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COVID Fears and Social Anxiety in College Students

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Abstract

The COVID-19 pandemic has been associated with numerous negative mental health outcomes such as social anxiety, and lead to a great deal of uncertainty. Intolerance of Uncertainty is a relatively new concept in the psychology literature and has begun to be studied in the context of anxiety. Literature has found a positive correlation between Intolerance of Uncertainty and several types of social anxiety. With these findings, researchers have begun to examine the COVID-19 pandemic to see how Intolerance of Uncertainty affects people's mental health during the pandemic. Intolerance of Uncertainty may be a mediator between social anxiety and the fears related to the COVID-19 pandemic. This paper proposed a study to examine whether Intolerance of Uncertainty is a mediator between social anxiety and fear of COVID-19 in college students, and found that Intolerance of Uncertainty acts a mediator between fear of COVID-19 and social anxiety.

COVID-19 and Social Anxiety Amongst College Students

The Coronavirus pandemic has affected our lives in ways that we have not seen in recent history. The world watched the disease spread throughout Wuhan and other parts of China, many unaware of the impact that it would soon have on the world. The first case was reported in the United States to the World Health Organization on December 31, 2019, although there was some concern, many believed that the virus would be contained to the area of Wuhan. On January 30, 2020, the virus had spread enough that the World Health Organization declared the COVID-19 outbreak a global health emergency (WHO, 2022). The first community transmission of COVID-19 was detected in the United States in February 2020. We watched as active cases steadily rose throughout February and early March, and by mid-March of 2020, all 50 states, Washington D.C., and four U.S. territories reported active cases of the virus (WHO, 2022).

On March 11, 2020, the World Health Organization officially declared the COVID-19 outbreak a global pandemic (WHO, 2022). Two days later, the President of the United States declared COVID-19 as a national emergency in the U.S., and state level governments began issuing state-wide stay-at-home orders (AJMC Staff, 2021). The federal government banned much incoming international travel, and the United States was soon on lockdown (Trump, 2020). Businesses closed, and hospitals rapidly became overwhelmed with the number of COVID-19 positive cases (Dall & Schnirring, 2020). High schools and universities shut down, effectively leading students to undertake home-schooling via remote learning. We saw how dangerous the virus could be as it quickly spread through nursing homes and residential facilities and claimed lives of the elderly and the ill. People continued to worry increasingly regarding how much damage the virus would inflict.

After months of stay-at-home orders, the country slowly began to open back up, but with strict guidelines on how to effectively limit the spread of the virus (Lovelace Jr., 2020). Even though the country was working toward getting back to normal, the new norms were far from what we were used to before the pandemic. We saw country-wide face mask mandates, and businesses were not allowed to have their buildings at full capacity. We continued to see guidelines suggesting that people stay at least six feet away from each other and to continue to wear face masks as restrictions were slowly being lifted.

It has now been over a year since COVID-19 first emerged in the United States, and although the number of active cases is beginning to drop and we are seeing more people receiving vaccines, the virus is still very much a concern to many people throughout the country. According to the World Health Organization, worldwide there have been over 450,000,000 confirmed cases of COVID-19 with over 6,000,000 COVID-19 related deaths. In the United States, we have seen 80,000,000 confirmed cases with nearly 1,000,000 deaths, making it clear that the United States has been one of the most affected countries in the world (WHO, 2022).

Additionally, we are now seeing a resurgence in the virus due to the Delta and Omicron variants. Numbers of COVID cases have decreased several times across the United States, but as the variants became more prevalent, cases spiked, including positive cases among those who are fully vaccinated. This has led to a return in mask mandates and possibly uncertainty for many people.

Although the primary concern of the COVID-19 pandemic has been for the physical safety of persons who are elderly or immunocompromised, there has been another side of this pandemic that has garnered significantly less attention. The pandemic has brought about one of the worst global mental health crises in recent history, much of which has resulted from the

psychological stress of lockdown and isolation (Holmes et al., 2020). This mental health crisis has not only affected older people. We are seeing various populations in numerous countries reporting increased worry, anxiety, and depression since the start of the pandemic (Fiorenzato et al., 2020; Nielsen & Levkovich, 2020). This paper will review some of the most prevalent negative outcomes of the pandemic and propose a study that will examine the correlates of these outcomes in college students.

The psychological effects that the COVID-19 pandemic has had on different populations is a necessarily new topic; nevertheless, the literature is growing quickly. Considering that there was little literature on the psychological effects of global pandemics prior to COVID-19, this topic is still relatively exploratory. The current study is intended to contribute to that exploration and help develop a better understanding of the different ways that fears deriving from COVID-19 and other global pandemics can affect different populations on a psychological level. More specifically, the current study will be looking at how fears of COVID-19 affect social anxiety. Fears of COVID-19 has changed many of the social norms that we are accustomed to. With many of those norms altered, people have become increasingly uncertain about social situations, and may experience an increase in social anxiety.

Fear of COVID-19

There has been a strong focus on the effects that lockdown due to COVID-19 has on people's mental health. Although this topic is important, a less talked about issue is a fear of COVID-19 itself. Fitzpatrick and colleagues (2020) found that Fear of COVID-19 has led to heightened depression and anxiety symptoms throughout the United States. They surveyed a national sample of U.S. adults ($n = 10,368$) online measuring COVID-19 fears, social vulnerabilities, and mental health consequences (Fitzpatrick et al., 2020). This study has given

some insight into how a fear of COVID-19 affects psychological well-being, but this is still a fresh topic that needs further research. The purpose of the current study is to give a clearer idea of how a fear of COVID-19 affects people psychologically.

Fear of COVID-19 can present in numerous ways. People may feel anxious or nervous when they see news stories about the pandemic on television. They may also have physical reactions when thinking about the pandemic such as a racing heart or clammy hands. While some people may be afraid of getting the virus, others may be particularly afraid of dying because of the virus.

Intolerance of Uncertainty

Over the past several decades, we have seen an increased interest in the concept of Intolerance of Uncertainty (IU) in psychological research. Intolerance of Uncertainty is conceptualized as having difficulty with ambiguity, newness, or unpredictability (Sookman & Pinard, 1995) or an excessive tendency “to consider it unacceptable that a negative event may occur, however small the probability of its occurrence” (Dugas et al., 2001, p. 552).

Although some literature uses the terms “Intolerance of Uncertainty” and “Intolerance of Ambiguity” interchangeably, Intolerance of Ambiguity is characterized by discomfort related to a component of a current situation that is considered ambiguous; whereas Intolerance of Uncertainty is more related to discomfort when thinking about an ambiguous future event (Grenier et al., 2005). For example, Intolerance of Ambiguity could occur if someone were attending a social event, and unsure of the social norms of the event, and this situation led to discomfort. If someone was going to be attending a social event soon and they felt discomfort thinking about the upcoming event due to uncertainty regarding social norms, this would be

defined as intolerance of uncertainty. For this study, we will use Buhr and Dugas' (2009) conceptualization of intolerance of uncertainty 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 behavioral level to uncertain situations and events" (Buhr & Dugas, 2009, p. 216).

As intolerance of uncertainty began to gain more attention, numerous studies examined whether intolerance of uncertainty was related to anxiety (Carleton et al., 2012; Dar et al., 2017; McEvoy & Mahoney, 2012). McEvoy & Mahoney (2012) examined whether intolerance of uncertainty mediated symptoms of different anxiety disorders and depression. They found that intolerance of uncertainty most strongly mediated the relationship between neuroticism and worry, however IU mediated the relationship between neuroticism and other symptoms of social phobia, generalized anxiety disorder, OCD, and depression (McEvoy & Mahoney, 2012). Carleton and colleagues (2012) examined IU across anxiety and depression. They found that people with a principal diagnosis of Social Anxiety Disorder, Pathological Demand Avoidance, Generalized Anxiety Disorder, Obsessive Compulsive Disorder, or Major Depressive Disorder scored higher on intolerance of uncertainty than those in the general population with no diagnosis, suggesting that IU could be a significant contributing factor to these diagnoses (Carleton et al., 2012). Dar and colleagues (2017) examined the indirect effects of worry between intolerance of uncertainty and symptoms of depression and anxiety and found that both worry and IU contributed to anxiety and depression related symptoms.

Anxiety and worry have also been found to be a mediator between IU and depression (Swee et al., 2019). We have begun to get a clearer picture of how intolerance of uncertainty and anxiety are related, but with the concept of intolerance of uncertainty still being relatively new in

the field, further research would be beneficial to understanding what exactly intolerance of uncertainty is and how it affects people psychologically.

Although there is little research on the direct relationship between Intolerance of Uncertainty and worry, the research that has been done has found a connection. Intolerance of Uncertainty has been linked to worry in both clinical (Lee et al., 2010) and nonclinical samples (Dugas et al., 2001), though Dugas and colleagues (2001) stated that the generalizability of the results to males may be questionable due to a lack of male participants in the study. There is significant avoidance and stress related to negative emotions in people with Generalized Anxiety Disorder, suggesting that the internal state elicited by intolerance of uncertainty may be what is motivating the worry (Lee et al., 2010).

Intolerance of Uncertainty and Social Anxiety

A key feature of social anxiety is a fear of rejection. One way to avoid being rejected is to understand how to behave in certain social situations, therefore it would make sense to experience an increase in social anxiety in those with Intolerance of Uncertainty when entering a social situation that is ambiguous, and they are uncertain as to how to behave in that situation. The literature on Intolerance of Uncertainty has focused on the relationship between IU and generalized anxiety disorder, along with OCD. Boelen and Reijntjes (2009) were the first to explore a possible relationship between IU and social anxiety and found that IU was related to levels of social anxiety, along with GAD and OCD (Boelen & Reijntjes, 2009). Several subsequent studies have focused on the relationship between IU and symptoms of social anxiety (Carleton et al., 2009; Whiting et al., 2014). Carleton et al. (2009) examined IU as a predictor of social anxiety and found that people with social anxiety symptoms were comparable to those

high in worry with regard to levels of IU. Lowe and Harris (2019) found that IU was a predictor of social anxiety.

Whiting and colleagues (2014) examined the role of IU in different social anxiety subtypes. IU was a significant contributor to both performance social anxiety and interaction social anxiety, though IU contributed more variance to the performance subtype. The research on intolerance of uncertainty and social anxiety has shown promise, but additional research may help solidify this connection. Additional research on the relationship between intolerance of uncertainty and social anxiety could explain further how social anxiety operates. Gaining more of that understanding could lead to new therapeutic techniques that help treat social anxiety, and this study could contribute to that endeavor in the wake of the COVID-19 pandemic.

Intolerance of Uncertainty, Anxiety, and COVID-19

Uncertainty has run rampant during the time of the COVID-19 pandemic. Despite the recency of the pandemic, researchers immediately started to examine the relationship between IU and anxiety and depression symptoms related to the COVID-19 pandemic. Several studies have examined the possible mediating role that Intolerance of Uncertainty has between psychological distress potentially due to the pandemic (Bakioglu et al., 2020; Ferreira et al., 2020; Parlapani et al., 2020; Reizer et al., 2021; Rettie & Daniels, 2020; Satici et al., 2020; Smith et al., 2020).

The research suggests that IU plays a role in the psychological distress brought on by the COVID-19 pandemic. We can see these results globally as studies have been conducted in Brazil (Ferreira et al., 2020), Greece (Parlapani et al, 2020), and Turkey (Satici et al., 2020). Most of these studies have examined symptoms of depression and anxiety; however, Parlapani et al. (2020) looked specifically at loneliness in older adults in Greece.

COVID-19 and Depression

Although depression will not be a main focus of this proposed study, the link between COVID-19 and depression has received a great deal of attention. In June of 2020, depressive disorder was four times as prevalent as it was towards the beginning of the year in the United States due to COVID-19 (Czeisler et al., 2020). In Italy, anxiety has been heightened by COVID-19 and there has also been a concurrent increase in depression symptoms (Fiorenzato et al., 2021). An increase in depression symptoms was evident in the initial stage of the pandemic in China (Wang et al., 2020). This concurrent increase in depression symptoms with anxiety symptoms due to COVID-19 is something to keep in mind for this study. Considering that some symptoms of anxiety and depression overlap, we will include a scale to differentiate anxiety symptoms from depression symptoms.

COVID-19 and College Students

One population that has been somewhat overlooked during the COVID-19 pandemic is college students. Students have been considered a vulnerable population for the psychological effects of the COVID-19 lockdown, including increased anxiety (Manjareeka & Pathak, 2021). When the United States went on lockdown in March of 2020, universities across the nation transitioned to remote learning in the middle of their spring semester. Students at most universities were sent home, many of whom were living on campus. Suddenly, they were continuing their coursework online (Pan, 2020). They quickly had to say goodbye to their friends on campus, and they lost their ability to gather in their usual social environments. This situation has led to a mental health crisis, and numerous studies have documented that the COVID-19 pandemic has had a significant psychological impact on college students (Browning et al., 2021; Tasso et al., 2021).

Smith and colleagues (2020) included undergraduate students in their study examining IU as a moderating factor between mental health outcomes and the COVID-19 pandemic, although only 31 of the 349 (9%) participants were confirmed as undergraduate students. In most of the research examining IU, psychological distress, and the COVID-19 pandemic, the samples have consisted of the general public. We do not know what percentage of these public samples consist of undergraduate students; thus, the conclusions that can be drawn about the college student population is limited. The purpose of the current study is to determine whether intolerance of uncertainty is linked to social anxiety amongst college students during the COVID-19 pandemic. The research suggests that college students are, in fact, a vulnerable population during the COVID-19 pandemic. There is little research to support these findings, and one of the purposes of this current study is to contribute further support to the idea that college students are an overlooked, vulnerable population during the COVID-19 pandemic.

Summary and Current Study

Overall, the literature on Intolerance of Uncertainty is promising. Although it is a fresh concept, there is research finding that Intolerance of Uncertainty is related to different types of anxiety, including social anxiety and worry. In the past year, researchers have begun to turn their attention to the COVID-19 pandemic and have found that COVID-19 has resulted in a spike of anxiety. The literature suggests that Intolerance of Uncertainty is a mediating factor in that relationship. Research has also shown that college students are an affected population when it comes to mental health decline during the pandemic, despite college students being an overlooked population.

The current study explored the mediating effect of Intolerance of Uncertainty on the relationship between social anxiety and fears related to the COVID-19 pandemic in college

students. The current study also examined whether levels of worry and depression relate to social anxiety and COVID-19 fears.

Hypotheses

Although there has been little research on Intolerance of Uncertainty and even less research on the psychological effects of the COVID-19 pandemic, studies have generally found a relationship between Intolerance of Uncertainty and social anxiety. The research has also found a relationship between Intolerance of Uncertainty, psychological distress including social anxiety and depression, and the COVID-19 pandemic.

Hypothesis 1: Examined the relationships among Intolerance of Uncertainty, social anxiety, and fear of the COVID-19 pandemic: we predicted that (1a) social anxiety would be correlated positively for fear of COVID-19, and (1b) Intolerance of Uncertainty would mediate this relationship.

Hypothesis 2: Examined the relationships among social anxiety, worry, depression and fear of COVID-19: we predicted that (2a) worry and depression would predict fear of COVID-19, and (2b) social anxiety would predict fear of COVID-19 above and beyond the effects of worry and depression.

Method

Participants

Data were collected between November 19, 2021, and December 13, 2021. Participants were undergraduate students at Eastern Illinois University enrolled in Introductory Psychology. A total of 174 students participated in the study, and 11 students' data was removed due to

missing data, leaving us with 163 participants. They received course credit for participating in the study. Eastern Illinois students of all ages were allowed to participate in the study, but only data from individuals within the typical college age range (18 to 23 years) were analyzed, so that the sample would be more homogeneous, though no data needed to be removed due to being outside of this age range. An a priori power analysis suggested that a sample size of 88 was needed to detect a medium effect size ($\alpha = .05$).

Procedure

Data was collected online through EIU's SONA system, using Qualtrics. Participants were provided with a consent form describing the study, and if they agreed then they completed a packet of questionnaires online that included measures of Intolerance of Uncertainty, fear of COVID-19, social anxiety, worry, and depression.

Measures

Demographics

A demographic questionnaire designed for this study was used to gather participant information such as age, sex, and race/ethnicity.

Fear of COVID-19

The Fear of COVID-19 Scale (FCV-19S; Ahorsu et al., 2020) was used to measure the severity of COVID-19 fear. The FCV-19S was developed by Ahorsu and colleagues (2020) amidst the COVID-19 pandemic to evaluate an individual's fear of the virus. The FCV-19S is a 7-item self-report scale used to determine someone's level of fear regarding the COVID-19 pandemic. The items are scored on a 5-point Likert scale ranging from 1 ("Strongly Disagree")

to 5 (“Strongly Agree”). Examples of items on the scale include “It makes me uncomfortable to think about coronavirus-19” and “I cannot sleep because I’m worrying about getting coronavirus-19.” The scale is scored by the sum of the items, with a higher score indicating greater fear of COVID-19. The FCV-19S has been shown to have strong internal consistency ranging from .82 to .91 for different samples from different countries (Ahorsu et al., 2020; Perz et al., 2020; Bitan et al., 2020; Soraci et al., 2020), and also appears to have strong convergent validity (Ahorsu et al., 2020; Perz et al., 2020; Bitan et al., 2020; Soraci et al., 2020), discriminant validity (Ahorsu et al., 2020; Perz et al., 2020; Bitan et al., 2020; Soraci et al., 2020), and construct validity (Ahorsu et al., 2020; Perz et al., 2020; Bitan et al., 2020; Soraci et al., 2020).

Social Anxiety

The Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) was used to measure symptoms of social anxiety. The SIAS was developed by Mattick and Clarke in 1998 to evaluate symptoms of social anxiety. The SIAS is a 20-item self-report scale used to gauge reactions to multiple different social interaction situations ranging from one-on-one conversations to group situations. The items are scored on a 5-point Likert scale ranging from 0 to 4 with items such as “I find it difficult to mix comfortably with the people I work with.” The scale is scored by the sum of the items, with a higher score meaning more prominent social anxiety symptoms. The SIAS has been shown to have strong internal consistency ranging from .89 to .94 (Carleton et al., 2009; Mattick & Clarke, 1998).

Worry

The Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990) was used to look specifically at worry symptoms as worry and intolerance of uncertainty are closely related. The PSWQ is a 16-item scale that was developed by Meyer and colleagues (1990) to measure general worry symptoms. The items are scored on a 5-point Likert scale ranging from 1 (“Not at all typical of me”) to 5 (“Very typical of me”) including items such as “My worries overwhelm me” and “I have been a worrier all my life.” Some items such as “I find it easy to dismiss worrisome thoughts.” are reverse-scored. The sum of the items is then used to determine the amount of worry the person experiences. The PSWQ has been shown to have strong internal consistency ranging from .80 to .91 (Beck et al., 1995; Pestle et al., 2008).

Depression, Anxiety and Stress

The Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995) was used to assess depression from anxiety in participants. The DASS-21 is a shortened version of the original DASS developed by Lovibond and Lovibond (1995). The shortened version of the DASS is a 21-item scale used to measure symptoms of depression, anxiety, and stress in one scale and distinguish symptoms between the three. The items are scored on a 4-point Likert scale ranging from 0 (“Did not apply to me at all”) to 3 (“Applied to me very much or most of the time”) including items such as “I found it hard to wind down” and “I felt down-hearted and blue.” Participants rate how much these statements applied to them over the previous week. The higher the score, the greater the depression, anxiety, and stress is in that participant. The DASS has been shown to have acceptable to strong internal consistency ranging from .84 to .94 for depression, .74 to .87 for anxiety, and .79 to .91 for stress (Antony et al., 1998; Musa et al., 2007; Asghari et al., 2008; Lee et al., 2019), as well as moderate to strong concurrent validity

(Antony et al., 1998; Musa et al., 2007; Asghari et al., 2008; Lee et al., 2019), construct validity (Antony et al., 1998; Musa et al., 2007; Asghari et al., 2008; Lee et al., 2019), convergent validity (Antony et al., 1998; Musa et al., 2007; Asghari et al., 2008; Lee et al., 2019), and discriminant validity (Antony et al., 1998; Musa et al., 2007; Asghari et al., 2008; Lee et al., 2019).

Intolerance of Uncertainty

The short version of the Intolerance of Uncertainty Scale (IUS-12; Carleton et al., 2007) was used to measure the level of Intolerance of Uncertainty. The IUS-12 was developed from the Intolerance of Uncertainty Scale (Freeston et al., 1994) by Carleton and colleagues (2007) to provide a briefer way to evaluate symptoms of Intolerance of Uncertainty. The original scale has 27 items used to determine how one feels about unexpected events. The IUS-12 is a 12-item self-report scale with the same function as the original 27-item scale. The items are scaled on a 5-point Likert scale ranging from 1 (“Not at all characteristic of me”) to 5 (“Entirely characteristic of me”) with items such as “Unforeseen events upset me greatly.” and “When I am uncertain I can’t function very well.” The scale is scored by summing items scores, with higher scores indicating greater levels of intolerance of uncertainty. The IUS-12 correlates strongly with the original scale ($r = .98$; Carleton et al., 2007). The IUS-12 has also been shown to have strong internal consistency ranging from .87 to .92 (Khawaja & Yu, 2010; Hong & Lee, 2015), as well as strong test-retest reliability (Khawaja & Yu, 2010; Hong & Lee, 2015), concurrent validity (Khawaja & Yu, 2010; Hong & Lee, 2015), discriminant validity (Khawaja & Yu, 2010; Hong & Lee, 2015), and predicative validity (Khawaja & Yu, 2010; Hong & Lee, 2015).

Results

Internal consistencies (Cronbach's α) were calculated for primary variables to assess consistency of measures (Table 1). Alpha values for all scales were good to excellent, ranging from .87 to .92. Perz and colleagues (2020) used the Fear of COVID-19 Scale with a college population and reported a higher mean and standard deviation for the scale than was found in this sample ($M = 30.3$, $SD = 10.2$). It is important to note, however, that their sample of college students consisted largely (55%) of non-traditional students, and their data were collected in 2020 toward the beginning of the pandemic (Perz et al., 2020).

To further examine the sample, we examined the suggested cut-off scores for the measures. Peters (2000) suggests a cut-off score of 36 for the Social Interaction Anxiety Scale to distinguish between clinical levels and sub-clinical levels of social anxiety. Using this cut-off, 52 (32%) participants in our study fall in the "clinical levels" category. For the Penn State Worry Questionnaire, Wuthrich and colleagues (2014) suggest a cut-off score of 50 to discriminate Generalized Anxiety Disorder from non-clinical samples. In our sample, 67 (41%) participants fall in the clinical category. For the Depression Anxiety Stress Scale, Lovibond and Lovibond (1995) suggest cut-off scores for several severity levels including "normal" (9 for depression, 7 for anxiety, 14 for stress), "mild" (13 for depression, 9 for anxiety, 18 for stress), "moderate" (20 for depression, 14 for anxiety, 25 for stress), "severe" (27 for depression, 19 for anxiety, 33 for stress), and "extremely severe" (28+ for depression, 20+ for anxiety, 34+ for stress). Using these suggested cut-off scores, 30 (18%) participants scored "severe" or higher for depression, 52 (32%) scored "severe" or higher for anxiety, and 26 (16%) scored "severe" or higher for stress. Cut-off scores are not provided for the short form Intolerance of Uncertainty Scale and the Fear of COVID-19 Scale.

Although there are no cut-off scores to determine a potentially clinical level of fear of COVID, we further examined the scores in the sample on the Fear of COVID-19 Scale. Items are rated on a 5-point Likert scale ranging from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”). When looking at items on the scale that are related to feeling afraid or anxious, the individual item means range from 2.16 (“I am afraid of losing my life because of Corona.”) to 2.45 (“When I watch the news and stories about Corona on social media, I become nervous or anxious.”). When looking at individual items that refer to physical reactions to the fear of COVID, the item means ranges from 1.33 (“I cannot sleep because I’m worrying about getting Corona.”) to 1.60 (“My heart races or palpitates when I think about getting corona.”). Thus, we would posit that participants in our sample reported relatively low to moderate fear of COVID on average, and many of those experiencing some fear of COVID are not experiencing enough fear to exhibit physical symptoms.

Main Hypotheses

Hypothesis 1a and 1b were supported (see Table 2). Hypothesis 1a predicted that social anxiety would be positively correlated with fear of COVID; social anxiety was positively correlated with fear of COVID ($r = .248, p < .001$). Hypothesis 1b predicted that Intolerance of Uncertainty would mediate the relationship between social anxiety and fear of COVID. To determine if social anxiety was positively correlated with fear of COVID, and that Intolerance of Uncertainty mediated this relationship, a Baron and Kenny test for mediation was performed. Step 1 of this process requires a relationship between the hypothesized causal variable (fear of COVID) and outcome variable (social anxiety). A multiple regression analysis indicated that fear of COVID and social anxiety were positively correlated in the sample, $\beta = .25, p = .001$.

Step 2 looked at the causal variable and the potential mediating variable (Intolerance of Uncertainty). Another multiple regression analysis was performed, and as fear of COVID increased, Intolerance of Uncertainty increased as well, $\beta = .33, p < .001$.

Step 3 examined the relationship between the mediating variable and the outcome variable while controlling the causal variable. Results showed that as Intolerance of Uncertainty increased, social anxiety increased, $\beta = .68, p < .001$.

Step 4 investigated whether the relationship between the causal variable and the outcome variable is fully mediated ($\beta = 0$) or partially mediated ($\beta \neq 0$). With this sample, we found a partial correlation, $\beta = .025, p = .675$, though the results that we found were close to full mediation. As fear of COVID increased, social anxiety was not significantly related, while controlling Intolerance of Uncertainty. The amount of mediation was .22. According to a Sobel's test, the partial mediation was statistically significant, $Z = 4.10, p < .001$.

Hypothesis 2a and 2b were supported (See Table 4). This was tested using hierarchical multiple regression. Hypothesis 2a predicted that worry and depression would predict fear of COVID; depression predicted fear of COVID ($\beta = .25, p = .002$). However, the relationship between worry and fear of COVID was marginally non-significant, though it was trending in the predicted direction ($\beta = .16, p = .052$) and Hypothesis 2b predicted that social anxiety would predict fear of COVID-19 beyond the effects of worry and depression. Social anxiety did not predict fear of COVID-19 beyond the effects of worry and depression ($\beta = .06, p = .56$).

Exploratory Analysis

To further explore the relationship between fear of COVID-19, Intolerance of Uncertainty, and social anxiety. We conducted a mediation model with the causal and outcome

variable flipped (see Table 3). In this analysis, social anxiety is our causal variable, and fear of COVID-19 is our outcome variable, with Intolerance of Uncertainty as our mediator. To determine if fear of COVID was positively correlated with social anxiety, and that Intolerance of Uncertainty mediated this relationship, a Baron and Kenny test for mediation was performed. Step 1 of this process requires a relationship between the hypothesized causal variable (social anxiety) and outcome variable (fear of COVID). A multiple regression analysis indicated that social anxiety and fear of COVID were positively correlated in the sample, $\beta = .25, p = .001$.

Step 2 looked at the causal variable and the potential mediating variable (Intolerance of Uncertainty). Another multiple regression analysis was performed, and as social anxiety increased, Intolerance of Uncertainty increased as well, $\beta = .69, p < .001$.

Step 3 examines the relationship between the mediating variable and the outcome variable while controlling the causal variable. Results showed that as Intolerance of Uncertainty increased, fear of COVID increased, $\beta = .30, p = .004$.

Step 4 investigates whether the relationship between the causal variable and the outcome variable is fully mediated ($\beta = 0$) or partially mediated ($\beta \neq 0$). With this sample, we found a partial correlation, $\beta = .04, p = .675$. As social anxiety increased, fear of COVID was not significantly related, while controlling Intolerance of Uncertainty. The amount of mediation was .20. According to a Sobel's test, the partial mediation was statistically significant, $Z = 2.82, p = .002$.

We also explored the possibility of Intolerance of Uncertainty being a moderating variable. We first transformed the predictor and the potential moderator into centered variables.

We then performed a hierarchical regression using the centered variables and found this to be non-significant ($\beta = .038, p = .511$).

Discussion

The purpose of this study was to examine the level of COVID-19 fears in college students and whether these are related to social anxiety and Intolerance of Uncertainty. Although the fear of COVID-19 is a newly developing phenomenon, there is a quickly growing pool of research. Although the concept of Intolerance of Uncertainty has been around for several years, the research is limited for it as well. In this section, we discuss the relationship that fear of COVID has with social anxiety, and the potential role that Intolerance of Uncertainty plays. This section concludes with a discussion of limitations and putative clinical implications.

Our primary hypothesis was that fear of COVID would predict social anxiety, and that Intolerance of Uncertainty would mediate that relationship. We found that fear of COVID was related to social anxiety in our sample, and Intolerance of Uncertainty did partially mediate this relationship. Surprisingly, we found that the relationship between fear of COVID and social anxiety was not present when we controlled for the mediating variable, suggesting that Intolerance of Uncertainty is a necessary factor for the relationship to exist. While this suggests that Intolerance of Uncertainty plays a key role in the relationship, there are other factors involved that are unknown at this point, as we found it to be partial mediation. This is a particularly interesting finding, as there is a rapidly growing area of research on COVID-19 and various kinds of anxiety, but few studies have included Intolerance of Uncertainty.

Our secondary hypothesis was that worry, and depression would predict fear of COVID, and that social anxiety would predict COVID beyond the effects of worry and depression. We

wanted to include these variables; given that worry and depression are related to and overlap with social anxiety, so it is important to account for these different related outcomes. Depression predicted fear of COVID. However, the relationship between worry and fear of COVID was marginally insignificant, though it was trending in the predicted direction. Social anxiety did not predict COVID fears beyond the effects of worry and depression. This finding suggests that worry and depression may be additional factors to consider when examining the relationship between fear of COVID and social anxiety. We may be seeing additional mediators with worry and depression, considering that we found intolerance of uncertainty was only a partial mediator.

We followed up with some exploratory analyses as well. Considering that social anxiety is more of a trait, we wondered if we had the causal and outcome variables flipped, and social anxiety predicted fear of COVID, rather than the other way around. We found results comparable to our first analysis. Social anxiety did predict fear of COVID, but only when intolerance of uncertainty was taken into consideration as a mediator. We also explored the possibility of intolerance of uncertainty being a moderator, but we found this to be insignificant.

Limitations

One of the primary limitations of this study is the use of the Fear of COVID Scale (Ahorsu et al., 2020). The Fear of COVID Scale measures the fear that people have of the virus itself. Specifically, it would have been preferable to assess the specific social fears related to COVID. Our research yielded no such existing scale. We concluded that the Fear of COVID scale was the best available option, and we did not have the resources to develop a new scale.

Another limitation is the timing of the study. We may have found different results if this study had been conducted in 2020 when the pandemic was new and perhaps causing more fear,

social anxiety, and uncertainty in college students. We suspect that people have had time to adjust to the new norms of the pandemic.

Finally, the pandemic is a new occurrence, and while the research is growing rapidly, there are still limited data and measures. Likewise, Intolerance of Uncertainty is also an under researched topic. Considering that these two variables are two of our primary variables in the study, it is difficult to determine if there are other factors related to them that are not accounted for in this study due to the lack of available research. Additional research related to the effects of the pandemic and Intolerance of Uncertainty would be beneficial.

Clinical Implications

Not only have we seen an increase in research related to psychological distress during the pandemic, but we also have seen an increase in people seeking counseling services related to pandemic distress. This study suggests that a focus on developing a tolerance for uncertainty could be beneficial for people seeking treatment due to anxiety resulting from the pandemic. Developing new coping skills that build tolerance to uncertainty could potentially lead to effective therapeutic outcomes for people experiencing psychological distress related to the COVID-19 pandemic.

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Table 1

Descriptive Statistics of Main Study Variables

	<i>M</i>	<i>SD</i>	<i>Possible Range</i>	<i>Observed Range</i>	<i>α</i>
Fear of COVID	13.39	6.23	7-35	7-33	.89
Social Anxiety	29.27	14.13	0-80	0-61	.89
Worry	53.50	13.93	16-80	25-80	.87
Depression	7.09	7.02	0-42	0-28	.92
Anxiety	7.16	6.73	0-42	0-27	.88
Stress	9.26	7.12	0-42	0-28	.90
Intolerance of Uncertainty	30.40	10.89	12-60	12-60	.92

Note. Fear of COVID = Fear of COVID-19 Scale; Social Anxiety = Social Interaction Anxiety Scale; Worry = Penn State Worry Questionnaire; Depression, Anxiety, and Stress = Depression Anxiety Stress Scale; Intolerance of Uncertainty = short version of the Intolerance of Uncertainty Scale.

Table 2

Mediation Indirect and Total Effects for Main Hypothesis

Type	Effect	SE	β	<i>p</i>
Indirect	Fear of COVID => IU => Social Anxiety	.17	.22	.001
Component	Fear of COVID => IU	.13	.33	< .001
	IU => Social Anxiety	.08	.68	< .001
Direct	Fear of COVID => Social Anxiety	.19	.03	.675
Total	Fear of COVID => Social Anxiety	.17	.25	.001

Table 3

Mediation Indirect and Total Effects for Exploratory Analysis

Type	Effect	SE	β	<i>p</i>
Indirect	Social Anxiety => IU => Fear of COVID	.03	.20	.001
Component	Social Anxiety => IU	.04	.69	< .001
	IU => Fear of COVID	.06	.30	.004
Direct	Social Anxiety => Fear of COVID	.05	.04	.530
Total	Social Anxiety => Fear of COVID	.03	.25	.001

Table 4

Regression Correlations to Fear of COVID

Variable	β	<i>p</i>
Worry	.16	.052
Depression	.25	.002
Social Anxiety	.06	.56

Appendix A

Intolerance of Uncertainty Scale – Short Form

Please Circle the number that best corresponds to how much you agree with each statement. The rating scale is as follows:

- 1 = **Not at all** characteristic of me.
- 2 = **A little** characteristic of me.
- 3 = **Somewhat** characteristic of me.
- 4 = **Very** characteristic of me.
- 5 = **Entirely** characteristic of me.

1. Unforeseen events upset me greatly.
2. It frustrates me not having all the information I need.
3. Uncertainty keeps me from living a full life.
4. One should always look ahead so as to avoid surprises.
5. A small unforeseen event can spoil everything, even with the best of planning.
6. When it's time to act, uncertainty paralyses me.
7. When I am uncertain, I can't function very well.
8. I always want to know what the future has in store for me.
9. I can't stand being taken by surprise.
10. The smallest doubt can stop me from acting.
11. I should be able to organize everything in advance.
12. I must get away from all uncertain situations.

Appendix B

Social Interaction Anxiety Scale

For each item, please circle the number to indicate the degree to which you feel the statement is characteristic or true for you. The rating scale is as follows:

0 = **Not at all** characteristic or true of me.

1 = **Slightly** characteristic or true of me.

2 = **Moderately** characteristic or true of me.

3 = **Very** characteristic or true of me.

4 = **Extremely** characteristic or true of me.

1. I get nervous if I have to speak with someone in authority (teacher, boss, etc.).
2. I have difficulty making eye contact with others.
3. I become tense if I have to talk about myself or my feelings.
4. I find it difficult to mix comfortably with the people I work with.
5. I find it easy to make friends my own age.
6. I tense up if I meet an acquaintance in the street.
7. When mixing socially, I am uncomfortable.
8. I feel tense if I am alone with just one other person.
9. I am at ease meeting people at parties, etc.
10. I have difficulty talking with other people.
11. I find it easy to think of things to talk about.
12. I worry about expressing myself in case I appear awkward.
13. I find it difficult to disagree with another's point of view.
14. I have difficulty talking to attractive persons of the opposite sex.
15. I find myself worrying that I won't know what to say in social situations.
16. I am nervous mixing with people I don't know well.
17. I feel I'll say something embarrassing when talking.
18. When mixing in a group, I find myself worrying I will be ignored.
19. I am tense mixing in a group.

20. I am unsure whether to greet someone I know only slightly.

Appendix C

Fear of COVID-19 Scale

For each item, please circle the number to indicate the degree to which you agree with each statement. The rating scale is as follows:

1 = Strongly disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly agree

1. I am most afraid of Corona.
2. It makes me uncomfortable to think about Corona.
3. My hands become clammy when I think about Corona.
4. I am afraid of losing my life because of Corona.
5. When I watch the news and stories about Corona on social media, I become nervous or anxious.
6. I cannot sleep because I'm worrying about getting Corona.
7. My heart races or palpitates when I think about getting Corona.

Appendix D

Depression Anxiety and Stress Scale

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you **over the past week**. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 = Did not apply to me at all.

1 = Applied to me to some degree, or some of the time.

2 = Applied to me to a considerable degree or a good part of time.

3 = Applied to me very much or most of the time.

1 (s). I found it hard to wind down.

2 (a). I was aware of dryness of my mouth.

3 (d). I couldn't seem to experience any positive feeling at all.

4 (a). I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion.)

5 (d). I found it difficult to work up the initiative to do things.

6 (s). I tended to over-react to situations.

7 (a). I experienced trembling (e.g. in the hands).

8 (s). I felt that I was using a lot of nervous energy.

9 (a). I was worried about situations in which I might panic and make a fool of myself.

10 (d). I felt that I had nothing to look forward to.

11 (s). I found myself getting agitated.

12 (s). I found it difficult to relax.

13 (d). I felt down-hearted and blue.

14 (s). I was intolerant of anything that kept me from getting on with what I was doing.

15 (a). I felt I was close to panic.

16 (d). I was unable to become enthusiastic about anything.

17 (d). I felt I wasn't worth much as a person.

18 (s). I felt that I was rather touchy.

19 (a). I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, hear missing a beat).

20 (a). I felt scared without any good reason.

21 (d). I felt that life was meaningless.

Appendix E

Penn State Worry Questionnaire

Rate each of the following statements on a scale of 1 (“not at all typical of me”) to 5 (“very typical of me”). Please do not leave any items blank.

1. If I do not have enough time to do anything, I do not worry about it.
2. My worries overwhelm me.
3. I do not tend to worry about things.
4. Many situations make me worry.
5. I know I should not worry about things, but I just cannot help it.
6. When I am under pressure, I worry a lot.
7. I am always worrying about something.
8. I find it easy to dismiss worrisome thoughts.
9. As soon as I finish one task, I start to worry about everything else I have to do.
10. I never worry about anything.
11. When there is nothing more I can do about a concern, I do not worry about it anymore.
12. I have been a worrier all my life.
13. I notice that I have been worrying about things.
14. Once I start worrying, I cannot stop.
15. I worry all the time.
16. I worry about projects until they are all done.