Byrne-Davis et al., 2022).

A systematic review and meta-analysis investigated psychiatric and neuropsychiatric symptoms associated with severe coronavirus infections. The findings from this suggested that clinicians should be vigilant of long-term issues such as depression, anxiety, fatigue, post-traumatic stress disorder, and rarer neuropsychiatric syndromes (Rogers et al., 2020). There is a need for more representative research from various affected countries, especially focusing on vulnerable populations, as depressive and anxiety symptoms were reported in 16–28% of the screened participants (Rajkumar, 2020).

Specific research is needed to examine individual differences underlining the psychological mechanisms that play a crucial role in pandemic behaviour and how individuals cope and adapt (Chew et al., 2020). Specifically, dysfunctional personality traits can act as catalysts for mental health issues during crises (Somma et al., 2020; Zajenkowski et al., 2020). One of the most robust personality models used in individual differences research in recent years is the NEO-PI-R model or the Big Five model. This model has five first-order personality traits: openness, conscientiousness, extraversion, agreeability, and neuroticism (Costa & McCrae, 1992). Conscientiousness and neuroticism are most relevant to mental health-related outcomes such as anxiety and depression (Kotov et al., 2010). From a maladaptive viewpoint, neuroticism represents an individual's tendency to experience negative emotions including depression, anxiety, and anger. However, from a more adaptive viewpoint, it also indicates risk avoidance tendencies (Sarkar & Majumder, 2020). Conscientiousness reflects an individual's tendency to be diligent, self-disciplined, responsible, well-organised, and follow rules (Costa & McCrae, 1992). In the literature, high levels of neuroticism and low levels of conscientiousness and extraversion have been associated with depressive symptoms in the general population (Hakulinen et al., 2015; Klein et al., 2011). Neuroticism is most commonly associated with anxiety-related manifestations (Griffith et al., 2010).

It is unclear how neuroticism manifests when confronted with fear of COVID-19 or the perceived threat of this infection. Available evidence, however, suggests a relationship may exist. In a sample of Canadian adults, neuroticism and extraversion were found to be linked to higher stress levels during the pandemic. People with high neuroticism experienced higher stress due to the perceived threat of COVID-19 and lower self-efficacy, which mediated this relationship (Liu et al., 2021). Neuroticism was associated with COVID-19 death anxiety, and the relationship was mediated by perceived stress in a sample of young Indian adults (Pradhan et al., 2020). Neuroticism predicted pandemic-related psychopathology in a sample of adults from the United States, along with corona phobia (i.e. fear of contracting COVID-19) and hypochondriasis (Lee & Crunk, 2020).

Given the multidimensional nature of personality traits, it remains unclear if individuals with high conscientiousness will inherently seek to avoid germs and maintain an organised lifestyle (McCrae & Costa, 2008) or whether this trait could increase vulnerability to anxiety or depression in the context of the pandemic (Boudouda & Gana, 2020). Conscientiousness has been negatively associated with generalised anxiety and depressive symptoms during the COVID-19 pandemic. Specifically, COVID-19 anxiety partially mediated this relationship, indicating that individuals with low conscientiousness exhibited higher levels of COVID-19 anxiety, which in turn led to greater symptoms of depression and generalised anxiety (Nikčević et al., 2021).

In summary, current empirical investigations suggest that fear and the perceived threat of COVID-19 are related to mental health outcomes, such as depression and anxiety. Individual differences in personality traits, particularly neuroticism and conscientiousness, have been associated with or predicted mental health outcomes during the COVID-19 pandemic. Emerging studies have shown that these traits can moderate the relationship between COVID-19-related variables and various outcomes. For instance, the impact of allostatic load on mental health during this pandemic was moderated by medium and high levels of neuroticism (Gallagher et al., 2021). Additionally, neuroticism moderated the relationship between attention to COVID-19-related information, worry, and negative affect (Kroencke et al., 2020). Conscientiousness moderated the relationship between the psychological impact of COVID-19 and people's sense of life changes (Szepietowska et al., 2024), and was also associated with a weaker negative association between pandemic severity and adult well-being, acting as a protective factor (Zhang et al., 2021).

How these personality traits moderate the relationship between fear and perceived threat, as well as depression and anxiety, remains unclear. This study addresses these gaps in the literature. By examining neuroticism and conscientiousness as moderators, we can enhance our understanding of individual differences, vulnerability to negative outcomes, and potential for tailored interventions. This refines our comprehension of the interplay between personality traits, cognitive processes, emotional responses, and mental health outcomes. This information can inform future models, identify high-risk individuals, and advance theoretical knowledge in psychology.

As such, this study had two primary objectives: (1) to investigate the moderating role of neuroticism and conscientiousness in the relationship between the perceived threat of COVID-19 and anxiety and depression separately and (2) to examine the role of these traits in the relationship between fear of COVID-19 and anxiety and depression. Based on previous studies, we expect neuroticism to strengthen the connection between perceived threat and anxiety and depression. We also anticipate conscientiousness to act as a buffer or protective factor and diminish the relationship between COVID-19 perceived threat and anxiety, as well as depression. Second, we hypothesised that neuroticism would moderate the relationship between fear of COVID-19 and anxiety and depression, strengthening it. Finally, we hypothesised that conscientiousness would moderate the relationship between fear of COVID-19 and anxiety and depression, weakening it.

Method

Participants

The sample consisted of 295 participants (70.8% females) from Bucharest, Romania's capital city, with a mean age M = 37.2 and SD = 11.9. Participants were recruited from the community using snowball sampling (Johnson, 2014). The invitation to participate in the study was

transmitted online to students and academic staff from the university where the researchers worked, with the request to complete the questionnaire and share it with a friend or a family member. This strategy was adopted because the questionnaire items included references to mental health, which can be stigmatising (Woodall et al., 2010), and we aimed to increase research participation. The main inclusion criterion was adults without a mental health diagnosis at the time of data collection. Most participants had a university education (76.2%), while 23.8% completed high school studies. At the time of data collection, approximately 80% were employed or freelancers, 13.2% were students, and 6.8% were unemployed. Regarding monthly income, 62.7% reported an above-average income level, 22% estimated an average income level, and 15.3% reported a below-average income level.

Measures

Anxiety and depression were measured using the corresponding subscales of the Depression, Anxiety, Stress Scale (DASS-21R; Lovibond & Lovibond, 1995 adapted in Romanian by Perte, 2011), a 21-item instrument divided into three subscales that investigate distress in the last week. All items were scored directly on a 4-point Likert scale, from 0 (*not at all*) to 3 (*all the time or almost all the time*). Each subscale had seven items. The Depression subscale consists of Items 1, 2, 10, 13, 15, 18, and 20. An example item is "I felt that I had nothing to look forward to". Cronbach's alpha for this subscale was 0.76. The Anxiety subscale includes Items 4, 5, 8, 9, 12, 14, and 21. An example item is "I found it difficult to relax". The internal consistency of this subscale was good, with a Cronbach α of 0.84.

The perceived threat of COVID-19 was measured using a 4-item scale adapted from Champion (1999). Responses were scored on a 5-point Likert scale ranging from 1 (*highly unlikely*) to 5 (*most likely*). An example of an item is "To what extent do you think you risk a COVID-19 infection in the next three months?". Given that the items were adapted, we conducted a confirmatory factor analysis which resulted in good fit indices: CFI = 0.99, TLI = 0.99, SRMR = 0.01, RMSEA = 0.04 (95% CI = [0.00, 0.13] (for details, see Table 1 ESM in the Electronic Supplementary Material). Additionally, this 4-item scale was used in previous research on a larger sample with good psychometric properties (Iacob et al., 2021). The Cronbach's α index of internal consistency for this sample was 0.77.

Fear of COVID-19 was measured using a translated version of The Fear of COVID-19 Scale (Ahorsu et al., 2020), a 7-item scale that investigated different aspects of COVID-19-related fear (e.g., "I am most afraid of coronavirus-19".). The scale was validated in the Romanian population (Stănculescu, 2021), demonstrating good psychometric properties and measurement invariance across genders; confirmatory analysis indicated good model fit (CFI = .99, TLI = .97, RMSEA = .06, SRMR = .01). In addition, composite reliability was .89. All items were scored directly on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). In this sample, the instrument had good internal consistency, with a Cronbach α of 0.85.

Neuroticism and conscientiousness were measured using the corresponding subscales from the International Personality Item Pool (IPIP-Ro; Goldberg et al., 2006, adapted in Romanian by Iliescu et al., 2015). Each subscale has 10 items, with answers rated on a 5-point Likert scale ranging from 1 *(strongly disagree)* to 5 (*strongly agree*). An example of an item from the neuroticism subscale is "Often feel blue". The subscale has very good internal consistency (α = 0.88). An example item from the conscientiousness subscale is "I am always prepared". In the current sample, Cronbach's α was good (α = 0.82).

Procedure

Data were gathered using Google Forms during April and June 2020, when the state of emergency was still active in Romania due to the COVID-19 pandemic. The questionnaire was shared online and participation was voluntary. The participants were asked to read and agree to provide informed consent and to process the data collected through the survey. They were able to request additional information via emails. No duplicate or missing information was found, owing to the settings of the questionnaire. This cross-sectional study followed the procedures of the Declaration of Helsinki and the local ethics requirements. Furthermore, it received ethical approval from the Centre for Risk Studies, Spatial Modelling, and Dynamics of Terrestrial and Coastal Systems at the University of Bucharest on 26.03.2020.

Statistical analysis

Statistical analyses were computed using Jamovi v1.6.23 (The jamovi project, 2021). First of all, we calculated the bivariate Pearson correlations (*r*) among the study variables, following Cohen's (1988) benchmarks for interpretation: weak correlation (r - values smaller than 0.3), moderate correlation (r - values between 0.3 and.05), strong correlations (r - values above 0.5). Next, we report the means, standard deviations, and normality indicators (i.e. skewness and kurtosis) for all variables. We followed George and Mallery's (2010) recommendations for acceptable skewness and kurtosis values congruent with the normality assumption.

Second, moderation analyses were performed using the *medmod* module of Jamovi v1.6.23. The variables were treated as continuous. All moderating models included one predictor (perceived threat or fear of COVID-19), one moderator (neuroticism or conscientiousness), and one criterion (depression or anxiety). Prior to the analysis, we mean-centered the predictor and moderator variables (using *the vmean* function) to address potential multicollinearity issues and interpret the interaction terms (Hofer, 2017). We then analysed the direct relationship between the predictor and moderator on the criterion. If the relationships were statistically significant ($p < 0.05$), we also reported the interaction effects (predictor × moderator) on the criterion. O'Connor's (1998) syntax was used to examine this effect at three levels of the moderator: low (-1 SD under the mean), average, and high (+1 SD above the mean). Finally, the regression slopes for each moderation model were plotted using the IBM SPSS Statistics 25.

Results

Descriptive statistics

The main descriptive statistics and correlations for the study variables are reported in Table 1. For all investigated variables, skewness and kurtosis values were acceptable, ranging between −1.96 and +1.96 (George & Mallery, 2010). The mean score for perceived threat was 11 (SD = 3.54), indicating a moderate level of perceived threat among the participants. This suggests that, on average, the participants felt a moderate risk of contracting COVID-19 within the next three months. The mean for fear was 13.3 (SD = 5.36), reflecting a relatively high level of fear of COVID-19. The means for anxiety (M = 3.04, SD = 3.84) and depression (M = 4.49, SD = 3.71) were relatively low. However, the standard deviations indicated considerable variability in the mental health outcomes.

Almost all variables had significant weak-to-strong correlations among them in the expected directions. Anxiety and depression were positively correlated with perceived threat, fear of COVID-19, and neuroticism but negatively correlated with conscientiousness.

Conscientiousness and neuroticism as moderators between perceived threat and anxiety

Perceived threat, conscientiousness, and neuroticism separately predicted anxiety in the proposed models. The interaction effect between perceived threat and conscientiousness was significant and negative (estimate = −.01, SE = .007, 95% CI = [−.03, −.003], p = .01),

Table 1
Descriptive statistics and correlations.

Variable	1	2	3	4	5	6
1. Anxiety	–					
2. Depression	0.64***	–				
3. Perceived threat	0.23***	0.20***	–			
4. Fear	0.56***	0.46***	0.36***	–		
5. Neuroticism	0.54***	0.43***	0.14*	0.34***	–	
6. Conscientiousness	−0.22***	−0.21***	0.05	−0.12*	−0.23***	–
Mean	3.04	4.49	11	13.3	25.7	35.7
SD	3.84	3.71	3.54	5.36	8.02	6.80
Skewness	1.50	1.17	0.04	1.22	0.28	−0.34
Kurtosis	1.94	1.56	−0.23	1.49	−0.52	−0.05

Note. * p < .05, ** p < .01, *** p < .001.

indicating a moderating effect. Among individuals with higher conscientiousness the relationship between perceived threat and anxiety was weaker than among those with lower conscientiousness, indicating a moderating effect of this trait (Table 2a, ESM). The interaction effect between perceived threat and neuroticism was significant and positive (estimate = .01, *SE* = .006, 95% *CI* = [.006, .003], *p* < .01). The relationship between perceived threat and anxiety was stronger among those with average and high levels of neuroticism than among those with low levels of neuroticism (Table 2b, ESM). The slopes of the curves are shown in Fig. 1.

Conscientiousness and neuroticism as moderators between perceived threat and depression

The perceived threat and its two moderators independently predicted depression. The moderation estimates table indicated that both conscientiousness and neuroticism moderated the relationship between perceived threat and depression, as expected. The relationship between perceived threat and depression was weaker among participants with low and average levels of conscientiousness than those with high levels of conscientiousness (Table 2c ESM). Among those with average and high levels of neuroticism, the relationship between the predictor and the criterion variable was stronger as opposed to those with low levels of neuroticism (see Fig. 2 and Table 2d ESM).

Conscientiousness and neuroticism as moderators between fear of COVID-19 and anxiety

Table 2f ESM presents estimates indicating that neuroticism moderated the relationship between fear of COVID-19 and anxiety, as evidenced by a significant interaction effect (estimate = .01, 95% *CI* = [.004, .01], *p* = .001). In other words, among individuals with higher neuroticism scores the relationship between anxiety and COVID-19 fear was stronger than among those with lower neuroticism (Table 2f, ESM). Regarding conscientiousness, the interaction effect did not reach statistical significance (estimate = −.006, *SE* = .004, 95% *CI* = [−.01, .002], *p* = .16.

Conscientiousness and neuroticism as moderators between fear of COVID-19 and depression

The data showed that conscientiousness moderated the relationship between fear of COVID-19 and depression, as indicated by a significant and negative interaction effect (estimate = −.01, 95% *CI* = [−.02, −.006], p < .001). The negative coefficient suggests that among those with higher levels of conscientiousness the relationship between fear of COVID-19 and depression was weaker compared to those with lower levels of conscientiousness (Table 2g ESM). The interaction effect between neuroticism and fear of COVID-19 was not significant (estimate = .006, *SE* = .004, 95% *CI* = [−.001, .01], *p* = .12).

Discussion

In light of the toll that the COVID-19 pandemic had on mental health, this study aimed to (1) investigate the moderating role of neuroticism and conscientiousness on the relationship between the perceived threat of COVID-19, anxiety, and depression separately, and (2) examine the role of neuroticism and conscientiousness on the relationship between fear of COVID-19 and anxiety and depression separately.

As expected, perceived threat of COVID-19 predicted both anxiety and depression, but the relationship was moderated differently by neuroticism and conscientiousness. Among those with average and high levels of neuroticism the relationship between perceived threat and these mental health outcomes was stronger, indicating that this trait could potentially act as a risk factor for anxiety and depression during the COVID-19 lockdown. Once again, neuroticism has proved to be a liability for mental health, as reported over the years (Gale et al., 2016). Participants who perceived COVID-19 as more dangerous were more

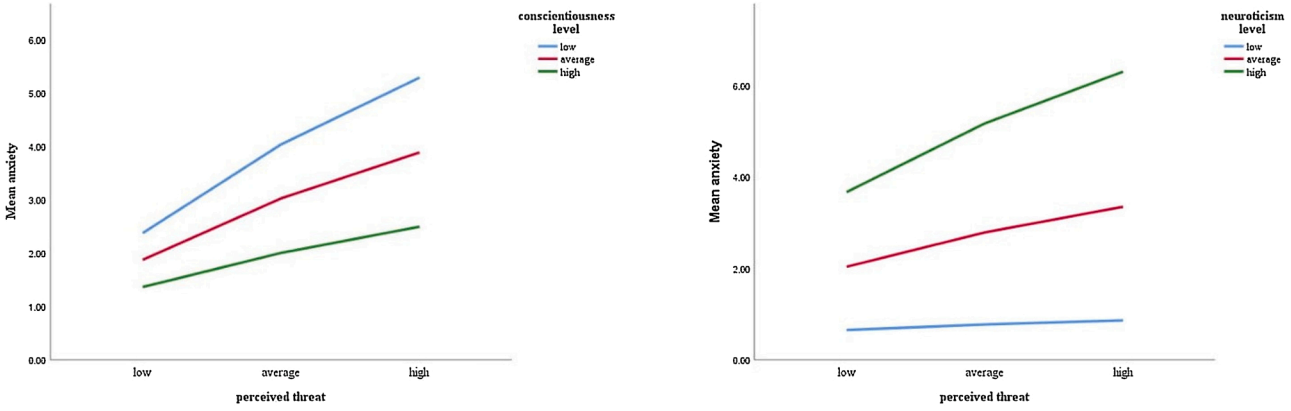

Fig. 1. Slopes for conscientiousness and neuroticism as moderators of the relationship between perceived threat and anxiety.

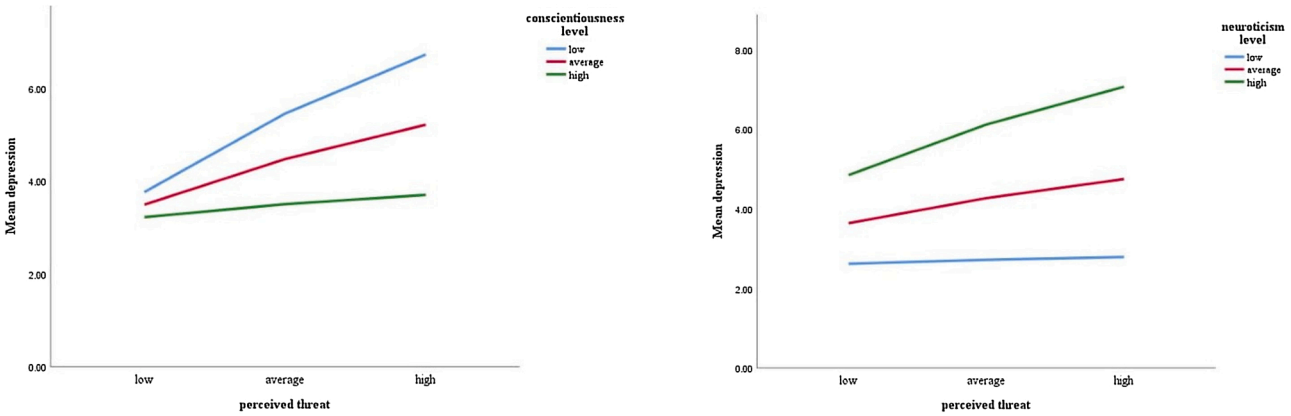

Fig. 2. Slopes for conscientiousness and neuroticism as moderators of the relationship between perceived threat and depression.

vulnerable to anxiety and depression symptoms, especially when they had average and high levels of neuroticism. They could be closely monitored during these challenging times, since recent findings suggest that resilience capacities during the COVID-19 pandemic can be downplayed by neuroticism (Zager Kocjan et al., 2021). Low and average levels of conscientiousness weakened the association between COVID-19 perceived threat and mental health-related outcomes (i.e. anxiety and depression). This is not uncommon because high levels of conscientiousness can lead to self-oriented perfectionistic and workaholic behaviours (e.g. not getting out of the house even for essentials because that would mean breaking the rules, inability to disengage from work tasks, taking time to relax, the feeling of overwhelming because not all things can be done correctly) (Avanzi et al., 2020; Stoeber et al., 2009) that expose the person to stressful life situations, which, in turn, can increase depressive symptoms.

Fear of COVID-19 predicted anxiety and this relationship was moderated by neuroticism. In other words, the higher the neuroticism score, the stronger the association between fear and anxiety. This finding is consistent with previous work highlighting that people with neuroticism easily have fear-conditioned responses and generalise fear responses quickly to novel contexts (Garcia & Zoellner, 2017; Sep et al., 2019), such as a pandemic. Otherwise said, participants who feared COVID-19 were more vulnerable to anxiety and depression symptoms; this vulnerability was enhanced by neuroticism, especially when they perceived novel, ambiguous stimuli as dangerous.

The interaction effect between conscientiousness and fear on anxiety was not significant, but the conditional effects were significant at different levels of conscientiousness. This suggests that the relationship between predictor and criterion changes at different levels of conscientiousness, but there may be other variables involved in these changes (e.g. demographic subgroups). Moreover, the absence of a significant interaction effect may reflect small or inconsistent conditional effects across the different predictor levels. Different facets of conscientiousness have been reported to have opposing interactions with fear response acquisition. For example, participants high in self-discipline (i.e. the ability to control their behaviour) intensified their fear responses throughout the fear conditioning task. However, those high in dutifulness (i.e. the ability to follow through with what was established) and order (i.e. the ability to be organised and to make plans) displayed a weakening pattern of the fear response (Pineles et al., 2009). Therefore, an investigation of its facets would provide additional information and could explain what type of behaviour from the realm of conscientiousness weakens or strengthens the association between COVID-19 fear and anxiety.

Regarding the moderating role of the two traits in the relationship between fear of COVID-19 and depression, only conscientiousness yielded a significant interaction effect. As expected, high conscientiousness weakened the association between fear and depression. Several studies conducted on different populations in diverse contexts have reported similar findings (Kotov et al., 2010; Malouff et al., 2005). Surprisingly, neuroticism was associated with fear of COVID-19 and depression, but did not have a significant interaction effect. However, all conditional effects were significant, indicating a different type of contribution or insufficient variability in the data. A similar unexpected result was obtained by Chen et al. (2017), who investigated the moderating role of these two traits in the relationship between stress and depression in the elderly. Cultural characteristics can also explain this outcome. Considering the worldwide distribution of neuroticism, a study of 56 nations showed that Romanian levels of neuroticism are among the smallest and are placed in the first quartile with a mean $M = 48.03$ and $SD = 8.44$ (Trnka & Cabelkova, 2016). Our sample had an even smaller mean ($M = 25.7$), which did not provide a sufficient score variation. Besides, neuroticism is not a desirable trait. Participants may have tended to respond in a way that does not disadvantage them, which is not uncommon in societies with collectivistic backgrounds, such as Romania (Hofstede-insights, 2021).

The findings of this study must be interpreted considering its limitations. The convenience sampling method did not allow for general inferences to be made, and, as is the case with neuroticism, the scores were minor. They did not have enough variation to capture the possible interaction effect of fear of COVID-19 on depression. Since all survey questions were mandatory and participation was voluntary, some participants probably dropped out of the study, but we were unable to determine the number of people who attempted to participate and quit. This strategy may have introduced non-response bias due to sampling (Prince, 2012). Data were collected during the first COVID-19 lockdown, which did not allow the population to habituate to the situation. This is both a strength (because it captures the reactions during the crisis) and a limitation, because it may have led to an excessive level of the perceived threat of COVID-19.

Even so, the study contributes to theoretical advancements in understanding the psychological impact of the pandemic, identifying vulnerability, and protective personality factors. This highlights the relevance of individual differences in shaping psychological responses to health threats and adds to the growing body of literature that acknowledges the interplay between individual characteristics and public health outcomes.

Informed consent

Informed consent was obtained from all individual adult participants included in the study.

Compliance with ethical standards

The study followed all the procedures of the Declaration of Helsinki and received ethical approval from the Centre for Risk Studies, Spatial Modelling, and Dynamics of Terrestrial and Coastal Systems from the University of Bucharest on 26.03.2020.

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Data availability

All data are publicly available on the Mendeley Data website at https://data.mendeley.com/datasets/sf9jx27bjw/1.

Declaration of competing interest

The authors declare they have no conflict of interest.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.erap.2024.101050.

References

Ahorsu, D. K., Lin, C.-Y., Imani, V., Saffari, M., Griffiths, M. D., & Pakpour, A. H. (2020). The fear of COVID-19 scale: development and initial validation. *International Journal of Mental Health and Addiction, 20*(3), 1537–1545. https://doi.org/10.1007/s11469-020-00270-8

Avanzi, L., Perinelli, E., Vignoli, M., Junker, N. M., & Balducci, C. (2020). Unravelling work drive: a comparison between workaholism and overcommitment. *International Journal of Environmental Research and Public Health, 17*(16), 5755. https://doi.org/10.3390/ijerph17165755

Byrne-Davis, L. M. T., Turner, R. R., Amatya, S., Ashton, C., Bull, E. R., Chater, A. M., Lewis, L. J. M., Shorter, G. W., Whittaker, E., & Hart, J. K. (2022). Using behavioural science in public health settings during the COVID-19 pandemic: the experience of public health practitioners and behavioural scientists. *Acta Psychologica, 224*, Article 103527. https://doi.org/10.1016/j.actpsy.2022.103527

Boudouda, N. E., & Gana, K. (2020). Neuroticism, conscientiousness and extraversion interact to predict depression: a confirmation in a non-Western culture. *Personality and Individual Differences, 167*, Article 110219. https://doi.org/10.1016/j.paid.2020.110219

Champion, V. L. (1999). Revised susceptibility, benefits, and barriers scale for mammography screening. *Research in Nursing & Health, 22*(4), 341–348. https://doi.org/10.1002/(SICI)1098-240X(199908)22:4<341::AID-NUR8>3.0.CO;2-P

Chen, Y., Peng, Y., Ma, X., & Dong, X. (2017). Conscientiousness moderates the relationship between perceived stress and depressive symptoms among U.S. Chinese older adults. *The Journals of Gerontology: Series A, 72*(suppl_1), S108–S112. https://doi.org/10.1093/gerona/glw172

Chew, Q., Wei, K., Vasoo, S., Chua, H., & Sim, K. (2020). Narrative synthesis of psychological and coping responses towards emerging infectious disease outbreaks in the general population: practical considerations for the COVID-19 pandemic. *Singapore Medical Journal, 61*(7), 350–356. https://doi.org/10.11622/smedj.2020046

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Costa, P. T., & McCrae, R. R. (1992). The Five-Factor Model of Personality and its relevance to personality disorders. *Journal of Personality Disorders, 6*(4), 343–359. https://doi.org/10.1521/pedi.1992.6.4.343

Dascalu, S. (2020). The successes and failures of the initial COVID-19 pandemic response in Romania. *Frontiers in Public Health, 8*, 344. https://doi.org/10.3389/fpubh.2020.00344

Gale, C. R., Hagenaars, S. P., Davies, G., Hill, W. D., Liewald, D. C. M., Cullen, B., Penninx, B. W., Boomsma, D. I., Pell, J., Mcintosh, A. M., Smith, D. J., Deary, I. J., & Harris, S. E. (2016). Pleiotropy between neuroticism and physical and mental health: findings from 108 038 men and women in UK Biobank. *Translational Psychiatry, 6*(4). https://doi.org/10.1038/tp.2016.56. e791–e791.

Gallagher, S., Sumner, R., Creaven, A. M., O'Súilleabháin, P. S., & Howard, S. (2021). Allostatic load and mental health during COVID-19: the moderating role of neuroticism. *Brain, Behavior & Immunity - Health, 16*, Article 100311. https://doi.org/10.1016/j.bbih.2021.100311

Garcia, N. M., & Zoellner, L. A. (2017). Fear generalisation in individuals with high neuroticism: increasing predictability is not necessarily better. *Cognition and Emotion, 31*(8), 1647–1662. https://doi.org/10.1080/02699931.2016.1259160

George, D., & Mallery, M. (2010). *SPSS for Windows Step by Step: A Simple Guide and Reference* (10th ed.). Pearson.

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. G. (2006). The international personality item pool and the future of public-domain personality measures. *Journal of Research in Personality, 40*(1), 84–96. https://doi.org/10.1016/j.jrp.2005.08.007

Griffith, J. W., Zinbarg, R. E., Craske, M. G., Mineka, S., Rose, R. D., Waters, A. M., & Sutton, J. M. (2010). Neuroticism as a common dimension in the internalising disorders. *Psychological Medicine, 40*(7), 1125–1136. https://doi.org/10.1017/S0033291709991449

Hakulinen, C., Elovainio, M., Pulkki-Råback, L., Virtanen, M., Kivimäki, M., & Jokela, M. (2015). Personality and depressive symptoms: individual participant meta-analysis of 10 cohort studies: research article: personality and depression. *Depression and Anxiety, 32*(7), 461–470. https://doi.org/10.1002/da.22376

Hofer, M. (2017). Mean Centering. *The International Encyclopedia of Communication Research Methods* (pp. 1–3). https://doi.org/10.1002/9781118901731.iecrm0137

Hofstede-insights. (2021). *What about Romania?*. https://www.hofstede-insights.com/country/romania/.

Iacob, C. I., Ionescu, D., Avram, E., & Cojocaru, D. (2021). COVID-19 Pandemic worry and vaccination intention: the mediating role of the Health Belief Model Components. *Frontiers in Psychology, 12*, Article 674018. https://doi.org/10.3389/fpsyg.2021.674018

Iliescu, D., Popa, M., & Dimache, R. (2015). The Romanian adaptation of the International Personality Item Pool: IPIP-Ro. *Psihologia Resurselor Umane, 13*(10), 83–112.

Johnson, T. P. (2014). Snowball sampling: introduction. In N. Balakrishnan, T. Colton, B. Everitt, W. Piegorsch, F. Ruggeri, & J. L. Teugels (Eds.), *Wiley StatsRef: Statistics reference online* (1st ed.). Wiley & Sons. https://doi.org/10.1002/9781118445112.stat05720.

Klein, D. N., Kotov, R., & Bufferd, S. J. (2011). Personality and depression: explanatory models and review of the evidence. *Annual Review of Clinical Psychology, 7*(1), 269–295. https://doi.org/10.1146/annurev-clinpsy-032210-104540

Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking "big" personality traits to anxiety, depressive, and substance use disorders: a meta-analysis. *Psychological Bulletin, 136*(5), 768–821. https://doi.org/10.1037/a0020327

Kroencke, L., Geukes, K., Utesch, T., Kuper, N., & Back, M. D. (2020). Neuroticism and emotional risk during the COVID-19 pandemic. *Journal of Research in Personality, 89*, Article 104038. https://doi.org/10.1016/j.jrp.2020.104038

Lee, S. A., & Crunk, E. A. (2020). Fear and psychopathology during the COVID-19 crisis: neuroticism, hypochondriasis, reassurance-seeking, and coronaphobia as fear factors. *OMEGA - Journal of Death and Dying, 85*(2), 483–496. https://doi.org/10.1177/0030222820949350

Liu, S., Lithopoulos, A., Zhang, C.-Q., Garcia-Barrera, M. A., & Rhodes, R. E. (2021). Personality and perceived stress during COVID-19 pandemic: testing the mediating role of perceived threat and efficacy. *Personality and Individual Differences, 168*, Article 110351. https://doi.org/10.1016/j.paid.2020.110351

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Psychology Foundation.

Malouff, J. M., Thorsteinsson, E. B., & Schutte, N. S. (2005). The relationship between the Five-Factor Model of Personality and symptoms of clinical disorders: a meta-analysis. *Journal of Psychopathology and Behavioral Assessment, 27*(2), 101–114. https://doi.org/10.1007/s10862-005-5384-y

McCrae, R. R., & Costa, P. T. (2008). The five-factor theory of personality. *Handbook of personality: theory and research* (pp. 159–181). The Guilford Press.

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

O'Connor, B. P. (1998). SIMPLE: all-in-one programs for exploring interactions in moderated multiple regression. *Educational and Psychological Measurement, 58*, 836–840.

Perte, A. (2011). *DASS. Manual for the Scales of depression, anxiety and stress. Adaptation and standardisation on the Romanian population*. ASCR.

Pineles, S. L., Vogt, D. S., & Orr, S. P. (2009). Personality and fear responses during conditioning: beyond extraversion. *Personality and Individual Differences, 46*(1), 48–53. https://doi.org/10.1016/j.paid.2008.09.003

Pradhan, M., Chettri, A., & Maheshwari, S. (2020). Fear of death in the shadow of COVID-19: the mediating role of perceived stress in the relationship between neuroticism and death anxiety. *Death Studies*, 1–5. https://doi.org/10.1080/07481187.2020.1833384

Prince, M. (2012). Epidemiology. In P. Wright, J. Stern, & M. Phelan (Eds.), *Core Psychiatry* (pp. 115–129). Elsevier Ltd.. https://doi.org/10.1016/b978-0-7020-3397-1.00009-4

Rajkumar, R. P. (2020). COVID-19 and mental health: a review of the existing literature. *Asian Journal of Psychiatry, 52*, Article 102066. https://doi.org/10.1016/j.ajp.2020.102066

Rogers, J. P., Chesney, E., Oliver, D., Pollak, T. A., McGuire, P., Fusar-Poli, P., Zandi, M. S., Lewis, G., & David, A. S. (2020). Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic. *The Lancet Psychiatry, 7*(7), 611–627. https://doi.org/10.1016/S2215-0366(20)30203-0

Sarkar, S., & Majumder, P. (2020). COVID 19 draws attention to the adaptive evolutionary perspective of certain personality traits. *Asian Journal of Psychiatry, 53*, Article 102215. https://doi.org/10.1016/j.ajp.2020.102215

Sep, M. S. C., Steenmeijer, A., & Kennis, M. (2019). The relation between anxious personality traits and fear generalisation in healthy subjects: a systematic review and meta-analysis. *Neuroscience & Biobehavioral Reviews, 107*, 320–328. https://doi.org/10.1016/j.neubiorev.2019.09.029

Somma, A., Gialdi, G., Krueger, R. F., Markon, K. E., Frau, C., Lovallo, S., & Fossati, A. (2020). Dysfunctional personality features, non-scientifically supported causal beliefs, and emotional problems during the first month of the COVID-19 pandemic in Italy. *Personality and Individual Differences, 165*, Article 110139. https://doi.org/10.1016/j.paid.2020.110139

Stănculescu, E. (2021). Fear of COVID-19 in Romania: validation of the Romanian version of the Fear of COVID-19 Scale using graded response model analysis.

International Journal of Mental Health and Addiction, 20(2), 1094–1109. https://doi.org/10.1007/s11469-020-00428-4

Stoeber, J., Otto, K., & Dalbert, C. (2009). Perfectionism and the Big Five: conscientiousness predicts longitudinal increases in self-oriented perfectionism. *Personality and Individual Differences, 47*(4), 363–368. https://doi.org/10.1016/j.paid.2009.04.004

Strategic Communication Group. (2020). *COVID-19 Information*. Romanian Ministry of Health. https://www.mai.gov.ro/informare-covid-19-grupul-de-comunicare-strategica-31-decembrie-ora-13-00/.

Strategic Communication Group. (2021). *COVID-19 Information*. Romanian Ministry of Health. https://www.mai.gov.ro/informare-covid-19-grupul-de-comunicare-strategica-20-februarie-ora-13-00/.

Szepietowska, E. M., Zawadzka, E., & Filipiak, S. (2024). The psychological impact of the COVID-19 pandemic on the sense of life changes: the moderation effect of personality traits. *Current Psychology, 43*(20), 18800–18812. https://doi.org/10.1007/s12144-023-04929-y

The jamovi project. (2021). *jamovi (Version 1.6.23) [Computer Software]*. Retrieved from https://www.jamovi.org.

Trnka, R., & Cabelkova, I. (2016). Neuroticism across cultures: macro-level insights into the worldwide distribution of neuroticism. *Neuroticism: characteristics, impact on job performance, and health outcomes* (pp. 161–185). Nova Science Publishers.

Woodall, A., Morgan, C., Sloan, C., & Howard, L. (2010). Barriers to participation in mental health research: are there specific gender, ethnicity and age related barriers? *BMC Psychiatry, 10*(1), 103. https://doi.org/10.1186/1471-244x-10-103

World Health Organization. (2020). *Coronavirus Disease (COVID-2019) Situation Reports*. World Health Organization. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/.

Worldometer. (2020). *COVID-19 Coronavirus Pandemic*. https://www.worldometers.info/coronavirus/.

Zager Kocjan, G., Kavčič, T., & Avsec, A. (2021). Resilience matters: explaining the association between personality and psychological functioning during the COVID-19 pandemic. *International Journal of Clinical and Health Psychology, 21*(1), Article 100198. https://doi.org/10.1016/j.ijchp.2020.08.002

Zajenkowski, M., Jonason, P. K., Leniarska, M., & Kozakiewicz, Z. (2020). Who complies with the restrictions to reduce the spread of COVID-19?: Personality and perceptions of the COVID-19 situation. *Personality and Individual Differences, 166*, Article 110199. https://doi.org/10.1016/j.paid.2020.110199

Zhang, X., Wang, Y., Lyu, H., Zhang, Y., Liu, Y., & Luo, J. (2021). The influence of COVID-19 on the well-being of people: big data methods for capturing the well-being of working adults and protective factors nationwide. *Frontiers in Psychology, 12*, Article 681091. https://doi.org/10.3389/fpsyg.2021.681091