Current Psychology
https://doi.org/10.1007/s12144-022-03281-x

Relationship between COVID-19 anxiety and fear of death: the mediating role of intolerance of uncertainty among a Turkish sample

Meryem Berrin Bulut[1]

Accepted: 25 May 2022

Abstract
The Coronavirus Disease 2019 (COVID-19) pandemic has increased the salience of death in our lives. The aim of this study is to uncover potential mechanisms underlying fear of death during the pandemic. A sample of 478 volunteers (312 females and 166 males) aged 18 years and older participated voluntarily in this study. Coronavirus Anxiety Scale, Multidimensional Mortality Awareness Measure, Intolerance of Uncertainty Scale, and Personal Information Form were used for data collection. The mediating role of intolerance of uncertainty in the relationship between COVID-19 anxiety and fear of death was determined using the bootstrapping method. COVID-19 anxiety was associated with increased intolerance of uncertainty, and fear of death. Intolerance of uncertainty was associated with increased fear of death. Furthermore, intolerance of uncertainty partially mediated the relationship between COVID-19 anxiety and fear of death. Results suggest that intolerance of uncertainty is a critical variable in the relationship between COVID-19 anxiety and fear of death. The current research adds to our knowledge of fear of death by investigating COVID-19 anxiety and intolerance of uncertainty. Additionally, this study underlies and contributes to the consideration of psychological health of individuals during the pandemic process. The results are discussed within the context of the COVID-19 pandemic.

Keywords COVID-19 · COVID-19 anxiety · Intolerance of uncertainty · Death · Fear of death · Mediate

Introduction

With the COVID-19 outbreak, salience of death has increased in our lives. Although there are numerous fatal events like accidents or illnesses, COVID-19 has significantly affected many individuals all around the world. One major factor for this widescale effect may be argued to be related to the uncertainties about the virus: Who will be affected with the COVID-19 virus, when one might catch the disease, and whether the infection would lead to death cannot be predicted. As maintained by World Health Organization (WHO, 2022), the number of people who have died as a result of COVID-19 around the world between March 2020 and April 2022 was 6.190.349. In Turkey, the number of cumulative deaths is 98.493.

In addition to the anxiety about the disease, the virus has also brought many uncertainties to our lives: restrictions on social activities, questions regarding the efficiency of the vaccines, debates about going back to 'face-to-face' classes, etc. While the physiological health of people was prioritized at the beginning of the pandemic, emerging anxiety and uncertainty revealed the importance of their mental health (Robinson et al., 2022). Since intolerance of uncertainty is a variable that is believed to be linked to fear of death (see Lowe & Harris 2019), witnessing deaths on a daily basis could be argued to increase the anxiety about COVID-19, while also affecting the fear of death in connection to it. At the beginning of the pandemic, we were receiving death news of people we did not know. However, as the circle shrank in time, we started hearing about our relatives, friends, and people near us dying.

The fact that the COVID-19 pandemic is an indispensable subject of the prime news and that we are exposed to news about it every day makes death a salient issue and raises related anxiety (see Greenberg et al., 1986). It has become inevitable to see objects or people around us that will remind

✉ Meryem Berrin Bulut
berrin_teke@yahoo.com

[1] Psychology, Sivas Cumhuriyet University, Sivas, Turkey

Published online: 02 June 2022

us of death during the pandemic. Many things (e.g., cologne, wet wipes, masks, etc.) in our lives are now paired with death. Therefore, considering the large-scale effect fear of death has on individuals' lives, it should be considered a topic worthy of further attention.

COVID-19 anxiety and fear of death

Originating at Wuhan city of China, COVID-19 has quickly spread throughout the globe. The whole world is still trying to cope with this pandemic. The first case in Turkey was reported on March 11, 2020 (Turkish Ministry of Health, 2022). Not knowing when, where, to whom, and how the virus will be transmitted, has created significant concern for individuals. According to Maslow's (1954) basic needs theory, individuals need to fulfill their needs (e.g., physiological, security, love and affection, esteem, and self-actualization needs). After the Coronavirus pandemic was declared, many countries took measures, as a result of which people's social lives were restricted. This posed a significant problem since we satisfy our need for love and belonging through our social relationships. According to Cohen et al. (2000, pp. 11–12) social isolation causes diseases, instead of protecting or increasing health. Furthermore, social isolation raises unpleasant emotions and a sense of alienation while lowering self-esteem and control. In short, social isolation during the pandemic may act as a stressor (see also Umberson & Karas Montez 2010 for the relationship between social relationships and health). It can be suggested that, during this extraordinary time period, individuals had difficulties in meeting their needs for security, love, and respect.

The desire to continue with their lives is a fundamental motivation for human beings and a significant factor that separates them from other creatures. Because of their intellectual abilities, people are aware that death will come to them one day or that death is inevitable. For this reason, people live their lives with the knowledge of the inevitability of death and the knowledge that what they have achieved will one day be lost (Abdel-Khalek, 2005; Pyszczynski et al., 1997). The ability to imagine painful and tragic events such as death or awareness of death is seen as a source of anxiety for individuals (Solomon et al., 1991; Freud, 1955) states that the death instinct exists with its opposite, the life instinct. These two instincts are present in the unconscious of individuals throughout their lives, starting with birth. Due to the threat death instinct poses on the individual, in order to avoid self-harm, it is expressed as hostility or aggression towards other people. Levasseur et al. (2015) argue that fear of death is the fear of not being able to avoid dying at the end of the individual's life.

Fear of death is affected by different factors, such as religion. The religious orientation of the Turkish people (i.e., mostly Islam), with whom this study was conducted, has also important consequences for interpreting death. For the majority of Turks, death represents a transition to actual life rather than annihilation (Bulut, 2022). In Turkey, as in India, the topic of death is far more prevalent in people's daily lives than it is in Western Countries (Fernandez et al., 2010). Because death in Western countries frequently occurs in hospitals or other health-care settings, the act of dying is frequently kept hidden from public view (Muramatsu et al., 2008). On the other hand, it can be said that death is more prominent in Turkey.

Studies in the literature have shown a significant relationship between COVID-19 anxiety and fear of death. For example, fear of death mediated the relationship between neuroticism and anxiety during the COVID-19 pandemic (Pérez-Mengual et al., 2021), COVID-19 anxiety has been associated not only with death anxiety but also with many health-related variables (see Trougakos et al., 2020). Thus, the COVID-19 anxiety may have the capacity to influence fear of death. Accordingly, this study proposes the following hypotheses:

H1. COVID-19 anxiety is positively related to fear of death.

Intolerance of uncertainty and fear of death

People need to feel safe about the world they live in, and they usually need to get rid of feelings of uncertainty or find means to transform uncertain states to a pleasant and manageable experience on a cognitive level since too much uncertainty undermines the significance of one's existence (Van den Bos & Lind, 2002). There is a state of uncertainty regarding the Coronavirus outbreak. Although the individuals are careful about hygiene, they cannot be sure whether this virus will be transmitted to them and, at the same time, they do not know how long they will be away from their social environment. According to Pyszczynski et al. (2010), uncertainty is an undesirable situation for the individual since it often prevents the person from progressing in life, making plans, meeting their needs, and coping with difficulties.

Uncertainty arises either when individuals are unable to predict the future or when they are faced with a mismatch between different cognitions and experiences or behaviors. Uncertainty is defined by circumstances that cause doubt and confusion. The key element here is the unpredictability of future events and inconsistencies between important cognitions, experiences, and behaviors. In case of uncertainty, individuals cannot be sure about how to act and what to anticipate from the physical and social context in which they find themselves (Van den Bos & Lind, 2002). The Model of Uncertainty Management deals with personal uncertainty (Hogg, 2009). Starting with the observation that the world

is an uncertain place (Van den Bos, 2009, p. 187), the model defines the concept of personal uncertainty and how people react to personal uncertainty. Personal uncertainty has powerful effects on people's behaviors because it involves emotional and experiential processes and creates an anxious experience for individuals. Additionally, it involves people's implicit and explicit emotions, as well as other subjective reactions, which all originate from their feelings of uncertainty (Van den Bos, 2009).

Intolerance of uncertainty is significantly related to complicated grief, following a loved one's death (Boelen, 2010). Because personal uncertainty is a disturbing, repulsive, distressing, or emotionally threatening experience (Sorrentino et al., 2009), it is expected to be associated with fear of death. Uncertainty avoidance is linked to a society's level of stress in the face of an unclear future (Hofstede, 2011). Individuals in a high uncertainty avoidance culture feel intimidated by situations that are unknown or unpredictable (Hofstede, 2001). Turkey's societal culture is characterized by a strong desire to avoid uncertainty (Hofstede, 1991), with a score of 85 (Hofstede & Bond, 1988). Members of societies such as the Turkish society prefer more internal control methods such as thought suppression and worrying to cope with their thoughts (Kaya Yildirim & Yorulmaz, 2021). The fact that Turks are emotional can be evaluated as a factor explaining their high scores in uncertainty avoidance (Hofstede & Bond, 1988). Additionally, there is a greater demand for security in cultures with high uncertainty avoidance, and people hold on to their habits and are hesitant to assimilate new ideas. Both official and informal norms have a tremendous influence on their lives (Van Oudenhoven et al., 1998).

It can be stated that fear and threat are intimately and reciprocally linked, the higher the perceived threat, the higher the experience of fear. Under threatening circumstances, fear is the dominant negative emotion (Witte & Allen, 2000). Therefore, the uncertainty COVID-19 pandemic has brought about has negative effects on both physical (e.g., Robinson et al., 2022) and mental health (e.g., Racine et al., 2022) of individuals. Additionally, intolerance of uncertainty is positively related to both worrying and anxiety (Yao et al., 2022). Therefore, it can be suggested that intolerance of uncertainty is one of the factors that influences fear of death. This study proposes the following second hypothesis:

H2. Intolerance of uncertainty is positively related to fear of death.

COVID-19 anxiety and intolerance of uncertainty

Buhr and Dugas (2009) reported that worry levels were highest when heightened fear or anxiety was combined with intolerance of uncertainty. Similarly, intolerance of uncertainty is indirectly a crucial factor in the creation and preservation of general social and economic concerns in anxiety disorder models. In this context, uncertainty seems to be a significant aspect of anxiety (Carleton, 2012). Likewise, intolerance of uncertainty explains a large amount of variance in social anxiety severity, and it is found to be associated with generalized anxiety disorder, social anxiety (Boelen & Reijntjes, 2009), and social phobia (McEvoy & Mahoney, 2012). In short, generalized anxiety is related to intolerance of uncertainty.

A study on undergraduate participants showed that COVID-19 specific adapted forms of intolerance of uncertainty have a significant relationship with state/trait anxiety, fear of becoming sick and virus testing, and intolerance of uncertainty (Scharmer et al., 2020). Fear of COVID-19 is significantly related to intolerance of uncertainty in a positive direction (Karatas & Tagay, 2020; Pak et al., 2021; Satici et al., 2020). Similarly, concern about COVID-19 was positively correlated with intolerance of uncertainty (Wheaton et al., 2021). Accordingly, the following third hypothesis is proposed:

H3. COVID-19 anxiety is positively related to intolerance of uncertainty.

The mediating role of intolerance of uncertainty in the relationship between COVID-19 anxiety and fear of death

There is considerable evidence on the positive relationship between COVID-19 anxiety and fear of death (e.g., Trougakos et al., 2020), COVID-19 anxiety and intolerance of uncertainty (e.g., Satici et al., 2020), and intolerance of uncertainty and fear of death (e.g., Boelen 2010). However, there is a scarcity of studies exploring the relationship between COVID-19 anxiety and fear of death via intolerance of uncertainty. In addition to these, there is only limited research examining the mediating role of intolerance of uncertainty within the scope of COVID-19 in Turkey. Thus, this study is expected to fill this gap in the literature. Examples of previous studies carried out in Turkey are as follows: Deniz (2021) investigated the mediating role of intolerance of uncertainty and fear of COVID-19 in the relationship between self-compassion and well-being among participants between 18 and 73 years of age. In the relationship between self-compassion and well-being, fear of COVID-19 and intolerance of uncertainty were found to have a mediating effect. Recently, Bakioglu et al. (2020) have shown a mediating effect of intolerance of uncertainty in the relationship between fear of COVID-19 and positivity. Moreover, Celik and Gusan Kose (2021) reported the mediating effect of intolerance of uncertainty in the relationship between

coping style with stress and compulsive buying behavior. The association between the perceived COVID-19 threat and the present patient health score was partially mediated by intolerance of uncertainty (Gica et al., 2020). There are also studies conducted outside Turkey examining the mediating effect of intolerance of uncertainty. For instance, Akbari et al. (2021) reported that intolerance of uncertainty plays a mediating role in the relationship between fear of COVID-19 and health anxiety. In short, it can be stated that intolerance of uncertainty seems to be a significant mediator in the studies conducted during the pandemic. Therefore, our final hypothesis is as follows:

H4. Intolerance of uncertainty mediates the relationship between COVID-19 anxiety and fear of death.

The present study

Fear of death is a complex psychological phenomenon. Individuals might be scared of their mortality for a variety of reasons. Therefore, comprehending the implications and effects of the concept of death requires attention (Florian & Mikulincer, 2004, p. 57). This constitutes the starting point of the study.

According to Florian and others, the fear of death has three dimensions. The *intrapersonal* dimension includes all of the consequences of death on one's body and mind, such as corpse decomposition or failure to meet major life goals. The *interpersonal* component includes every aspect of death's impact on one's interpersonal life, such as the loss of close relationships, inability to take care of loved ones, and the risk of being forgotten. All connotations linked with what happens after death and the transcendental quality of one's existence, such as apprehension about what awaits us in the afterlife and the possibility of retribution, are included in the *transpersonal* dimension (Florian & Mikulincer, 2004, p. 58). Florian's (1979 cited in Florian & Mikulincer 2004) three-dimensional conceptualization is highly useful for comprehending the fear of personal death and dispelling ambiguities and misunderstandings that can arise from a naïve, unidimensional understanding of this crucial form of terror. Given the current state of the pandemic, there is a lot of ambiguity. The rise of tremendous uncertainty surrounding numerous areas of daily living characterizes life during the COVID-19 pandemic (Voitsidis et al., 2021). In this context, the goal of this study is to look into the role of uncertainty intolerance as a mediating factor in the relationship between COVID-19 anxiety and fear of death. Individuals are seriously affected by the pandemic's uncertainty, and it becomes more essential for them to deal with negative experiences at this time. The current study is also noteworthy since it is one of the few attempts at explaining how COVID-19 anxiety is linked with fear of death through intolerance of uncertainty. Therefore, this study will fill an important gap in the intolerance of uncertainty literature.

Accordingly, the findings of this study are likely to contribute to the knowledge regarding the multifaceted relationship between COVID-19 anxiety, intolerance of uncertainty, and fear of death. Additionally, insights to be gained from this study may potentially help mental health professionals develop and implement treatment programs to prevent adverse psychosocial effects of the COVID-19 pandemic. The COVID-19 pandemic has changed individuals' lives dramatically. The goal of this study is to uncover potential mechanisms underlying fear of death during the pandemic. In order to achieve this goal, the current research is designed to investigate fear of death during the COVID-19 pandemic process with a focus on COVID-19 anxiety and intolerance of uncertainty. Additionally, this study is important in terms of considering psychological health of individuals during the pandemic process. Given the importance of death in human existence (Willmott, 2000, p. 650), it can be stated that this thanato-psychological study can fill an important gap in the COVID-19 related literature.

The hypothetical model of the research is presented in Fig. 1.

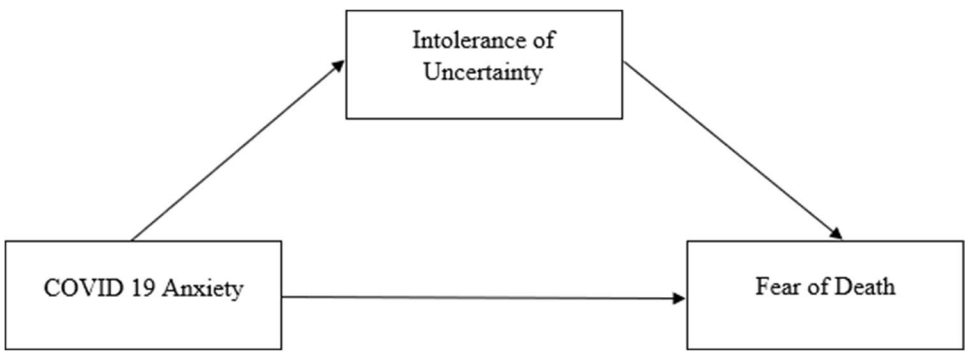

Fig. 1 Hypothetical model

Methods

Participants

According to Fritz and MacKinnon (2007, p. 14), 78 participants are necessary for conducting mediational research with 0.80 statistical power and medium (0.39) effect size. A larger sample size was allowed for this study since this would boost the statistical power for detecting minor effects while also bolstering the findings' robustness. A total number of 488 individuals, who were reached through convenience and snowball sampling, participated voluntarily in the study. Participants from Turkey voluntarily participated in this study. The general population of Turkish people was the target. Data on the settlement of the participants were not collected. Following the outlier analysis, 10 of the participants were omitted and the final analyses were conducted with 478 participants (n_{women} = 312 [65.3%] and n_{men} = 166 [34.7%]). The age of the participants ranged from 18 to 67 (M = 24 SD = 6.42). As for the education level, 42.5% (n = 203) of the participants were primary and secondary education graduates; 52.1% (n = 249) of the participants had an associate or undergraduate degree, and 5.4% (n = 26) had a graduate degree. Individuals from different occupational groups (i.e., teacher, lawyer, academician, engineer, etc.) voluntarily participated in this study.

Data collection tools

Coronavirus anxiety scale This scale was developed by Lee (2020) and adapted to the Turkish language by Evren et al. (2022). To assess the psychometric features of the Coronavirus Anxiety Scale (CAS) in Turkish, a cross-sectional online survey was conducted among 1023 Turkish native speakers. Two separate translators translated the CAS from English to Turkish, and these experts agreed on the translated version. The Turkish version of the CAS was then translated from Turkish to English by a second translator in order to establish their comparability. Confirmatory factor analysis revealed that the CAS's factor structure was adequate with a Cronbach's alpha of 0.80, and that the scale was internally consistent. The CAS's positive correlations with scales measuring similar structures (i.e. obsession with COVID-19 scale, fear of COVID-19 scale) showed that it had good convergent validity. According to these findings, the CAS is a valid and reliable tool for determining the level of anxiety related to the Coronavirus (Evren et al., 2022). The scale consists of 5 items (e.g., *"I felt dizzy, lightheaded, or faint, when I read or listened to news about the coronavirus"*). A 5-point Likert type scale was used (1-never and 5- almost every day in the last 2 weeks). The scale measures COVID-19 anxiety using an optimized cutoff score of 9. The coronavirus anxiety scale distinguishes between those with dysfunctional anxiety and those who are not anxious (Evren et al., 2022). In Evren et al.'s (2022) study, Cronbach's alpha internal consistency coefficient was 0.80. In this study, it was 0.84.

Intolerance of uncertainty scale This scale was originally developed in French by a group of researchers (Freeston et al., 1994) and was later adapted to the English language by Buhr and Dugas (2002). Sarı and Dağ (2009) adapted this scale to the Turkish language. It consists of 25 items (e.g., *"I cannot stand to unexpected events."*) and four factors ('uncertainty is stressful and upsetting', 'negative self-assessment about uncertainty', 'disturbing thoughts about the uncertainty of future', 'uncertainty keeps someone from acting). A 5-point Likert type scale was used (1-strongly disagree and 5-strongly agree). This scale measures emotional and behavioral responses to uncertain situations. Higher scores represent higher intolerance of uncertainty. Sarı and Dağ (2009) report the internal consistency coefficient as .79 and in this study, Cronbach's alpha was .92.

The Multidimensional Mortality Awareness measure This scale was developed by Levasseur et al. (2015) to measure mortality awareness integratively and optimistically, and was adapted to the Turkish language by Bulut et al. (2017). It consists of 30 items (e.g., *"When I think about death, I feel nervous."*) and five factors (mortality legacy, mortality fearfulness, mortality acceptance, mortality disempowerment and mortality disengagement). A five-point Likert type scale ranging from 1-strongly disagree to 5-strongly agree was used. In the current study, the mortality fearfulness factor was used which consists of 11 items. Higher scores mean higher fear of death. Bulut et al. (2017) report a Cronbach's alpha of 0.79 for the whole scale. In this study, the internal consistency for mortality fearfulness was 0.89.

The Sociodemographic Information Form The demographic information on the participants' gender, age, education level and occupation was collected using this form.

Data collection and analyses

Due to the COVID-19 outbreak, data of the study were collected via Google Forms between March and April 2021. Data was gathered through online communication platforms (i.e., Whatsapp, Instagram, Twitter). The website address of the research form was shared on these platforms. The pool of people initially contacted for data collection consisted of the immediate social circle of the researcher. These first participants invited others in their social circle via online

communication platforms. The necessary ethical permissions were acquired from the university's ethics committee prior to study. Participation was voluntary and at any moment during the study, participants were allowed to quit without having to provide an explanation. It took about 15 min to fill out the questionnaire. The data were analyzed anonymously, and participants were not asked any questions regarding their personal information.

The data of this study were collected via self-report, which is susceptible to common method biases. To reduce this, the process of data collection and data analyses were controlled stringently (Podsakoff et al., 2012). Harman's single factor test was used to examine the bias of common method, and common method bias was not detected (explained variance 19.22%). To avoid socially desirable answers, participants were assured that the questions had no correct or incorrect answers.

The skewness and kurtosis values showed sample distribution to be normal. Preliminary analyses, including descriptive statistics, correlation, and regression analysis among all the variables considered in the model, were conducted. Hayes Process Macro (v 3.1) model using SPSS 25 was performed to test mediation. The bootstrapping method was used with the software developed by Hayes and Preacher (2013) to test the mediating effect. Bootstrapping is an intensive computational method that involves extracting samples from repeated data sets and estimating the indirect effect on each resampled data set (Preacher & Hayes, 2008). Whether the mediation is statistically significant was examined on 5000 bootstrap samples. Standardized regression estimate scores and squared multiple correlations were calculated to interpret the results.

Results

The relationships between the variables of the study were given in Table 1.

Table 1 shows the significant correlations between the variables of the study. COVID-19 anxiety is positively related to both intolerance of uncertainty and fear of death. Similarly, intolerance of uncertainty is positively related to fear of death.

The predictors of fear of death are presented in Table 2.

Table 2 displays the findings of regression analysis. Both COVID-19 anxiety and intolerance of uncertainty predict the variance in fear of death significantly with 14% of explained variance.

The observed mediation model is presented in Fig. 2.

Figure 2 shows that COVID-19 anxiety is a significant (positive) predictor of intolerance of uncertainty ($\beta = 0.31$, $SE = 0.05$, $p < .05$), indicating that individuals scoring higher

Table 1 Bivariate correlations between the variables of the study

Variables	N	M	sd	1	2	3
1. Covid-19 Anxiety	478	1.32	0.55	1	0.27*	0.22*
2. Intolerance of uncertainty	478	3.25	0.62		1	0.35*
3. Fear of death	478	2.71	0.81			1

*$p < .05$

Table 2 Predicting fear of death

Variables	Beta	t	p	R^2	Adj.R^2	ΔF
Covid-19 Anxiety	0.14*	3.15	0.00	14%	14%	38.57
Intolerance of Uncertainty	0.31*	7.05	0.00			

*$p < .05$

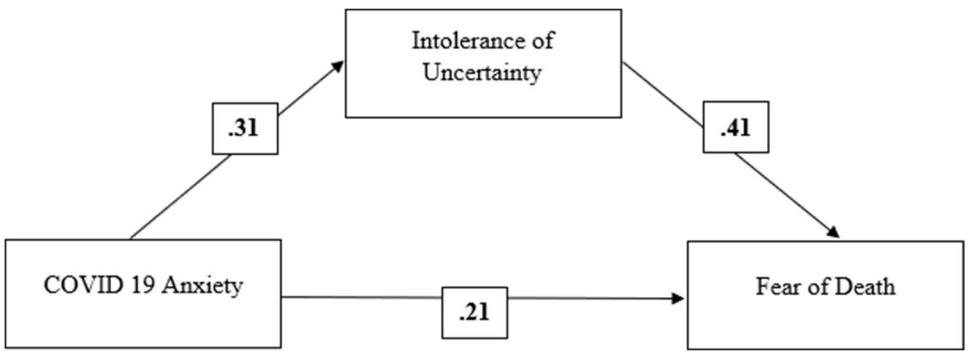

Fig. 2 Observed mediation model

on COVID-19 anxiety are more likely to have an intolerance for uncertainty. Intolerance of uncertainty is a significant (positive) predictor of fear of death ($\beta = 0.41$, $SE = 0.06$, $p < .05$), indicating that individuals scoring higher on intolerance of uncertainty are more likely to have higher fear of death scores. COVID-19 anxiety is a significant (positive) predictor of fear of death ($\beta = 0.21$, $SE = 0.07$, $p < .05$), indicating that individuals scoring higher on COVID-19 anxiety are more likely to have higher fear of death scores. These coefficients reflect the direct effects within the path model. Since the indirect effect is between the lower and upper bound of the 95% confidence interval, the conclusion is that the indirect effect of the group is zero. In this method, the significance of the mediating effect is confirmed when there is no "0" within the confidence intervals obtained (Preacher & Hayes, 2008). Because zero (the null) does not fall between the 95% confidence interval's lower and upper bounds, ($\beta = 0.13$, $SE = 0.03$, LLCI-ULCI 0.0651-0.1945) we infer that the total effect of COVID-19 anxiety on fear of death is significantly different from zero. This model accounted for 14% of the variance in fear of death.

Discussion

This study aimed to test the relationship between COVID-19 anxiety, intolerance of uncertainty, and fear of death, and to investigate the mediating role of intolerance of uncertainty in the relationship between COVID-19 anxiety and fear of death. The findings showed that there were significant relationships between COVID-19 anxiety and fear of death (H1); intolerance of uncertainty and fear of death (H2); COVID-19 anxiety and intolerance of uncertainty (H3). Additionally, intolerance of uncertainty partially mediated the relationship between COVID-19 anxiety and fear of death (H4).

Findings of the current study showed that COVID-19 anxiety is positively related to fear of death, suggesting that individuals with higher COVID-19 anxiety were more likely to experience fear of death and vice versa. This correlation (r = .22) had a small to medium correlation value (Cohen, 1988). This result was in accordance with previous findings indicating a relationship between general anxiety and fear of death (e.g., Hoelter & Hoelter 1978, 1981). Fear of death, according to Melanie Klein, is the root of all anxiety (Blass, 2014). It can be stated that this finding has met our expectations. Similarly, intolerance of uncertainty was positively related to fear of death, suggesting that individuals who are more intolerant to uncertainty experience more fear of death and vice versa. This correlation (r = .35) had a medium correlation value (Cohen, 1988). Previous studies reported consistent findings indicating that intolerance of uncertainty is significantly related to fear of death / death anxiety (e.g., Boelen 2010; Hohman & Hogg, 2011; Upenieks, 2021). Since many things cannot be known about death, it can be stated that death itself is an uncertainty. In other words, individuals experience death once in their lives and do not have the opportunity to transfer their experience to other individuals. What will happen during and after death is thus also unknown. Furthermore, COVID-19 anxiety and intolerance of uncertainty are positively correlated, suggesting that increased COVID-19 anxiety is related to increased intolerance of uncertainty and vice versa. This correlation (r = .27) had a small to medium correlation value (Cohen, 1988). Similar findings are present in the literature. For instance, COVID-19 specific adapted forms of intolerance of uncertainty have a significant relationship with state/trait anxiety, and intolerance of uncertainty (Scharmer et al., 2020). A significant positive correlation between COVID-19 fear and intolerance of uncertainty was reported (see Karatas & Tagay 2020; Satici et al., 2020). Likewise, intolerance of uncertainty and anxiety are positively related to each other (Yook et al., 2010). All of these findings clearly indicate a relationship between anxiety and intolerance of uncertainty.

Lastly, intolerance of uncertainty partially mediated the relationship between COVID-19 anxiety and fear of death. COVID-19 anxiety was associated with more intolerance of uncertainty, and fear of death. Intolerance of uncertainty was associated with increased fear of death. Previous studies (e.g., Bakioglu et al., 2020, Celik & Gusan Kose, 2021, Deniz 2021) have shown that intolerance of uncertainty played a mediating role in the relationship between various variables during the pandemic period. Based on these findings, it can be stated that intolerance of uncertainty should be considered an important mediator for psychological studies conducted during the pandemic. According to Bavolar et al. (2021), intolerance of uncertainty has an important role in reaction to threats. Given the high level of uncertainty surrounding the COVID-19 pandemic in its early stages, intolerance of uncertainty could be a key trait in interpreting people's reactions. Likewise, intolerance of uncertainty plays a significant role on participants' mental health during the early stages of the COVID-19 pandemic (Ferreira et al., 2020).

While our findings are in line with previous research, the current study adds to our understanding of the fear of death by demonstrating for the first time that intolerance of uncertainty partially mediates the association between COVID-19 anxiety and fear of death. Furthermore, this study draws attention to the importance of psychological health besides physiological health during the pandemic process, which should be considered as one of its strengths. This important role of intolerance of uncertainty in the relationship between COVID-19 anxiety and fear of death indicates that the study has implications on both academical and practical fields. In terms of academical research, conducting more studies on intolerance of uncertainty is necessary to deepen our knowledge on the topic. As for the practicing, psychologists,

psychiatrists and other mental health professionals, paying attention to the levels of intolerance of uncertainty of the clients may prove to be beneficial for reducing their fear of death.

Limitations and future directions

There were a number of limitations. To begin with, we used a cross-sectional design that delivers data collected during a specific time period. Longitudinal studies can be preferred in the future to obtain more information. Secondly, our scales lacked open-ended questions that may have provided in-depth input. Third, the non-probability sampling method, which uses non-randomized ways to draw the sample, makes it impossible to generalize the findings (Etikan, 2016). Another crucial consideration is the social desirability bias (Gordon, 1987), which may influence the participants' responses. Participants may not have been honest with their answers or may have misinterpreted the items, which might have impacted the results. Furthermore, due to the requirements of online data collection, scales could not be delivered to individuals who do not have internet access or do not know how to use a computer or mobile devices. Turkey consists of 7 geographical regions (namely Central Anatolia region, Aegean region, Marmara region, Black Sea region, the Mediterranean region, eastern Anatolia region, southeastern Anatolia region) and each geographical region has its own social and cultural orientation. The failure to have any information about the settlements of the participants can be considered as another limitation of this study. In future studies, working with a representative sample from each geographical region can provide more detailed information.

The ability to perform thanato-psychological research in a Turkish and Islamic context is a strength of this work (see Bulut, 2022). For future research, more cross-cultural and culture-specific studies are still needed in this field. In conclusion, the present study highlights the important role of intolerance of uncertainty as a mediating variable with the ability to affect fear of death in relation to COVID-19 anxiety. Considering all the findings reported above, we suggest that reducing the uncertainties in the pandemic process is important in order to alleviate the fear of death. Therefore, authorities can be advised to prioritize uncertainty reduction in their public communications regarding pandemic management. In the future, in-depth knowledge of intolerance of uncertainty can be obtained by conducting longitudinal studies.

Data availability The datasets generated during and/or analyzed during the current study are available in the Google Drive repository, https://drive.google.com/drive/my-drive.

Declarations

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflict of interest The author declare that she has no conflict of interest.

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

References

Abdel-Khalek, A. M. (2005). Death anxiety in clinical and non-clinical groups. *Death Studies*, *29*(3), 251–259. https://doi.org/10.1080/07481180590916371

Akbari, M., Spada, M. M., Nikcevic, A. V., & Zamani, E. (2021). The relationship between fear of COVID-19 and health anxiety among families with COVID-19 infected: The mediating role of metacognitions, intolerance of uncertainty and emotion regulation. *Clinical Psychology & Psychotheraphy*, 1–13. https://doi.org/10.1002/cpp.2628

Bakioglu, F., Korkmaz, O., & Ercan, H. (2020). Fear of COVID-19 and positivity: Mediating role of intolerance of unertainty, depression, anxiety, and stress. *International Journal of Mental Health and Addiction, 19*(6), 2369–2382. https://doi.org/10.1007/s11469-020-00331-y

Bavolar, J., Kacmar, P., Hricova, M., Schrötter, J., Kovacova-Holevova, B., Köverova, M., & Raczova, B. (2021). Intolerance of uncertainty and reactions to the COVID-19 pandemic. *The Journal of General Psychology*. https://doi.org/10.1080/00221309.2021.1922346

Blass, R. B. (2014). On "the fear of death" as the primary anxiety: How and why Klein differs from Freud. *The International Journal of Psychoanalysis, 95,* 613–627. https://doi.org/10.1111/1745-8315.12177

Boelen, P. (2010). Intolerance of uncertainty and emotional distress following the death of a loved one. *Anxiety Stress & Coping, 23*(4), 471–478. https://doi.org/10.1080/10615800903494135

Boelen, P. A., & Reijntjes, A. (2009). Intolerance of uncertainty and social anxiety. *Journal of Anxiety Disorders*, *23*(1), 130–135. https://doi.org/10.1016/j.janxdis.2008.04.007

Buhr, K., & Dugas, M. J. (2002). The intolerance of uncertainty scale: Psychometric properties of the english version. *Behaviour Research and Therapy*, *40*(8), 931–945. https://doi.org/10.1016/s0005-7967(01)00092-4

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), 215–223. https://doi.org/10.1016/j.brat.2008.12.004

Bulut, M. B. (2022). Turkish version of the interpretation of death scale: Cultural adaptation and validation. *Journal of Gerontological Social Work, 65*(1), 24–44. https://doi.org/10.1080/01634372.2021.1920536

Bulut, M. B., McDermott, M., & McEwan, O. (2017). Adapting the multidimensional mortality awareness measure: A study of validity and reliability. *The Journal of International Social Research, 10*(49), 268–275. https://doi.org/10.17719/jisr.2017.1578

Carleton, R. N. (2012). The intolerance of uncertainty construct in the context of anxiety disorders: Theoretical and practical

perspectives. *Perspective*, *12*(8), 937–947. https://doi.org/10.1586/ern.12.82

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

Cohen, S., Gottlieb, B. H., & Underwood, L. G. (2000). Social relationships and health. In S. Cohen, L. G. Underwood, & B. H. Gottlieb (Eds.), *Social support measurement and intervention: A guide for health and social scientists* (pp. 3–25). Oxford University Press. https://doi.org/10.1093/med:psych/9780195126709.003.0001

Çelik, S., & Güsan Köse, G. (2021). Mediating effect of intolerance of uncertainty in the relationship between coping styles with stress during pandemic (COVID-19) process and compulsive buying behavior. *Progress in Neuropsychopharmacology & Biological Psychiatry*, *110*, 1–9. https://doi.org/10.1016/j.pnpbp.2021.110321

Deniz, M. E. (2021). Self-compassion, intolerance of uncertainty, fear of COVID-19, and well-being: A serial mediation investigation. *Personality and Individual Differences*, *177*, 1–5. https://doi.org/10.1016/j.paid.2021.110824

Etikan, I. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1–4. https://doi.org/10.11648/j.ajtas.20160501.11

Evren, C., Evren, B., Dalbudak, E., Topçu, M., & Kutlu, N. (2022). Measuring anxiety related to COVID-19: A Turkish validation study of the Coronavirus Anxiety Scale. *Death Studies*, *46*(5), 1052–1058. https://doi.org/10.1080/07481187.2020.1774969

Fernandez, S., Castano, E., & Singh, I. (2010). Managing death in the burning grounds of Varanasi, India: A terror management investigation. *Journal of Cross-Cultural Psychology*, *41*(2), 182–194. https://doi.org/10.1177/0022022109354376

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 Psicologica*, *27*(1), 62–69. https://doi.org/10.14349/sumapsi.2020.v27.n1.8

Florian, V., & Mikulincer, M. (2004). A multifaceted perspective on the existential meanings, manifestations, and consequences of the fear of personal death. In J. Greenberg, S. L. Koole, & T. Pyszczynski (Eds.), *Handbook of Experimental Existential Psychology* (pp. 54–70). The Guilford Press.

Freeston, M. H., Rheaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences*, *17*(6), 791–802. https://doi.org/10.1016/0191-8869(94)90048-5

Freud, S. (1955). *The theory of the instincts*. The Modern Library.

Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science*, *18*(3), 233–239. https://doi.org/10.1111/j.1467-9280.2007.01882.x

Gica, S., Kavakli, M., Durduran, Y., & Ak, M. (2020). The effect of COVID-19 pandemic on psychosomatic complaints and investigation of the mediating role of intolerance to uncertainty, biological rhythm changes and perceived COVID-19 threat in this relationship: a web-based community survey. *Psychiatry and Clinical Psychopharmacology, 30*(2), 89–96. https://doi.org/10.5455/PCP.20200514033022

Gordon, R. A. (1987). Social desirability bias: A demonstration and technique for its reduction. *Teaching of Psychology*, *14*(1), 40–42.

Greenberg, J., Pyszczynski, T., & Solomon, S. (1986). The causes and consequences of a need for self-esteem: A terror management theory. In R. F. Baumeister (Ed.), *Public self and private self* (pp. 189–212). Springer.

Hayes, A. F., & Preacher, K. J. (2013). Conditional process modeling: Using structural equation modeling to examine contingent causal processes. In G. R. Hancock, & R. O. Mueller (Eds.), *Structural equation modeling: A second course* (pp. 219–266). IAP Information Age Publishing.

Hoelter, J. W., & Hoelter, J. A. (1978). The relationship between fear of death and anxiety. *Journal of Psychology*, *99*, 225–226. https://doi.org/10.1080/00223980.1978.9921462

Hoelter, J. W., & Hoelter, J. A. (1981). On the interrelationships among exposure to death and dying, fear of death, and anxiety. *Omega- Journal of Death and Dying*, *11*(3), 241–254. https://doi.org/10.2190/TY4E-KV6Q-WE9D-7DAT

Hofstede, G. (1991). *Cultures and Organizations*. Profile Books.

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institution, and organizations accross nations* (2nd ed.). Sage Publications.

Hofstede, G. (2011). Dimensionalizing cultures: The Hofstede model in context. *Online Readings in Psychology and Culture, 2*. https://doi.org/10.9707/2307-0919.1014

Hofstede, G., & Bond, M. H. (1988). The Confucius connection: From cultural roots to economic growth. *Organizational Dynamics*, *16*(4), 5–21.

Hogg, M. A. (2009). Managing self-uncertainty through group identification. *Psychological Inquiry*, *20*(4), 221–224. https://doi.org/10.1080/10478400903333452

Hohman, Z. P., & Hogg, M. A. (2011). Fear and uncertainty in the face of death: The role of life after death in group identification. *European Journal of Social Psychology*, *41*(6), 751–760. https://doi.org/10.1002/ejsp.818

Karatas, Z., & Tagay, O. (2020). The relationships between resilience of the adults affected by the COVID pandemic in Turkey and COVID-19 fear, meaning in life, life satisfaction, intolerance of uncertainty and hope. *Personality and Individuals Differences*, *172*, 110592. https://doi.org/10.1016/j.paid.2020.110592

Kaya Yildirim, Ä., & Yorulmaz, O. (2021). Are our thoughts important or actions? A literature review of thought-action fusion on morality. *Turkish Journal of Clinical Psychiatry*, *24*, 109–122. https://doi.org/10.5505/kpd.2020.13540

Lee, S. A. (2020). Coronavirus Anxiety Scale: A brief mental health screener for COVID-19 related anxiety. *Death Studies, 44*(7), 393–401. https://doi.org/10.1080/07481187.2020.174848116

Levasseur, O., McDermott, M. R., & Lafreniere, K. (2015). The Multidimensional Mortality Awareness Measure and Model (MMAMM): Development and validation of a new self-report questionnaire and psychological framework. *Journal of Death and Dying*, *70*(3), 317–341. https://doi.org/10.1177/0030222815569440

Lowe, J., & Harris, L. M. (2019). A comparison of death anxiety, intolerance of uncertainty and self-esteem as predictors of social anxiety symptoms. *Behavior Change*, *36*, 165–179. doi:https://doi.org/10.1017/bec.2019.11

Maslow, A. H. (1954). *Motivation and personality*. Harpers.

McEvoy, P. M., & Mahoney, A. E. J. (2012). To be sure, to be sure: Intolerance of uncertainty mediates symptoms of various anxiety disorders and depression. *Behavior Therapy*, *43*(3), 533–545. https://doi.org/10.1016/j.beth.2011.02.007

Muramatsu, N., Hoyem, R. L., Yin, H., & Campbell, R. T. (2008). Place of death among older Americans: Does state spending on home- and community-based services promote home death? *Medical Care*, *46*(8), 829–838. https://doi.org/10.1097/MLR.0b013e3181791a79

Pak, H., Susen, Y., Denizci Nazlıgul, M., & Griffiths, M. (2021). 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. *International Journal of Mental Health and Addiction*, online version. https://doi.org/10.1007/s11469-021-00489-z

Pérez-Mengual, N., Aragonés-Barbera, I., Moret-Tatay, C., & Moliner-Albero, A. R. (2021). The relationship of fear of death between neuroticism and anxiety during the COVID-19

pandemic. *Frontiers in Psychiatry, 12,* 648498. https://doi.org/10.3389/fpsyt.2021.648498

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, *63*, 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879–891. https://doi.org/10.3758/brm.40.3.879

Pyszczynski, T., Greenberg, J., Koole, S. L., & Solomon, S. (2010). Experimental existential psychology: Coping with the facts of life. In S. T. Fiske, D. T. Gilbert ve G. Lindzey (Eds.), *Handbook of Social Psychology* (pp. 724–757). Wiley.

Pyszczynski, T., Greenberg, J., & Solomon, S. (1997). Why do we need what we need? A terror management perspective on the roots of human social motivation. *Psychological Inquiry, 8*(1), 1–20. https://doi.org/10.1207/s15327965pli0801_1

Racine, S., Miller, A., Mehak, A., & Trolio, V. (2022). Examining risk and protective factors for psychological health during the COVID-19 pandemic. *Anxiety Stress & Coping*, *35*(1), 124–140. https://doi.org/10.1080/10615806.2021.1958789

Robinson, E., Sutin, A. R., Daly, M., & Jones, A. (2022). A systematic review and meta-analysis of longitudinal cohort studies comparing mental health before versus during the COVID-19 pandemic in 2020. *Journal of Affective Disorders*, *296*, 567–576. https://doi.org/10.1016/j.jad.2021.09.098

Sarı, S., & Dağ, İ. (2009). Adaptation, validity and reliability of the intolerance to uncertainty scale, positive beliefs regarding anxiety scale and the consequences of anxiety scale to Turkish. *Anatolian Journal of Psychiatry, 10,* 261–270.

Satici, B., Saricali, M., Satici, S. A., & Griffins, M. D. (2020). Intolerance of uncertainty and mental wellbeing: Serial mediation by rumination and fear of COVID-19. *International Journal of Mental Health and Addiction*. https://doi.org/10.1007/s11469-020-00305-0

Scharmer, C., Martinez, K., Gorrell, S., Reilly, E. E., Donahue, J. M., & Anderson, D. A. (2020). Eating disorder pathology and compulsive exercise during the COVID-19 public health emergency: Examining risk associated with COVID-19 anxiety and intolerance of uncertainty. *International Journal of Eating Disorders*, *53*, 2049–2054. https://doi.org/10.1002/eat.23395

Solomon, S., Greenberg, J., & Pyszczynski, T. (1991). A terror management theory of social behavior: The psychological functions of self-esteem and cultural worldviews. *Advances in Experimental Social Psychology*, *24*, 93–159. https://doi.org/10.1016/S0065-2601(08)60328-7

Sorrentino, R. M., Ye, Y., & Szeto, A. C. H. (2009). Uncertainty management: To fear of not to fear? *Psychological Inquiry*, *20*(4), 240–244. https://doi.org/10.1080/10478400903333528

Trougakos, J. P., Chawla, N., & McCarthy, J. M. (2020). Working in a pandemic: Exploring the impact of COVID-19 health anxiety on work, family, and health outcomes. *Journal of Applied Psychology, 105*(11), 1234–1245. https://doi.org/10.1037/apl0000739

Turkish Ministry of Health. (2022). https://www.saglik.gov.tr/TR,80604/bakan-koca-turkiyenin-kovid-19la-1-yillik-mucadele-surecini-degerlendirdi.html. Accessed April 2022.

Umberson, D., & Karas Montez, J. (2010). Social relationships and health: A flashpoint for health policy. *Journal of Health and Social Behavior*, *51*(5), 554–566.

Upenieks, L. (2021). Uncertainty in faith, fear of death? Transitions in religious doubt and death anxiety in later life. *Omega- Journal of Death and Dying*, Online First. https://doi.org/10.1177/00302228211029475

Van den Bos, K. (2009). The social psychology of uncertainty management and system justification. In J. T. Jost, A. C. Kay, & H. Thorisdottir (Eds.), *Social and Psychological bases of ideology and system justification* (pp. 185–209). Oxford University Press.

Van den Bos, K., & Lind, E. A. (2002). Uncertainty management by means of fairness judgments. *Advances in Experimental Social Psychology*, *34*, 1–60. https://doi.org/10.1016/S0065-2601(02)80003-X

Van Oudenhoven, J. P., Mechelse, L., & de Dreu, C. K. W. (1998). Managerial conflict management in five European countries: The importance of power distance, uncertainty avoidance, and masculinity. *Applied Psychology: An International Review, 47*(3), 439–455. https://doi.org/10.1111/j.1464-0597.1998.tb00037.x

Voitsidis, P., Nikopoulou, V. A., Holeva, V., Parlapani, E., Sereslis, K., Tsipropoulou, V. … Diakogiannis, I. (2021). The mediating role of fear of COVID-19 in the relationship between intolerance of uncertainty and depression. *Psychology and Psychotherapy: Theory Research and Practice*, *94*(3), 884–893. https://doi.org/10.1111/papt.12315

Wheaton, M. G., Messner, G. R., & Marks, J. B. (2021). Intolerance of uncertainty as a factor linking obsessive-compulsive symptoms, health anxiety and concerns about the spread of the novel coronavirus (COVID-19) in the United States. *Journal of Obsessive-Compulsive and Related Disorders*, *28*, 100605. https://doi.org/10.1016/j.jocrd.2020.100605

WHO (World Health Organization). (2022). Coronavirus (COVID-19) dashboard. https://COVID19.who.int/. Accessed April 2022.

Willmott, H. (2000). Death. So what? Sociology, sequestration and emancipation. *The Sociological Review*, *48*(4), 649–665.

Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior, 27*(5), 591–615.

Yao, N., Yang, Y., Jiang, Y., & Rodriguez, M. (2022). Intolerance of uncertainty relates to anxiety and depression through negative coping and worry: Evidence from a repeated-measures study. *International Journal of Cognitive Therapy*, 1–15. https://doi.org/10.1007/s41811-021-00130-w

Yook, K., Kim, K. H., Suh, S. Y., & Lee, K. S. (2010). Intolerance of uncertainty, worry, and rumination in major depressive disorder and generalized anxiety disorder. *Journal of Anxiety Disorder*, *24*(6), 623–628. https://doi.org/10.1016/j.janxdis.2010.04.003