

Article

Intolerance of Uncertainty and Risk Perception during the COVID-19 Pandemic: The Mediating Role of Fear of COVID-19

Maria Teresa Graffeo, Gaia Albano , Laura Salerno , Maria Di Blasi  and Gianluca Lo Coco * 

Department of Psychology, Educational Science and Human Movement, University of Palermo, Viale delle Scienze, Edificio 15, 90128 Palermo, Italy; mariateresa.graffeo@community.unipa.it (M.T.G.); gaia.albano@unipa.it (G.A.); laura.salerno@unipa.it (L.S.); maria.diblasid@unipa.it (M.D.B.)

* Correspondence: gianluca.lococo@unipa.it

Abstract: The COVID-19 pandemic, a period of uncertainty and risk, has presented a threat to people's physical and mental health worldwide. Previous research has shown that pandemic-related uncertainty can contribute to individuals' psychological distress and coping responses. Therefore, the aim of this study was to investigate the relationship between intolerance of uncertainty and risk perception (i.e., individual's perceived likelihood of becoming infected both for themselves and people in one's own country and perceived severity of the infection), and the mediating role of fear of COVID-19. This two-wave longitudinal study (T1 = April 2020; T2 = May 2020) involved 486 young adults (age range = 18–29 years; $M_{\text{age}} = 23.84 \pm 2.94$). Participants provided demographic data as well as measures of intolerance of uncertainty, fear of COVID-19, and risk perception. Structural equation modeling showed that intolerance of uncertainty was indirectly related to risk perception through fear of COVID-19. The study confirms the central role of IU in fear management and, consequently, in determining individuals' risk estimates.



Citation: Graffeo, M.T.; Albano, G.; Salerno, L.; Di Blasi, M.; Lo Coco, G. Intolerance of Uncertainty and Risk Perception during the COVID-19 Pandemic: The Mediating Role of Fear of COVID-19. *Psych* **2022**, *4*, 269–276. <https://doi.org/10.3390/psych4020023>

Academic Editors: Ramona Bongelli, Ilaria Riccioni and Alessia Bertolazzi

Received: 31 March 2022

Accepted: 12 May 2022

Published: 16 May 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Keywords: intolerance of uncertainty; risk perception; COVID-19; fear; young adults

1. Introduction

A worldwide health threat, such as the COVID-19 pandemic, generates heavy worries about one's own and others' health, concerns related both to one's own income and the economic stability of entire countries, and even worries of everyday life, including habits and plans for the future. Specifically, regarding the COVID-19 pandemic, health-related worries have been exacerbated by the difficulty to control the spread of the virus and the wide diffusion of vehicles of infection in everyday life [1–5]. In addition, the social isolation imposed by the quarantine has heavily tested individuals' abilities to tolerate uncertainty [6,7].

Intolerance of uncertainty (IU) refers to a negative disposition toward uncertain situations and events, with a pervasive and dysfunctional effect on the assessment of stressors and threats characterized by unpredictability, uncertainty and ambiguity. Intolerance of uncertainty is correlated with a difficulty to employ effective emotion regulation strategies and with adverse coping responses to threats [8–10].

In this sense, distress produced by uncertainty is an understandable reaction that is still extremely susceptible to degenerations [11] and thus requires high attention by researchers, clinicians and all the operators promoting mental health. Coping strategies undertaken in response to threats that are relatively predictable and confined, such as a diagnosis of a particular type of cancer or heart disease, can differ from those adopted in response to an ambiguous and uncertain threat, such as the possibility of a pandemic infection [10]. Additionally, despite a pandemic is a paradigmatic context of uncertainty, characterized by the impossibility to predict and program future events [5], uncertainty is not tolerated by everyone in the same way [9,10]. Evidence shows that these assumptions fit perfectly with

strategies and responses observed yet in the face of the 2009 H1N1 pandemic [10] and now towards COVID-19 pandemic [5,11].

Previous literature underlined the role of IU as a vulnerability factor for the development of negative feelings (e.g., stress, anxiety and fear), destructive beliefs and appraisals about the risk and maladaptive ongoings in the individual process of coping with COVID-19 [3,12–14]. More specifically, previous studies found evidence of correlation between IU and fear, the prevailing negative emotion under threatening conditions and one of the strongest motivations to behavior changes [15–17]. This assumption is corroborated by studies showing that fear plays a role as a fundamental mediator between the dispositional condition of IU and the development of mental health issues during the COVID-19 pandemic [18–20]. Consequently, individuals with high levels of IU feel more fear toward the pandemic threat and this may foster psychological stress and maladaptive changes in health behaviors, in response to the highly uncertain phenomenon of COVID-19.

Moreover, many studies remark the strong connection between IU and risk perception as well as the psychological reaction to COVID-19 as a threatening situation [2,20–22]. This relationship is supported by the evidence toward the role of IU in compromising an adequate evaluation of a threat [10,23].

Furthermore, previous research has found that individuals with elevated healthy anxiety are more likely to cognitively overestimate their risk for illness [24], and this relationship was also confirmed for higher fear levels and higher risk perception during the COVID-19 pandemic [25]. Several theoretical perspectives attempted to explain the relationship between emotional response and assessment of risk. For example, the risk-as-feelings hypothesis [26] suggests that emotional responses (e.g., worry and anxiety) can influence cognitive evaluations about the probability of potential outcomes and can override cognitive, or rational, assessments of risk. Moreover, according to the appraisal-tendency framework [27], fearful people may tend to express pessimistic risk estimates and risk-averse choices.

Moreover, the consequences on decision making are complex: it is known that low risk perception related to a pandemic discourages health promoting behaviors [17], but, at the same time, many studies showed that people with high health anxiety and a severe risk perception also tend to report a variety of other maladaptive safety behaviors [2,3,28,29].

A special focus is needed on the examination of vulnerable groups that can be at risk of high stress reactions in response to the unpredictability events due to the pandemic, such as young adults, people in lower-income groups or facing job loss, and those with pre-existing health conditions [30–33]. It is worth noting that previous research reports have shown that the COVID-19 pandemic has affected women's mental health more than men. Women reported higher levels of depression, anxiety and PTSD, and worse psychological adjustment than men, which also persisted after the earlier phase of the pandemic [34–36].

Previous literature explored the role of IU in psychological reactions to COVID-19 among children and adolescents' population [2,22,37] and even the psychological consequences of COVID-19 among the young adults [7,38]. Nevertheless, there is still limited research attention to the impact of IU on young adults' fear, worry and anxiety in response to COVID-19 and their subjective perception of risk related to the virus.

This study aims to fill this knowledge gap by investigating the relationship between IU and risk perception, and the mediating role of fear of COVID-19 among a sample of young adults. We hypothesized that higher IU would be related to higher fear of COVID-19 and in turn to higher risk perception.

2. Materials and Methods

2.1. Participants and Procedure

This study is part of a longitudinal three-wave (1 month apart) study with a follow up measure at one year [31]. It aimed at investigating the psychological distress during the COVID-19 pandemic and involved 3864 community participants (73.3% females, $M_{\text{age}} = 36.55 \pm 4.76$ years). For the purposes of the current study, we examined a two-

wave panel data (i.e., T1 = between the 7 and 24 April 2020; during the first phase of the COVID-19 outbreak in Italy and T2 = between the 18 and 31 May 2020; during the second phase when the Italian restrictive measures were eased). Only young adults (age range: 18–29 years) who provided data both on T1 and T2 were included in the present study ($n = 486$). Participants' demographic and health-related information is reported in Table 1. Participants completed an online survey on the Google Form web platform. The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Ethics Committee of the University of Palermo. Informed consent was obtained from all subjects involved in the study.

Table 1. Participants' demographic and health-related data ($n = 486$).

Variables	M (SD)/n (%)
Age	23.84 (2.94)
Gender, females	398 (81.9)
Level of education,	
8 years of school	2 (0.4)
13 years of school	197 (40.5)
Degree/post-degree	287 (59.1)
Occupation	
Unoccupied/student/retired	378 (77.8)
Occupied	108 (22.2)
Own COVID-19 diagnosis, yes	3 (0.6)
COVID-19 diagnosis among relatives, yes	100 (20.6)

2.2. Measures

IU was measured at T1 using the Intolerance of Uncertainty Scale-Revised (IUS-R) [8,39]. The IUS-R consists of 12 items (e.g., *I can't stand it when things happen suddenly*). Participants are asked to rate the extent to which each statement applies to themselves on a five-point Likert scale ranging from 1 (*not at all characteristic of me*) to 5 (*entirely characteristic of me*). The IUS-R provides scores on two domains (i.e., prospective and inhibitory) and a total score. Only the total score has been used in this study. Higher scores correspond to a higher IU. In the current study, the IUS-R showed good internal consistency ($\alpha = 0.880$).

Fear of COVID-19 was measured at T1 using the Fear of COVID-19 Scale [40]. This scale includes 7 items (e.g., *When I watch news and stories about Corona on social media, I become nervous or anxious*). Participants indicate their level of agreement with the statements using a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). This scale provides a total score, and higher scores correspond to higher fear of COVID-19. In the current study, this scale showed good internal consistency ($\alpha = 0.871$).

Risk perception was evaluated at T2 using three questions: *"How likely do you think you will be directly and personally infected with the coronavirus in the next 6 months?"*; *"How much do you agree or disagree with the following statement: getting sick with coronavirus can be very serious"*, and *"How much do you agree or disagree with the following statement: the coronavirus will not affect a great many people in the region where I currently live"*. Participants indicate their level of agreement with the statements using a seven-point Likert scale ranging from 1 (*not at all likely/totally disagree*) to 7 (*very likely/strongly agree*). A total score was created by averaging responses across the three items (mean inter-item correlation = 0.177).

2.3. Plan of Data Analysis

As a preliminary step in data analysis, univariate distributions (i.e., skewness and kurtosis) were examined. The internal consistency of the scales (Cronbach's α and mean inter-item correlation. Mean inter-item correlations between 0.15 and 0.50 indicate adequate

internal consistency [41]), as well as descriptive statistics and bivariate correlations (i.e., Pearson correlations) were computed.

In order to test the hypotheses of the study, structural equation modeling (SEM) with ML estimation was used. The indirect effect (i.e., mediated effect) of IU on COVID-19 risk perception through fear of COVID-19 was assessed using a bootstrapping procedure with 5000 resamples [42]. 95% confidence interval (CI) for the estimate that does not include the zero value indicates a significant indirect effect at the $p < 0.05$ level. Data analyses were conducted using SPSS v. 22 and Mplus v. 7.0.

3. Results

3.1. Preliminary Analyses

All variables had a normal distribution ($|Sk| < 1$ and $|Ku| < 1$). Descriptive statistics and correlations between variables are reported in Table 2.

Table 2. Descriptive Statistics and Correlations Between the Variables of the Study.

	M	SD	Skewness	Kurtosis	1	2
1. Intolerance of Uncertainty	36.79	9.38	0.096	−0.307	-	-
2. Fear of COVID-19	14.86	5.68	0.903	0.375	0.316 **	-
3. COVID-19 Risk Perception	4.55	1.02	−0.320	−0.061	0.078	0.287 **

Note: ** $p < 0.01$.

3.2. Testing the Hypotheses

The hypothesized model accounted for 10% ($R^2 = 0.100$) and 8% ($R^2 = 0.082$) of the variance in fear of COVID-19 and COVID-19 risk perception, respectively. IU significantly predicted fear of COVID-19, and fear of COVID-19 significantly predicted COVID-19 risk perception. The direct path from IU to COVID-19 risk perception was not significant. There was a significant indirect effect through fear of COVID-19 (indirect effect = 0.092, $p < 0.001$, 95% CI: 0.062–0.122), indicating that fear of COVID-19 mediated the association between IU and COVID-19 risk perception (Figure 1).

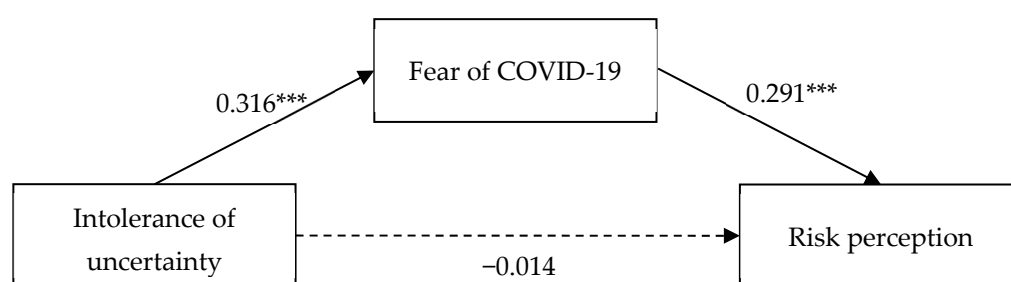


Figure 1. Mediation Analysis. Standardized estimates are reported. Solid lines represent significant paths, whereas dotted lines represent non-significant paths. T1 = between 7 and 24 April 2020. Time 2 = between 18 and 31 May 2020. *** $p < 0.001$.

4. Discussion

The current longitudinal study examined the relationship between IU and COVID-19 risk perception, and the mediating role of fear of COVID-19 among young adults. The results of the study showed that IU was indirectly related to risk perception through fear of COVID-19. However, we did not find a significant direct path from IU to COVID-19 risk perception.

These results showed that the young adults who reported higher levels of IU also reported high fear of COVID-19 and, consequently, greater COVID-19 risk perception. As suggested by previous studies, the COVID-19 unpredictability was considered one of the most stressful aspects of the actual pandemic especially for specific, vulnerable groups, such as young adults [30,33,38]. Lockdown was considered a life condition which heavily

tested the individual levels of tolerance of uncertainty and triggered negative emotions such as fear, anger, nervousness, sadness, and boredom [7,43].

Higher levels of IU can lead individuals to overwhelming emotions, by perceiving more problems than actually exist [10,23]. In this sense, as previously described, the IU is linked to how individuals interpret future uncertain situations [8–10,44] and it is related to distress management difficulties, anxiety and fear [45,46].

Many authors suggest that the construct of IU can be explained as a transdiagnostic factor contributing to negative affects [2,47,48] and our results seem to potentially corroborate this claim. More precisely, IU has been associated with dysfunctional fear and anxiety as related to a cognitive strategy used by individuals with high IU to manage the unknown; various studies confirm that IU is one of the main predictors of fear and anxiety also in the context of COVID-19 [3,12,14].

Our findings are in line with those reported in recent studies that examined the mediational role of fear of COVID-19. For example, Satici and colleagues [20] found that the relationship between IU and mental well-being was mediated by the fear of COVID-19, whereas Voitsidis and colleagues [18] found that fear of COVID-19 influenced the association between IU and depression.

As previously mentioned, young adults with difficulties in their emotional regulation ability can be considered a vulnerable group more exposed to develop several psychological problems [49,50]. In addition to the threat of the pandemic, they are also experiencing prolonged isolation, home confinement and family conflicts, which can lead to serious emotional problems [7,51–54]. Therefore, it is of great significance to explore the mechanism by which negative emotions are generated in youths during the pandemic in order to help them regulate their emotions.

On the other hand, in our model COVID-19 risk perception corresponds to an emotional experience and consequent behavior as explained by the higher levels of fear of COVID-19 [55]. In this study, the COVID-19 risk perception variable was evaluated considering the real chance of being personally infected by COVID-19 and to what extent this risk can be a serious problem for personal health and for the Italian region where participants are currently living. In this context, the COVID-19 risk perception is linked to subjective assessment of the likelihood that a specified health problem can occur and to the awareness about its consequences [17,56,57]. In line with our findings, the uncertainty of the pandemic can trigger an exacerbation of negative emotions and especially fear which might lead to an increase in COVID-19 risk perception [15–17]. Recent studies have supported the assumptions about a significant correlation between uncertainty and fear for one's own or loved ones' health [3,12,20,21].

In conclusion, considering the central role of IU in distress management [45,46], anxiety and fear, as well as the power of IU to compromise fear extinction learning [58] and its ability to amplify risk estimates [17,55], the current results provide a potentially useful new path for future investigations: monitoring the levels of IU within the context of the pandemic in order to prevent the chronic irrational fear of COVID-19, and to stimulate adequate/realistic risk perceptions, in line with the actual status of the spread of the virus. This may encourage flexibility and adaptability in reacting to the fluctuating trend that characterizes the spread of a viral infection.

The study has several strengths. First, the contribution represents a prospective two-wave panel study, which is temporally consistent with the first two COVID-19 phases of lockdown in Italy. Secondly, modifiable psychological factors, such as fear of COVID-19 and risk perception were assessed. Thirdly, the recruitment of participants was conducted in several regions of Italy, a country dramatically affected by COVID-19 in 2020. However, the results of this study should be considered in light of its limitations. To our knowledge it is the first study which examined the impact of IU and fear of COVID-19 on risk perceptions, and therefore further research is needed to replicate the findings in a larger and more cross-cultural sample of the general population [59]. Further limitations of this study include the short time-lag between the two data collections, so the findings of the study need to

be verified by a longitudinal design with longer time interval between measurements. Additionally, COVID-19 risk perception was evaluated by three questions specifically developed for this study. Future studies should use more valid and reliable COVID-19 risk perception measures. Finally, as data were collected through self-report measures, it may be possible that the data may be influenced by social desirability bias. Finally, the data were collected in 2020 and the findings cannot generalize to risk perceptions in 2021, when COVID-19 vaccines became available [60].

5. Conclusions

The results from this longitudinal study highlighted that intolerance of uncertainty was indirectly related to risk perception through fear of COVID-19, so confirming the key role of IU in fear management and in individuals' risk evaluation.

These findings have some clinical and social implications to take into account. By dealing with the constructs of tolerance of uncertainty and negative emotions we might help youngsters to cope more promptly with all negative consequences due to a worldwide emergency or economic dissatisfaction, fostering empowerment and problem-solving skills. Interventions focused on improving effective emotional coping strategies might strengthen people's resilience towards the unpredictable adverse events on psychological wellbeing. Moreover, policymakers should provide appropriate psychological and social support services to improve youngsters' emotional well-being, aimed at organizing and increasing resources to support individuals and families both during and after any lockdown measure and in the definition of their future.

Author Contributions: Conceptualization, M.T.G., G.A. and G.L.C.; methodology, G.A., L.S. and G.L.C.; formal analysis, M.T.G., L.S. and G.A.; writing—original draft preparation, M.T.G. and G.A.; writing—review and editing, M.D.B., G.L.C. and L.S.; supervision, M.D.B. and G.L.C. All authors have read and agreed to the published version of the manuscript.

Funding: GA was co-funded by EU–PON Ricerca e Innovazione 2014–2020 DM 1062/2021.

Institutional Review Board Statement: The study was conducted according to the ethical standards of the Italian Psychological Association (AIP), as well as the Declaration of Helsinki. It received the approval of the Ethics Committee of the University of Palermo (protocol code n. 3/2020-25 May 2020).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data available on request from the authors.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Maaravi, Y.; Heller, B. Not all worries were created equal: The case of COVID-19 anxiety. *Public Health* **2020**, *185*, 243–245. [[CrossRef](#)] [[PubMed](#)]
2. Korte, C.; Friedberg, R.D.; Wilgenbusch, T.; Paternostro, J.K.; Brown, K.; Kakolu, A.; Tiller-Ormord, J.; Baweja, R.; Cassar, M.; Barnowski, A.; et al. Intolerance of Uncertainty and Health-Related Anxiety in Youth amid the COVID-19 Pandemic: Understanding and Weathering the Continuing Storm. *J. Clin. Psychol. Med. Settings* **2021**, 1–9. [[CrossRef](#)] [[PubMed](#)]
3. Mertens, G.; Gerritsen, L.; Duijndam, S.; Salemink, E.; Engelhard, I.M. Fear of the coronavirus (COVID-19): Predictors in an online study conducted in March 2020. *J. Anxiety Disord.* **2020**, *74*, 102258. [[CrossRef](#)] [[PubMed](#)]
4. Golets, A.; Farias, J.; Pilati, R.; Costa, H. COVID-19 pandemic and tourism: The impact of health risk perception and intolerance of uncertainty on travel intentions. *Curr. Psychol.* **2021**, 1–14. [[CrossRef](#)] [[PubMed](#)]
5. Del Valle, M.; Andrés, M.L.; Urquijo, S.; Yerro, M.; López Morales, H.; Canet Juric, L. Intolerance of uncertainty over COVID-19 pandemic and its effect on anxiety and depressive symptoms. *Rev. Interam. Psicol./Interam. J. Psychol.* **2020**, *54*, e1335. [[CrossRef](#)]
6. Brooks, S.K.; Webster, R.K.; Smith, L.E.; Woodland, L.; Wessely, S.; Greenberg, N.; Rubin, G.J. The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *Lancet* **2020**, *395*, 912–920. [[CrossRef](#)]
7. Stavridou, A.; Stergiopoulou, A.A.; Panagouli, E.; Mesiris, G.; Thirios, A.; Mougias, T.; Troupis, T.; Psaltopoulou, T.; Tsoia, M.; Sergeantanis, T.N.; et al. Psychosocial consequences of COVID-19 in children, adolescents and young adults: A systematic review. *Psychiatry Clin. Neurosci.* **2020**, *74*, 615–616. [[CrossRef](#)]

8. Carleton, R.N.; Norton, M.A.; Asmundson, G.J. Fearing the unknown: A short version of the Intolerance of Uncertainty Scale. *J. Anxiety Disord.* **2007**, *21*, 105–117. [[CrossRef](#)]
9. Carleton, R.N. Into the unknown: A review and synthesis of contemporary models involving uncertainty. *J. Anxiety Disord.* **2016**, *39*, 30–43. [[CrossRef](#)]
10. Taha, S.; Matheson, K.; Cronin, T.; Anisman, H. Intolerance of uncertainty, appraisals, coping, and anxiety: The case of the 2009 H1N1 pandemic. *Br. J. Health Psychol.* **2014**, *19*, 592–605. [[CrossRef](#)]
11. Zhao, J.; Ye, B.; Ma, T. Positive Information of COVID-19 and Anxiety: A Moderated Mediation Model of Risk Perception and Intolerance of Uncertainty. *Front. Psychiatry* **2021**, *12*, 715929. [[CrossRef](#)] [[PubMed](#)]
12. Millroth, P.; Frey, R. Fear and anxiety in the face of COVID-19: Negative dispositions towards risk and uncertainty as vulnerability factors. *J. Anxiety Disord.* **2021**, *83*, 102454. [[CrossRef](#)] [[PubMed](#)]
13. Bongelli, R.; Canestrari, C.; Fermani, A.; Muzi, M.; Riccioni, I.; Bertolazzi, A.; Burro, R. Associations between Personality Traits, Intolerance of Uncertainty, Coping Strategies, and Stress in Italian Frontline and Non-Frontline HCWs during the COVID-19 Pandemic-A Multi-Group Path-Analysis. *Healthcare* **2021**, *9*, 1086. [[CrossRef](#)] [[PubMed](#)]
14. Köverová, M.; Ráčová, B.; Kováčová Holevová, B. Predictors of Anxiety, Stress, and Concern of COVID-19 Infection in Older Adults During the First and the Second Waves of the COVID-19 Pandemic in Slovakia. *Gerontol. Geriatr. Med.* **2021**, *7*, 23337214211047642. [[CrossRef](#)]
15. Nabi, R.L.; Myrick, J.G. Uplifting Fear Appeals: Considering the Role of Hope in Fear-Based Persuasive Messages. *Health Commun.* **2019**, *34*, 463–474. [[CrossRef](#)]
16. Witte, K.; Allen, M. A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Educ. Behav.* **2000**, *27*, 591–615. [[CrossRef](#)]
17. Huynh, T.L. “The more I fear about COVID-19, the more I wear medical masks”: A survey on risk perception and medical masks’ uses. *MedRxiv* **2020**. [[CrossRef](#)]
18. Voitsidis, P.; Nikopoulou, V.A.; Holeva, V.; Parlapani, E.; Sereslis, K.; Tsipropoulou, V.; Karamouzi, P.; Giazkoulidou, A.; Tsopaneli, N.; Diakogiannis, I. The mediating role of fear of COVID-19 in the relationship between intolerance of uncertainty and depression. *Psychol. Psychother.* **2021**, *94*, 884–893. [[CrossRef](#)]
19. Pak, H.; Süsen, Y.; Denizci Nazlıgül, M.; Griffiths, M. The Mediating Effects of Fear of COVID-19 and Depression on the Association Between Intolerance of Uncertainty and Emotional Eating During the COVID-19 Pandemic in Turkey. *Int. J. Ment. Health Addict.* **2021**, 1–15, (advance online publication). [[CrossRef](#)]
20. Satıcı, B.; Saricali, M.; Satıcı, S.A.; Griffiths, M.D. Intolerance of Uncertainty and Mental Wellbeing: Serial Mediation by Rumination and Fear of COVID-19. *Int. J. Ment. Health Addict.* **2020**, 1–12. [[CrossRef](#)]
21. Bakioglu, F.; Korkmaz, O.; Ercan, H. Fear of COVID-19 and Positivity: Mediating Role of Intolerance of Uncertainty, Depression, Anxiety, and Stress. *Int. J. Ment. Health Addict.* **2021**, *19*, 2369–2382. [[CrossRef](#)] [[PubMed](#)]
22. Li, Q.; Luo, R.; Zhang, X.; Meng, G.; Dai, B.; Liu, X. Intolerance of COVID-19-Related Uncertainty and Negative Emotions among Chinese Adolescents: A Moderated Mediation Model of Risk Perception, Social Exclusion and Perceived Efficacy. *Int. J. Environ. Res. Public Health* **2021**, *18*, 2864. [[CrossRef](#)]
23. Pepperrine, E.; Lomax, C.; Freeston, M.H. Disentangling intolerance of uncertainty and threat appraisal in everyday situations. *J. Anxiety Disord.* **2018**, *57*, 31–38. [[CrossRef](#)]
24. Marcus, D.K.; Church, S.E. Are dysfunctional beliefs about illness unique to hypochondriasis? *J. Psychosom. Res.* **2003**, *54*, 543–547. [[CrossRef](#)]
25. Han, M.F.Y.; Mahendran, R.; Yu, J. Associations Between Fear of COVID-19, Affective Symptoms and Risk Perception Among Community-Dwelling Older Adults During a COVID-19 Lockdown. *Front. Psychol.* **2021**, *12*, 961. [[CrossRef](#)] [[PubMed](#)]
26. Loewenstein, G.F.; Weber, E.U.; Hsee, C.K.; Welch, N. Risk as feelings. *Psychol. Bull.* **2001**, *127*, 267–286. [[CrossRef](#)]
27. Lerner, J.S.; Keltner, D. Fear, Anger and Risk. *J. Pers. Soc. Psychol.* **2001**, *81*, 146–159. [[CrossRef](#)]
28. Leppin, A.; Aro, A.R. Risk perceptions related to SARS and avian influenza: Theoretical foundations of current empirical research. *Int. J. Behav. Med.* **2009**, *16*, 7–29. [[CrossRef](#)]
29. Asmundson, G.J.G.; Taylor, S. How health anxiety influences responses to viral outbreaks like COVID-19: What all decision-makers, health authorities, and health care professionals need to know. *J. Anxiety Disord.* **2020**, *71*, 102211. [[CrossRef](#)]
30. Shevlin, M.; McBride, O.; Murphy, J.; Miller, J.G.; Hartman, T.K.; Levita, L.; Mason, L.; Martinez, A.P.; McKay, R.; Stocks, T.V.A.; et al. Anxiety, depression, traumatic stress and COVID-19-related anxiety in the UK general population during the COVID-19 pandemic. *BJPsych Open* **2020**, *6*, e125. [[CrossRef](#)]
31. Di Blasi, M.; Gullo, S.; Mancinelli, E.; Freda, M.F.; Esposito, G.; Gelo, O.C.G.; Lagetto, G.; Giordano, C.; Mazzeschi, C.; Pazzagli, C.; et al. Psychological distress associated with the COVID-19 lockdown: A two-wave network analysis. *J. Affect. Disord.* **2021**, *284*, 18–26. [[CrossRef](#)]
32. Xiong, J.; Lipsitz, O.; Nasri, F.; Lui, L.M.W.; Gill, H.; Phan, L.; Chen-Li, D.; Iacobucci, M.; Ho, R.; Majeed, A.; et al. Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *J. Affect. Disord.* **2020**, *277*, 55–64. [[CrossRef](#)]
33. Frank, P.; Lob, E.; Steptoe, A.; Fancourt, D. Trajectories of depressive symptoms among vulnerable groups in the UK during the COVID-19 pandemic. *medRxiv* **2020**. [[CrossRef](#)]

34. Di Blasi, M.; Albano, G.; Bassi, G.; Mancinelli, E.; Giordano, C.; Mazzeschi, C.; Pazzagli, C.; Salcuni, S.; Coco, G.L.; Gelo, O.C.G.; et al. Factors Related to Women's Psychological Distress during the COVID-19 Pandemic: Evidence from a Two-Wave Longitudinal Study. *Int. J. Environ. Res. Public Health* **2021**, *18*, 11656. [[CrossRef](#)]
35. Ausín, B.; González-Sanguino, C.; Castellanos, M.Á.; Muñoz, M. Gender-related differences in the psychological impact of confinement as a consequence of COVID-19 in Spain. *J. Gen. Stud.* **2021**, *30*, 29–38. [[CrossRef](#)]
36. Pierce, M.; Hope, H.; Ford, T.; Hatch, S.; Hotopf, M.; John, A.; Kontopantelis, E.; Webb, R.; Wessely, S.; McManus, S.; et al. Mental health before and during the COVID-19 pandemic: A longitudinal probability sample survey of the UK population. *Lancet Psychiatry* **2020**, *7*, 883–892. [[CrossRef](#)]
37. He, X.; Zhang, Y.; Chen, M.; Zhang, J.; Zou, W.; Luo, Y. Media Exposure to COVID-19 Predicted Acute Stress: A Moderated Mediation Model of Intolerance of Uncertainty and Perceived Social Support. *Front. Psychiatry* **2021**, *11*, 613368. [[CrossRef](#)]
38. Glowacz, F.; Schmits, E. Psychological distress during the COVID-19 lockdown: The young adults most at risk. *Psychiatry Res.* **2020**, *293*, 113486. [[CrossRef](#)]
39. Bottesi, G.; Noventa, S.; Freeston, M.H.; Ghisi, M. Seeking certainty about Intolerance of Uncertainty: Addressing old and new issues through the Intolerance of Uncertainty Scale-Revised. *PLoS ONE* **2019**, *14*, e0211929. [[CrossRef](#)]
40. Ahorsu, D.K.; Lin, C.Y.; Imani, V.; Saffari, M.; Griffiths, M.D.; Pakpour, A.H. The Fear of COVID-19 Scale: Development and Initial Validation. *Int. J. Ment. Health Addict.* **2020**, *1*–9. [[CrossRef](#)]
41. Clark, L.A.; Watson, D. Constructing validity: Basic issues in objective scale development. *Psychol. Assess.* **1995**, *7*, 309–3019. [[CrossRef](#)]
42. Preacher, K.J.; Hayes, A.F. Asymptotic and resampling strategies for assessing and comparing indirect effects in simple and multiple mediator models. *Behav. Res. Methods* **2008**, *40*, 879–891. [[CrossRef](#)]
43. Orrù, G.; Ciacchini, R.; Gemignani, A.; Conversano, C. Psychological Intervention Measures During the Covid-19 Pandemic. *Clin. Neuropsychiatry* **2020**, *17*, 76–79. [[CrossRef](#)]
44. Li, Z.Y.; Wu, Z.M.; Tao, L.; He, X.L. Relationships between self-esteem, intolerance of uncertainty, career decision-making difficulties and job anxieties. *Chin. J. Clin. Psychol.* **2012**, *20*, 564–566.
45. Dar, K.A.; Iqbal, N.; Mushtaq, A. Intolerance of uncertainty, depression, and anxiety: Examining the indirect and moderating effects of worry. *Asian J. Psychiatry* **2017**, *29*, 129–133. [[CrossRef](#)] [[PubMed](#)]
46. Toro Tobar, R.A.; Avendaño-Prieto, B.L.; Vargas Espinosa, N.M. Transdiagnostic Model of Anxiety and Depression According to the Relationship with Affect, Intolerance of Uncertainty, and Anxiety Sensitivity. *CES Psicol.* **2020**, *13*, 140–152. [[CrossRef](#)]
47. McEvoy, P.M.; Mahoney, A.E. Achieving certainty about the structure of intolerance of uncertainty in a treatment-seeking sample with anxiety and depression. *J. Anxiety Disord.* **2011**, *25*, 112–122. [[CrossRef](#)]
48. Gillett, C.B.; Bilek, E.L.; Hanna, G.L.; Fitzgerald, K.D. Intolerance of uncertainty in youth with obsessive-compulsive disorder and generalized anxiety disorder: A transdiagnostic construct with implications for phenomenology and treatment. *Clin. Psychol. Rev.* **2018**, *60*, 100–108. [[CrossRef](#)]
49. Christie, K.A.; Burke, J.D., Jr.; Regier, D.A.; Rae, D.S.; Boyd, J.H.; Locke, B.Z. Epidemiologic evidence for early onset of mental disorders and higher risk of drug abuse in young adults. *Am. J. Psychiatry* **1988**, *145*, 971–975. [[CrossRef](#)]
50. Hankin, B.L. Adolescent depression: Description, causes, and interventions. *Epilepsy Behav.* **2006**, *8*, 102–114. [[CrossRef](#)]
51. Wang, C.; Pan, R.; Wan, X.; Tan, Y.; Xu, L.; Ho, C.S.; Ho, R.C. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. *Int. J. Environ. Res. Public Health* **2020**, *17*, 1729. [[CrossRef](#)]
52. Wang, G.; Zhang, Y.; Zhao, J.; Zhang, J.; Jiang, F. Mitigate the effects of home confinement on children during the COVID-19 outbreak. *Lancet* **2020**, *395*, 945–947. [[CrossRef](#)]
53. Zhou, S.-J.; Zhang, L.-G.; Wang, L.-L.; Guo, Z.-C.; Wang, J.-Q.; Chen, J.-C.; Liu, M.; Chen, X.; Chen, J.-X. Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. *Eur. Child Adolesc. Psychiatry* **2020**, *29*, 749–758. [[CrossRef](#)]
54. Guessoum, S.B.; Lachal, J.; Radjack, R.; Carretier, E.; Minassian, S.; Benoit, L.; Moro, M.R. Adolescent psychiatric disorders during the COVID-19 pandemic and lockdown. *Psychiatry Res.* **2020**, *291*, 113264. [[CrossRef](#)] [[PubMed](#)]
55. Slovic, P.; Peters, E. Risk Perception and Affect. *Curr. Dir. Psychol. Sci.* **2006**, *15*, 322–325. [[CrossRef](#)]
56. Sjöberg, L.; Moen, B.E.; Rundmo, T. Explaining risk perception. An evaluation of the psychometric paradigm in risk perception research. *Rotunde* **2004**, *85*, 1–33.
57. Tull, M.T.; Barbano, A.C.; Scamaldo, K.M.; Richmond, J.R.; Edmonds, K.A.; Rose, J.P.; Gratz, K.L. The prospective influence of COVID-19 affective risk assessments and intolerance of uncertainty on later dimensions of health anxiety. *J. Anxiety Disord.* **2020**, *75*, 102290. [[CrossRef](#)]
58. Morriss, J.; Christakou, A.; van Reekum, C.M. Nothing is safe: Intolerance of uncertainty is associated with compromised fear extinction learning. *Biol. Psychol.* **2016**, *121*, 187–193. [[CrossRef](#)]
59. Lo Coco, G.; Gentile, A.; Bosnar, K.; Milovanović, I.; Bianco, A.; Drid, P.; Pišot, S. A Cross-Country Examination on the Fear of COVID-19 and the Sense of Loneliness during the First Wave of COVID-19 Outbreak. *Int. J. Environ. Res. Public Health* **2021**, *18*, 2586. [[CrossRef](#)]
60. Salerno, L.; Craxi, L.; Amodio, E.; Lo Coco, G. Factors Affecting Hesitancy to mRNA and Viral Vector COVID-19 Vaccines among College Students in Italy. *Vaccines* **2021**, *9*, 927. [[CrossRef](#)]