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# Relationship between intolerance of uncertainty and symptom severity in Covid-19 patients: the mediating role of illness perception and Covid-19 fear

**Mir Shahnawaz[1] · Waseem Nabi[1] · Shabnum Nabi[1] · Munaza Afaq[1] · Mohmmad Altaf Paul[2] · Firdous Ahmad War[2,3] · Naveed Nazir Shah[1]**

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**Abstract**
The dynamic nature of coronavirus-19 (Covid-19) has caused a wreaked havoc globally, with millions of confirmed cases and deaths. Therefore, it is important to understand the psychological impact of the Covid-19 on the patients. In the present study, we examine whether intolerance of uncertainty was related to the severity of symptoms and whether this relationship is mediated by perception of illness and covid-19 fear. The study sample comprised of 98 Covid-19 patients (Mean = 35.17 SD = 12.89). Mediation analysis was conducted using the PROCESS macro for SPSS. Results of mediation analysis showed that the direct effect of intolerance of uncertainty on symptom severity was insignificant. However, the indirect effect via illness perception was significant, reflecting full mediation. The findings add knowledge to our understanding of the psychological consequences of Covid-19. The present study has implications for mental health services for patients with Covid-19, which will play a vital role in recovery from the illness.

**Keywords** Covid-19 fear · Intolerance of uncertainty · Perception of illness · Severity

## Introduction

The rapid spread of Covid-19 has proven to be a worldwide stressor that poses a threat to humankind (Balkhair, 2020; Krishnamoorthy et al., 2020). This had led to a surge in research across the globe regarding the humanitarian crisis precipitated. Due to its life-threatening nature, its mental health ramifications has vital implication for covid-19 patients and caregivers (Rajkumar, 2020; Salari et al., 2020). Lack of proper knowledge has created a lot of uncertainty, stigma, guilt and shame regarding the illness, which further impact their mental health (Dar et al., 2020; Hamama & Levin-Dagan., 202; Freeston et al., 2020). However, there is still a dearth of research on the psychological impact of Covid-19 among individuals infected with the virus. Fewer studies focused on the mental health of Covid-19 patients have reported higher psychopathology than the general population (Guo et al., 2020; Zhang et al., 2020). Given the uncertainty of the Covid-19 pandemic, it becomes essential to explore the role of an individual's ability to tolerate the uncertainty and role of related constructs such as perception of illness and covid-19 fear in covid-19 patients for better management of this disease.

The current study drew on the uncertainty and anticipation model of anxiety (UAMA), which suggest neurobiological and psychological processes are involved in adaptive anticipatory responding under conditions of uncertainty. This model posits that increased expectancies of threat under uncertainty can take the form of biased estimates of threat and an increased subjective feeling about negative future events. These biased expectancies result in a feedback loop in which anxious individuals are increasingly vigilant and even more attentive towards a perceived threat that underlies maladaptive responses to future uncertainty (Grupe & Nitschke, 2013). In line with UAMA, we explored a mediational model which examines the direct link between intolerance of uncertainty and symptom severity. In addition, we also examined the indirect link between intolerance of

✉ Firdous Ahmad War
mailfaw@gmail.com

[1] Government Medical College, Srinagar, India

[2] Higher Education Department, Srinagar, India

[3] Department of Psychology, Amar Singh College, Srinagar, J&K, India

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uncertainty and symptom severity via the perception of illness and fear of Covid-19 among Covid-19 patients.

In the situation, like Covid-19, uncertainties about the disease and its management are rampant. A complex, ambiguous and unpredictable situation like Covid-19 has a profound impact on the physical and mental health of the patient and their families (Carleton, 2016; Mishel, 1990). The pandemic threatens everyone's life, and individual's reactions to this threat depend on their perceptions of the likelihood that they might get infected and to their tolerance of these uncertainties. Recent results have also suggested that intolerance of uncertainty might be a significant factor related to the significant changes in one's routine during this pandemic (Satici et al., 2020). So it becomes essential to address their uncertainties associated with covid-19 to respond to this pandemic optimally. As asserted by the researcher, intolerance to uncertainty is one crucial factor that has affected mental health. Many studies have reported an association between the intolerance of uncertainty and stress in people (Ferreira et al., 2020). Intolerance of uncertainty models suggests that ability to tolerate uncertainty can influence a person's coping in a negative way, which in turn may result in psychological distress (Einstein, 2014; Rettie & Daniels, 2020). It is also associated with different psychopathologies (Dugas et al., 1997; Morriss et al., 2016).

With a wide range of uncertainties, perception of Covid-19 illness may play an important role in adaptation to Covid-19 infection, outcome, and satisfaction with the health care system (Hagger & Orbell, 2003a, b; Petrie et al., 2007). Perception of illness has been defined as "patient's cognitive appraisal and personal understanding of a medical condition and its potential consequences" (Broadbent et al., 2015). The illness representation models suggest that individuals create a mental representation (both cognitive and emotional) of their illness based on their information to adapt to their illness (Leventhal et al., 2001). Threatening perception of illness is significantly related to the physical and mental health outcomes (Evers et al., 2001; Hu et al., 2020; Hamama & Levin-Dagan, 2021; Man et al., 2020; Var & Rajeswaran, 2012) and modifying such perception has been shown better outcome (Petrie et al., 2002; War & Rajeswaren, 2013).

The worldwide spread of Covid-19 has resulted in a high degree of uncertainty and threatened perception of Covid-19, as discussed above, and heightened fear of Covid-19 illness (Asmundson & Taylor, 2020). Evidently, Covid-19-related fears multiply as the transmission rate increases, causing chronic and disproportionate fear among people (Ahorsu et al., 2020). Getting infected by the Covid-19 virus leads to a multitude of issues, including stigma, shame, guilt and discrimination (Hamama & Levin-Dagan, 2021). Therefore, the worldwide Cocid-19 pandemic has arguably resulted in a psychologically chaotic and gloomy environment. This time of heightened uncertainty has led to radical changes in individuals' daily routines. Due to impaired socio-occupational functioning, high mortality and threat to our existence, it has impacted our mental health and well-being (Satici et al., 2020). Therefore, it becomes important to understand the role the Covid-19 fear in Covid-19 patients.

Based on the limited data and literature, the present study tries to explain the relationship between intolerance of uncertainty and symptom severity as well as the role of perception of illness and covid-19 fear in mediating the association among covid-19 patients. From the previous studies (Carleton, 2012; Grupe & Nitschke, 2013), we developed a mediational model presented in Fig. 1. We hypothesized that intolerance of uncertainty would directly predict symptom severity, and this relationship would be mediated by perception of illness and covid-19 fear.

## Method

**Participants** A total of 106 subjects participated in the study. Of these, 98 (48 females) participants with Covid-19 diagnosis gave consent to participate in this study. The participants' age ranged between 18–65 years (Mean = 35.17 SD = 12.89). Cross-sectional data were collected using the snowball sampling method via Google Forms.

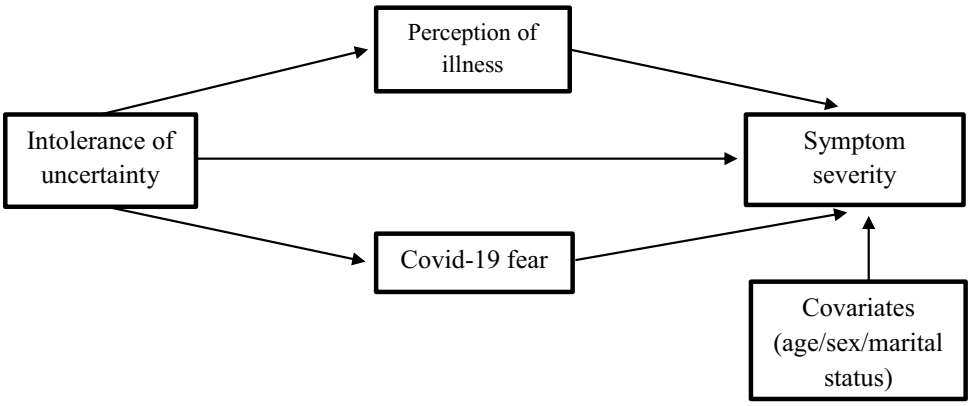


**Fig. 1** Hypothetical mediational model

A priori power analysis was done using the G*Power computer program (Faul et al., 2007). A total of 98 participants were indicated for a medium-size effect ($f^2 = 0.15$) with 80% power and an alpha of 0.05 using hierarchical multiple regression, fixed model, R2 increase.

## Measures

**Intolerance of Uncertainty Scale (Carleton et al., 2007)** The IUS-12 is a self-report measure that assesses an individual's propensity to find uncertain situations unpleasant. It measures the prospective and inhibitory dimensions of uncertainty (Carleton et al., 2007). Items were scored on a five-point scale ranging from 1 (Not at all characteristic of me) to 5 (Entirely characteristic of me). The high scores obtained from the scale indicate that the individual has a high intolerance of uncertainty. It has excellent internal consistency ($\alpha = 0.91$), and a strong correlation between the 12-item IUS and the original 27-item IUS ($r = 0.96$). In the present study, the internal consistency reliability (Cronbach's alpha) was found to be 0.89.

**Somatic Symptoms scale (Gierk et al., 2014)** It is a self-report measure, which assesses the participants for stomach problems, fatigue, back pain, headache, sleeping troubles, dizziness, shortness of breath, and pain in arms, legs, and joints. It is derived from the frequently used Patient Health Questionnaire–15 (PHQ–15), developed by Spitzer and colleagues under Pfizer, INC (Kroenke et al., 2010). It has a good reliability (Cronbach $\alpha = 0.81$) (Gierk et al., 2014). For the interest of our present study, we added some of the symptoms commonly reported by Covid-19 patients. The internal consistency relability (Cronbach's alpha) was found to be 0.87 in the present study.

**Brief Illness Perception Questionnaire (Broadbent et al., 2006)** This is a self-report scale that measures patients' cognitive and emotional representations of their illness, including consequences, timeline, personal control, treatment, control, identity, coherence, concern, emotional response, and causes. Each dimension is rated on a scale of 0–10. A high score indicated a more threatening perception of the illness. The Brief Illness Perception Questionnaire demonstrated good psychometric properties (range 0.5–0.7), including concurrent, predictive, and discriminant validity (Broadbent et al., 2015). In the current study, the internal consistency relability (Cronbach's alpha) was found to be 0.70.

**Covid-19-Related Fear (Ahorsu et al., 2020)** This 7-item scale is used to measure fears related to the ongoing Covid-19 pandemic. Participants are asked to rate the extent to which they have been bothered by each item during the pandemic on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). A higher score reflects higher levels of fear of Covid-19. It has been shown to possess robust psychometric properties, including internal consistency (Cronbach's alpha = 0.82), composite reliability (0.88), test–retest reliability (ICC = 0.72), and concurrent validity (Ahorsu et al., 2020). In the present study, the scale had good internal consistency reliability (Cronbach's alpha = 0.92).

## Procedure

The study was approved by the institutional review board. Moreover, the current study was conducted in accordance with the Helsinki Declaration as revised 2013. Due to the Covid-19 pandemic, this study was conducted online using Google Form because of the restrictions and safety of the participants. In the first section of the Google Form, the purpose of the study and informed consent was taken from the potential participants. The participants were contacted through the inpatient and outpatient Department of Pulmonary Medicine GMC, Srinagar. Participants who consent to participate in the study during data collection were included in the current study. Moreover, individuals with pre-existing physical and mental illnesses that required medication were excluded from participation.

## Results

### Preliminary analysis

Before inferential statistical analysis, we assessed the data for normality using skewness and kurtosis of the distribution for each measure. All study measures were deemed approximately normally distributed within the range of -2 to + 2. The variance inflation factor (VIF) was inspected and found to be less than 3, suggesting that multicollinearity was not high enough to cause instability in the estimates. Firstly, frequencies and percentages were calculated for socio-demographic variables. Then Pearson's correlation was used to establish the relationship between the variables under study. This was followed by mediation analysis using model 4 of Hayes PROCESS macro for SPSS (Hayes, 2018). Age, gender, and marital status were controlled for as covariates. Our sample comprised of 98 participants (49% males and 51% females) with a mean age of 35.17 years (SD = 12.89). Socio-demographics characteristics of the sample and their statistical values are presented in Table 1. Further analysis showed that perception of illness ($t(96) = 2.27$, $p = 0.02$) and symptom severity $t(96) = 3.48$, $p = 0.001$) were found to be significantly different in favor of females. Marital status is

**Table 1** Socio-demographics information of the sample

| Demographics | | N | Percentage |
|---|---|---|---|
| Gender | Male | 48 | 49 |
| | Female | 50 | 51 |
| Marital status | Unmarried | 48 | 49 |
| | Married | 50 | 51 |
| Education | Below higher secondary | 7 | 7.1 |
| | Undergraduate | 36 | 36.7 |
| | Postgraduate | 55 | 56.1 |
| Income | Low | 43 | 43.9 |
| | High | 55 | 56.1 |
| Mode | Hospitalized | 11 | 11.2 |
| | Home isolation | 87 | 88.8 |

significantly different according to the individual's perception of illness (t(96) = 2.36, $p = 0.02$), favouring married.

Means, standard deviations, and Pearson's correlations of the variables are presented in Table 2. As can be seen in Table 2, the bivariate correlation analyses revealed that IUS was positively correlated with BIPQ (r = 0.23, $p = 0.05$) and Covid-19 fear (r = 0.25, $p = 0.05$. In addition, all the mediator variables were significantly positively correlated with symptom severity. Moreover, BIPQ was positively correlated with age (r = 0.25, $p = 0.05$), and negatively correlated with gender (r = -0.23, $p = 0.05$) and marital status (r = -0.24, $p = 0.05$).

Results of the mediational analysis between the variables of interest are presented in Fig. 2. Participants with higher score on intolerance of uncertainty, perceived the covid-19 illness more threatening ($a_1 = 0.16$, t(93) = 2.25, $p = 0.02$) and was subsequently related to higher symptoms severity, ($a_2 = 0.42$, t(91) = 3.93, $p = 0.004$). The female gender revealed an association with a higher perceived threat of illness than males. Further, the indirect path of intolerance of uncertainty on symptom severity through illness perception was statistically significant ($a_1a_2 = 0.07$, SE = 0.036, 95% CI [0.005, 0.14]). In addition, participants with higher score on intolerance of uncertainty scored higher on Covid-19 fear ($b_1 = 0.21$, t(93) = 2.83, $p = 0.005$) and was subsequently related to higher symptom severity ($b_2 = 0.24$, t(91) = 1.91, $p = 0.05$). Married patients revealed an association with higher covid-19 fear than unmarried. Conversely, the indirect

**Table 2** Mean, standard deviations and zero-order correlations between different variables ($n = 98$)

| Variables | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| 1. IUS | 40.23 | 10.04 | 1 | 0.13 | 0.23* | 0.25* | 0.16 | -0.01 | -0.02 |
| 2. SSS | 17.47 | 10.49 | | 1 | 0.40** | 0.26** | 0.12 | -0.34** | -0.11 |
| 3. BIPQ | 42.09 | 7.21 | | | 1 | 0.16 | 0.25* | -0.23* | -0.24* |
| 4. C-19 fear | 20.13 | 7.75 | | | | 1 | 0.06 | -0.07 | -0.14 |
| 5. Age | 35.17 | 12.89 | | | | | 1 | 0.06 | -0.78** |
| 6. Gender | na | na | | | | | | 1 | -0.14 |
| 7.Marital status | na | na | | | | | | | 1 |

* $p < 0.05$, ** $p < 0.01$ (2-tailed)

*IUS* Intolerance of Uncertainty Scale; *SSS* Somatic Symptoms scale; *BIPQ* Brief Illness Perception Questionnaire; *C-19 fear* COVID-19-Related Fear scale)

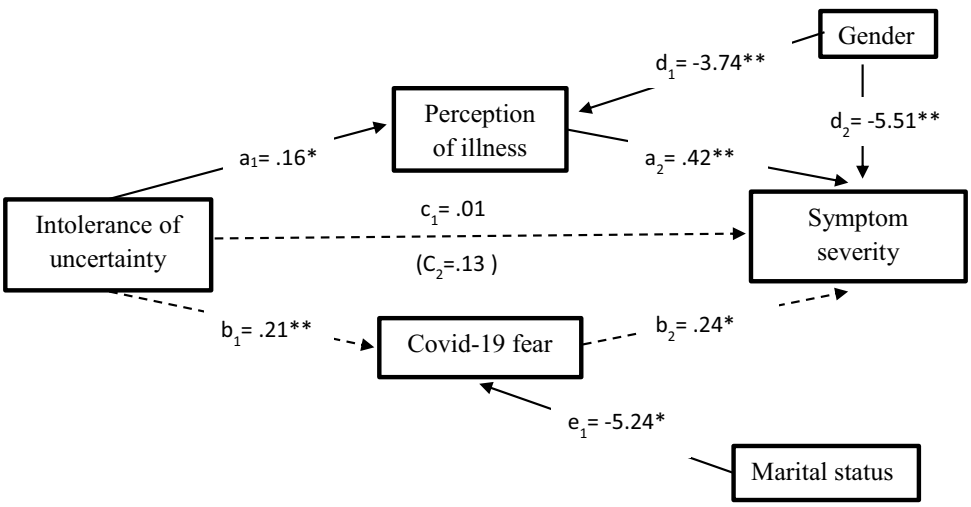


**Fig. 2** Summary of the mediation model shows the mediating effect of illness perception and covid-19 fear between intolerance of uncertainty and symptom severity

effect through covid-19 fear was statistically insignificant ($b_1b_2 = 0.05$, SE = 0.04, 95% CI [-0.002, 0.153]). The total (c2 = 0.13, SE = 0.10, 95% CI [-0.06, 0.33]) and direct effect ($c_1 = 0.01$, SE = 0.10, 95% CI [-0.19, 0.21]) of intolerance of uncertainty on symptom severity was also insignificant, reflecting full mediation (Baron & Kenny, 1986). Hence, these results revealed that illness perception fully mediated the link between intolerance of uncertainty and symptom severity. Covariate gender was negatively related to perception of illness ($d_1 = -3.73$, t(93) = -2.72, $p = 0.007$) and symptom severity ($d_2 = -5.51$, t(91) = -2.77, $p = 0.006$); marital status was negatively related covid-19 fear ($e_1 = -5.24$, t(91) = -2.10, $p = 0.03$).

## Discussion

The current study focused on people who contracted COVID-19 in Kashmir. In the present study, we investigated the relative impact of intolerance of uncertainty, perception of illness and covid-19 fear on symptom severity in Covid-19 patients. According to the findings, illness perception was significantly more threatening in females than males and married individuals than unmarried ones (Hamama & Levin-Dagan, 2021). Gender is one factor that affects health and well-being (Mroczek & Kolarz, 1998). Generally, females live longer due to their adaptability. However, since women are culturally perceived as vulnerable, weak, and delicate, it is culturally more acceptable for them to express their illnesses more easily. On the other hand, the role of the male gender emphasizes strength, bravery, and fearlessness (Bergdahl & Bergdahl, 2002; Gao et al., 2019; Limcaoco et al., 2020).

According to the uncertainty and anticipation model of anxiety (Grupe & Nitschke, 2013), an individual's belief systems, expectancies and appraisals regarding the threat under uncertainty can take the form of biased estimates of threat which further leads to hypervigilance and more attention towards a perceived threat. This exaggerated perceived threat, for example, may result in inappropriate or excessive anxiety toward the symptom severity. Therefore, our study tried to explore the link between intolerance of uncertainty and symptom severity and the role of perception of illness and Covid-19 fear. Results showed an indirect link between intolerance of uncertainty and symptom severity via the perception of illness and not Covid-19 fear.

In any illness individual's beliefs, experiences, assumptions and appraisal regarding that illness determine the outcome (Bonsaksen et al., 2015). Some events activate these beliefs, and any distorted interpretation of the event may result in maladaptive reactions or excessive anxiety (Clark & Beck, 2011). Therefore, it becomes essential to explore psychological aspects (intolerance of uncertainty, perception of illness and covid-19 fear) of Covid-19 illness. With respect to intolerance of uncertainty, results showed a significantly positive correlation with perception of illness and covid-19 fear. Intolerance of uncertainty has been conceptualized as "a dispositional characteristic that results from a set of negative beliefs about uncertainty and its implications and involves the tendency to react negatively on an emotional, cognitive, and behavioural level to uncertain situations and events" (Buhr & Dugas, 2009, p. 216). Disruption of our daily activities, social isolation and loss of perceived control due to Covid-19 fueled uncertainty among people (Satici et al., 2020). This unpredictability of the situation combined with misinformation and biased news further worsened the situation (Su et al., 2021). The fear of the unknown may be the fundamental component of pathological anxiety (Carleton et al., 2007). Thus, conceptual analysis indicates that difficulty tolerating uncertainty fuels the threatening perception regarding Covid-19 illness and can make individuals phobic toward the illness (Carleton, 2016).

Further, results showed a significant positive association between illness perception and symptom severity. Threatening perception of illness is found associated with both physical and mental health outcomes (Aqeel et al., 2020; Hu et al., 2020; Hamama & Levin-Dagan, 2021; Man et al., 2020; Var & Jamuna, 2012). Covid-19 is a contagious disease with no definitive treatment or vaccine available currently with life-threatening outcomes (Krishnamoorthy et al., 2020). Illness perception may act as a filter that guides the responses of an individual (Leventhal et al., 1980). The course of Covid-19 and its symptoms are perceived as never-ending due to misinformation about the illness, which increases their psychological burden and elicits a range of psychological responses (Su et al., 2021). Furthermore, we found that Covid-19 fear was also positively associated with symptom severity. In line with previous studies, it has been found positively related to pathological worry and health anxiety (Alizadehfard & Alipour, 2020; War & Jamuna, 2013).

With regard to the perception of illness and Covid-19 fear as mediators in our proposed model, our findings revealed that intolerance of uncertainty was not directly linked to symptom severity. However, the relationship was mediated by perception of illness and not by Covid-19 fear. To the best of our knowledge, we didn't come across any study which has examined the possibility of such a relation. Intolerance to uncertainty is a cognitive vulnerability for worry and anxiety (Bottesi et al., 2016). These negative beliefs about uncertainty and illness commonly interfere with our ability to deal with the situation or event effectively, leading to poor outcomes (Behar et al., 2009; Dugas et al., 1998; Koerner & Dugas, 2008).

## Limitations

This study has certain limitations. It is a cross-sectional mediational study, making it impossible to conclude cause-effect relations (Cole & Maxwell, 2003). It is a preliminary study, so a longitudinal design is warranted to reveal the causal effect. All the variables of interest were assessed using self-report measures via online mode, which can lead to bias in reporting, so a multimethod approach may help reduce the bias. The study sample is small and not representative. So one needs to be careful in generalizing the findings.

## Conclusion

Despite the limitations, the results demonstrate a need to build the proper awareness about the disease among the public and, more importantly, among the patients and their families (Koffman et al., 2020). Our primary findings suggest that intolerance of uncertainty is linked to symptom severity via their perception of illness. Perception plays a significant role in the physical and mental health of the infected people with Covid-19 and should be addressed appropriately. Finally, further research should concentrate on using qualitative methods to understand the psychological aspects of this illness in a better way.

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**Authors' contributions** Shahnawaz Ahmad Mir, Waseem Nabi and Naveed Nazir Shah developed the study concept and study design. Shahnawaz Ahmad Mir, Waseem Nabi, Shabnum Nabi, and Munazah Afaq helped in literature review, data collection and cleaning. Firdous Ahmad War and Mohmmad Altaf Paul, performed data analysis and interpretation. Mohmmad Altaf Paul, Firdous Ahmad War, Shabnum Nabi, Munazah Afaq, and Waseem Nabi drafted the manuscript and Naveed Nazir Shah provided the critical revisions. All the authors contributed to and approved the final version of the manuscript for submission.

## Declarations

**Conflict of interest** The author(s) declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## 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*, 1–9. Advance online publication. https://doi.org/10.1007/s11469-020-00270-8

Alizadehfard, S., & Alipour, A. (2020). The path analysis model in prediction of corona phobia based on intolerance of uncertainty and health anxiety. *Journal of Research in Psychological Health, 14*(1), 16–27. http://rph.khu.ac.ir/article-1-3756-en.html

Aqeel, M., Shuja, K. H., Abbas, J., Rehna, T., & Ziapour, A. (2020). The influence of illness perception, anxiety and depression disorders on students mental health during COVID-19 outbreak in Pakistan: A web-based cross-sectional survey. https://doi.org/10.21203/rs.3.rs-30128/v1

Asmundson, G. J., & Taylor, S. (2020). Coronaphobia: Fear and the 2019-nCoV outbreak. *Journal of Anxiety Disorders, 70*, 102196. https://doi.org/10.1016/j.janxdis.2020.102196

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Balkhair, A. A. (2020). COVID-19 pandemic: A new chapter in the-history of infectious diseases. *Oman Medical Journal, 35*, e123. https://doi.org/10.5001/omj.2020.41

Behar, E., DiMarco, I. D., Hekler, E. B., Mohlman, J., & Staples, A. M. (2009). Current theoretical models of Generalized anxiety disorder (GAD): Conceptual review and treatment implications. *Journal of Anxiety Disorders, 23*, 1011–1023. https://doi.org/10.1016/j.janxdis.2009.07.006

Bergdahl, J., & Bergdahl, M. (2002). Perceived stress in adults: Prevalence and association of depression, anxiety and medication in a Swedish population. *Stress and Health, 18*(5), 235–241. https://doi.org/10.1002/smi.946

Bonsaksen, T., Lerdal, A., & Fagermoen, M. S. (2015). Trajectories of illness perceptions in persons with chronic illness: An explorative longitudinal study. *Journal of Health Psychology, 20*, 942–953.

Bottesi, G., Ghisi, M., Carraro, E., Barclay, N., Payne, R., & Freeston, M. H. (2016). Revising the intolerance of uncertainty model of generalized anxiety disorder: Evidence from UK and Italian undergraduate samples. *Frontiers in Psychology, 7*, 1723. https://doi.org/10.3389/fpsyg.2016.01723

Broadbent, E., Petriea, K. J., Maina, J., & Weinman, J. (2006). The Brief illness perception questionnaire. *Journal of Psychosomatic Research, 60*, 631–637.

Broadbent, E., Wilkes, C., Koschwanez, H., Weinman, J., Norton, S., & Petrie, K. J. (2015). A systematic review and metaanalysis of the brief illness perception questionnaire. *Psychology & Health, 30*(11), 1361–1385. https://doi.org/10.1080/08870446.2015.1070851

Buhr, K., & Dugas, M. J. (2009). The role of fear of anxiety and intolerance of uncertainty in worry: an experimental manipulation. *Behaviour Research and Therapy, 47*(3), 215–23.

Carleton, R. N. (2012). The intolerance of uncertainty construct in the context of anxiety disorders: Theoretical and practical perspectives. *Expert Review of Neurotherapeutics, 12*, 937–947. https://doi.org/10.1586/ERN.12.82

Carleton, R. N. (2016). Into the unknown: A review and synthesis of contemporary models involving uncertainty. *Journal of Anxiety Disorders, 39*, 30–43. https://doi.org/10.1016/j.janxdis.2016.02.007

Carleton, R. N., Norton, P. J., & Asmundson, G. J. G. (2007). Fearing the unknown: A short version of the intolerance of uncertainty scale. *Journal of Anxiety Disorders, 21*, 105–117.

Clark, D. A., & Beck, A. T. (2011). *Cognitive therapy of anxiety disorders: Science and practice*. Guilford Press.

Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural

equation modeling. *Journal of Abnormal Psychology, 112*(4), 558–577. https://doi.org/10.1037/0021-843X.112.4.558

Dar, S. A., Khurshid, S. Q., Wani, Z. A., Khanam, A., Haq, I., Shah, N. N., et al. (2020). Stigma in coronavirus disease-19 survivors in Kashmir, India: A cross-sectional exploratory study. *PLoS ONE, 15*(11), e0240152. https://doi.org/10.1371/journal.pone.0240152

Dugas, M. J., Freeston, M. H., & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 21*, 593–606.

Dugas, M. J., Gagnon, F., Ladoceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*, 215–226. https://doi.org/10.1016/S0005-7967(97)00070-3

Einstein, D. A. (2014). Extension of the transdiagnostic model to focus on intolerance of uncertainty: A review of the literature and implications for treatment. *Clinical Psychology: Science and Practice, 21*, 280–300. https://doi.org/10.1111/cpsp.12077

Evers, M. A. W., Kraaimaat, F. W., van Lankveld, W. J. H., Jongen, P. J. H., Jacobs, J. W. G., & Bijlsma, J. W. J. (2001). Beyond unfavorable thinking: The illness cognition questionnaire for chronic diseases. *Journal of Consulting and Clinical Psychology, 69*(6), 1026–1036.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175–191. https://doi.org/10.3758/BF03193146

Ferreira, D. C. S., Oliveira, W. L., Delabrida, Z. N. C., Faro, A., & Cerqueira-Santos, E. (2020). Intolerance of uncertainty and mental health in Brazil during the Covid-19 pandemic. *Suma Psicológica, 27*, 62–69.

Freeston, M., Tiplady, A., Mawn, L., Bottesi, G., & Thwaites, S. (2020). Towards a model of uncertainty distress in the context of Coronavirus (COVID-19). *The Cognitive Behaviour Therapist*. https://doi.org/10.1017/S1754470X2000029X

Gao, W., Ping, S., & Liu, X. (2019). Gender differences in depression, anxiety, and stress among college students: A longitudinal study from China. *Journal of Affective Disorders, 263*, 292–300. https://doi.org/10.1016/j.jad.2019.11.121

Gierk, B., Kohlmann, S., Kroenke, K., Spangenberg, L., Zenger, M., Brähler, E., & Löwe, B. (2014). The somatic symptom scale-8 (SSS-8): A brief measure of somatic symptom burden. *JAMA Internal Medicine, 174*, 399–407. https://doi.org/10.1001/jamainternmed.2013.12179

Grupe, D. W., & Nitschke, J. B. (2013). Uncertainty and anticipation in anxiety: An integrated neurobiological and psychological perspective. *Nature Reviews Neuroscience, 14*, 488–501. https://doi.org/10.1038/nrn3524

Guo, Q., Zheng, Y., Shi, J., Wang, J., Li, G., Li, C., Fromson, J. A., Xu, Y., Liu, X., Xu, H., Zhang, T., Lu, Y., Chen, X., Hu, H., Tang, Y., Yang, S., Zhou, H., Wang, X., Chen, H., & Yang, Z. (2020). Immediate psychological distress in quarantined patients with COVID-19 and its association with peripheral inflammation: A mixed-method study. *Brain, Behavior, and Immunity, 88*, 17–27. https://doi.org/10.1016/j.bbi.2020.05.038

Hagger, M. S., & Orbell, S. (2003a). A meta-analytic review of the common-sense model of illness representations. *Psychology & Health, 18*, 141–184.

Hagger, M. S., & Orbell, S. (2003b). A meta-analytic review of the common-sense model of illness representations. *Psychology & Health, 18*(2), 141–184. https://doi.org/10.1080/0887044031000081321

Hamama, L., & Levin-Dagan, N. (2021). People who contracted COVID-19: The mediating role of shame and guilt in the link between threatening illness perception and mental health measures. *Anxiety, Stress, & Coping*. https://doi.org/10.1080/10615806.2021.1964073

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

Hu, Y., Chen, Y., Zheng, Y., You, C., Tan, J., Hu, L., & Ding, L. (2020). Factors related to mental health of inpatients with COVID-19 in Wuhan, China. *Brain, Behavior, and Immunity, 89*, 587–593. https://doi.org/10.1016/j.bbi.2020.07.016

Koerner, N., & Dugas, M. J. (2008). An investigation of appraisals in individuals vulnerable to excessive worry: The role of intolerance of uncertainty. *Cognitive Therapy and Research, 32*, 619–638. https://doi.org/10.1007/s10608-007-9125-2

Koffman, J., Etkind, S. N., Gross, J., et al. (2020). Uncertainty and Covid- 19: how are we to respond? *Journal of the Royal Society of Medicine*, 1–6. https://doi.org/10.1177/0141076820930665

Krishnamoorthy, Y., Nagarajan, R., Saya, G. K., & Menon, V. (2020). Prevalence of psychological morbidities among general population, healthcare workers and COVID-19 patients amidst the COVID-19 pandemic: A systematic review and meta-analysis. *Psychiatry Research, 293*, 113382. https://doi.org/10.1016/j.psychres.2020.113382

Kroenke, K., Spitzer, R. L., Williams, J. B., & Löwe, B. (2010). The patient health questionnaire somatic, anxiety, and depressive symptom scales: A systematic review. *General Hospital Psychiatry, 32*, 345–359. https://doi.org/10.1016/j.genhosppsych.2010.03.006

Leventhal, H., Meyer, D., & Nerenz, D. (1980). The common sense model of illness danger. In S. Rachman (Ed.), *Medicalpsychology*, Vol. 2 (pp. 7–30). Pergamon.

Leventhal, H., Leventhal, E. A., & Cameron, L. (2001). Representations, procedures, and affect in illness self-regulation: Aperceptual-cognitive model. In A. Baum, T. A. Revenson, & J. E. Singer (Eds.), *Handbook of health psychology*, (pp. 19–48). Lawrence Erlbaum.

Limcaoco, R. S. G., Mateos, M. E., Fernandez, M. J., & Roncero, C. (2020). Anxiety, worry and perceived stress in the world due to the COVID-19 pandemic. medRxiv. https://doi.org/10.1101/2020.04.03.20043992

Man, M. A., Toma, C., Motoc, N. S., Necrelescu, O. L., Bondor, C. I., Chis, A. F., Lesan, A., Pop, C. M., Todea, D. A., Dantes, E., Puiu, R., & Rajnoveanu, R. M. (2020). Disease perception and coping with emotional distress during covid-19 pandemic: A survey among medical staff. *International Journal of Environmental Research and Public Health, 17*(13), 4899. https://doi.org/10.3390/ijerph17134899

Mishel, M. H. (1990). Reconceptualization of the uncertainty in illness theory. *Image: the Journal of Nursing Scholarship, 22*, 256–262.

Morriss, J., Christakou, A., & vanReekum, C. M. (2016). Nothing is safe: Intolerance of uncertainty is associated with compromised fear extinction learning. *Biological Psychology, 121*(Pt B), 187–193. https://doi.org/10.1016/j.biopsycho.2016.05.001

Mroczek, D. K., & Kolarz, C. M. (1998). The effect of age on positive and negative affect: A developmental perspective on happiness. *Journal of Personality & Social Psychology, 75*, 1333–1349.

Petrie, K. J., Cameron, L. D., Ellis, C. J., Buick, D., & Weinman, J. (2002). Changing illness perceptions after myocardial infarction: An early intervention randomized controlled trial. *Psychosomatic Medicine, 64*(4), 580–586.

Petrie, K. J., Jago, L. A., & Devcich, D. A. (2007). The role of illness perceptions in patients with medical conditions. *Current Opinion in Psychiatry, 20*(2), 163–167. https://doi.org/10.1097/YCO.1090b1013e328014a328871

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

Rettie, H., & Daniels, J. (2020). Coping and tolerance of uncertainty: Predictors and mediators of mental health during the COVID-19 pandemic. *American Psychologist*. https://doi.org/10.1037/amp0000710

Salari, N., Hosseinian-Far, A., Jalali, R., Vaisi-Raygani, A., Rasoulpoor, S., Mohammadi, M., Rasoulpoor, S., & Khaledi-Paveh, B. (2020). Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: A systematic review and meta-analysis. *Globalization and Health, 16*, 1–11. https://doi.org/10.1186/s12992-020-00589-w

Satici, B., Saricali, M., Satici, S. A., & Griffiths, M. D. (2020). Intolerance of uncertainty and mental well-being: Serial mediation by rumination and fear of COVID-19 [published online ahead of print, 2020 May 15]. *International Journal of Mental Health and Addiction*, 1–12. https://doi.org/10.1007/s11469-020-00305-0

Su, Y., Venkat, A., Yadav, Y., Puglisi, L. B., & Fodeh, S. J. (2021). Twitter-based analysis reveals differential COVID-19 concerns across areas with socioeconomic disparities. *Computers in Biology and Medicine, 132*, 104336. https://doi.org/10.1016/j.compbiomed.2021.104336

Var, F. A., & Jamuna, R. (2012). Perception of illness in patients with traumatic brain injury. *Indian Journal of Psychological Medicine, 34*(3), 223–226.

Var, F.A., & Rajeswaran, J. (2012). Perception of Illness in Patients with Traumatic Brain Injury. *Indian Journal of Psychological Medicine, 34*(3), 223–226. https://doi.org/10.4103/0253-7176.106014

War, F. A., & Jamuna, R. (2013). Quality of life and perception of illness in patients with traumatic brain injury. *Indian Journal of Neurotrauma, 10*(2), 115–119. (Online ISSN: 0973-0508).

War, F. A., & Rajeswaren, J. (2013). Quality of life and perception of illness in patients with traumatic brain injury. *The Indian Journal of Neurotrauma, 10*(2), 115–119. https://doi.org/10.1016/j.ijnt.2013.12.004

Zhang, J., Lu, H., Zeng, H., Zhang, S., Du, Q., Jiang, T., & Du, B. (2020). The differential psychological distress of populations affected by the COVID-19 pandemic. In Brain, behaviour, and immunity (pp. 49–50). https://doi.org/10.1016/j.bbi.2020.04.031