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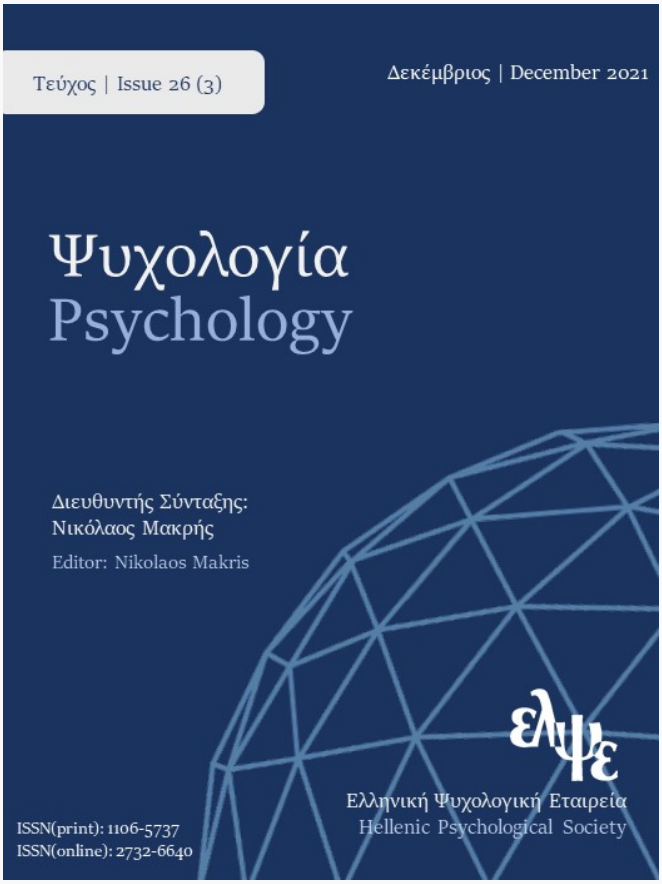

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ΕΜΠΕΙΡΙΚΗ ΕΡΓΑΣΙΑ | RESEARCH PAPER

COVID-19-related anxiety: the role of intolerance to uncertainty and resilience

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KEYWORDS

adults,
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intolerance of uncertainty,
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ABSTRACT

Coronavirus disease 2019 (COVID-19) was declared a pandemic by the World Health Organization in March 2020, spreading stress and fear around the world. The present study aims to elucidate on the psychological factors associated with perceived stress and anxiety in the context of COVID-19 pandemic, by examining the role of intolerance of uncertainty and psychological resilience. The study used baseline data collected in April-May of 2020 via an online survey distributed via social media to adults who resided in Greece. The outcome variable was the Covid-19 Anxiety Scale (CAS). Predictor variables were Intolerance to Uncertainty (IU) and psychological resilience measured by the Connor-Davidson Resilience Scale (CD-RISC). A total of 425 participants (67.2% females) with a mean age of 38.9 years participated in the survey. Women scored significantly higher than men in CAS. The results of hierarchical linear regression analysis showed that IU and resilience, independently of one another, were significantly associated with COVID-19 anxiety, explaining 16.5% of the variance. IU appears to be a risk factor above and beyond the protective mechanism of psychological resilience. Results underscore the importance of developing preventive strategies and interventions specifically targeting IU to mitigate the potential adverse psychological effects of the pandemic.

Introduction

Coronavirus disease 2019 (COVID-19) was declared a pandemic by the World Health Organization in March 2020, spreading fear and anxiety around the world. In Greece, the first COVID-19 case was officially reported on February 26th. In early March, the country introduced a series of containment strategies, and, by mid-March, the country went on a generalized lockdown that lasted for 6 weeks.

The pandemic, together with the subsequent lockdown, resulted in profound economic and social costs, while many fear that the prolonged physical and social distancing may have adversely impacted people's mental health (Pfefferbaum & North, 2020). Emerging research from around the globe has documented a sharp rise of psychological distress and mental health problems. Meta-analytic evidence shows elevated levels of depression, anxiety, and distress compared to pre-pandemic cohorts (Bueno-Notivol et al., 2021; Salari et al., 2020; Wu et

al., 2021). Additional adverse effects include a reported increase in substance and alcohol use (Czeisler et al., 2021; Rodriguez et al., 2020; Sun et al., 2020), and an alarming increase in suicidality (Fitzpatrick et al., 2020; Tanaka & Okamoto, 2021).

Research on the psychological effects of the COVID-19 pandemic in Greece mirror the findings of international research. The majority of published reports is cross-sectional, web-based surveys conducted during the first lockdown, between the months of April and May. Studies have reported elevated levels of depression, anxiety and distress in community samples (Fountoulakis et al., 2021; Papadopoulou et al., 2021; Parlapani, Holeva, Voitsidis, et al., 2020), university student samples (Kaparounaki et al., 2020; Patsali et al., 2020), high school students (Giannopoulou et al., 2021), and older adults (Parlapani, Holeva, Nikopoulou, et al., 2020). Findings on suicidality are concerning, with one large survey reporting 5.2% of the sample endorsing suicidal thoughts in the past two weeks (Papadopoulou et al., 2021) and another survey documenting a 10.40% increase of suicidal thoughts (Fountoulakis et al., 2021). Other studies have reported high levels of sleep problems (Voitsidis et al., 2020), particularly among older adults (Parlapani, Holeva, Nikopoulou, et al., 2020), as well as posttraumatic stress disorder and vicarious trauma among healthcare workers (Kalaitzaki & Rovithis, 2021). These findings are particularly worrying, given that they come from an already vulnerable population hit by a prolonged economic crisis (Peppou et al., 2020).

The Role of Uncertainty

To quote Freeston and colleagues (2020), the COVID-19 pandemic "represents an exemplar uncertainty situation" (p. 7). Uncertainty can be defined as "the experience of an unknown", with the unknown representing "the perceived absence of information at any level of consciousness" (Carleton, 2016, p. 31). A commonly used construct in the assessment of the affective dimension of experiencing an unknown is Intolerance to Uncertainty (IU). IU was originally defined as "a relatively broad construct representing cognitive, emotional, and behavioral reactions to uncertainty in everyday life situations" (Freeston, et al., 1994, p. 792). A refined definition of IU was proposed by Carleton (2016, p. 31) and is: "an individual's dispositional incapacity to endure the aversive response triggered by the perceived absence of salient, key, or sufficient information, and sustained by the associated perception of uncertainty".

IU appears to be a fundamental, transdiagnostic factor of anxiety disorders (Carleton, 2016; Carleton, Norton, et al., 2007). Individuals scoring high in IU have been shown to be more likely to exhibit heightened levels of anxiety when confronted by situations with uncertain outcomes (Dugas et al., 2001a). IU has been consistently linked with rumination, worry, and the development and maintenance of generalized anxiety disorder (Buhr & Dugas, 2009; Yook et al., 2010), depression (Huang et al., 2019; Miranda et al., 2008; Saulnier et al., 2019), panic disorder (Carleton et al., 2013, 2014), obsessive compulsive disorder (Hezel et al., 2019; Jacoby et al., 2013), social anxiety (Boelen, 2010; Carleton, Collimore, et al., 2007; Counsell et al., 2017), health anxiety (Fergus & Bardeen, 2013; Fergus & Valentiner, 2011; Wright et al., 2016), as well as posttraumatic stress disorder (Boelen, 2010; Raines et al., 2019).

The COVID-19 pandemic offered an ideal naturalistic setting to investigate the impact of IU in perceived stress and anxiety. Emergent research has associated IU with fear of COVID-19 (Mertens et al., 2020), perceived likelihood of future illness, perceived illness severity and body vigilance (Tull et al., 2020), COVID-19-related stress (Taylor et al., 2020), as well as with decreased mental wellbeing (Satici et al., 2020). Altogether, accumulating evidence supports the significant role of IU in the experience of stress in the context of the coronavirus pandemic.

The Role of Psychological Resilience

Resilience refers to a dispositional trait or process that allows individuals to "bounce-back" following exposure to stressful events (Luthar et al., 2000) and insulates them from the negative consequences of trauma

(Bonanno, 2004). Resilience embodies the qualities that allow an individual to cope successfully with stress-inducing situations and thrive in the face of adversity (Connor & Davidson, 2003). Resilience represents a complex, multidimensional construct that is challenging to capture in a single definition. Depending on the angle from which it is approached, it can refer to the ability to *recover* after exposure to stressful events, to *resist,* i.e., to maintain functioning during the exposure to said events, or to *reconfigure,* i.e., to restructure one's beliefs and behaviors after the exposure, in order to more successfully withstand the adverse effects of future negative events (Lepore & Revenson, 2006). As such, resilience may signify different qualities and characteristics that can be rooted in a variety of genetic, psychological, and environmental factors (Campbell-Sills & Stein, 2007; Southwick et al., 2014).

Notwithstanding these definitional issues, trait resilience has been robustly identified as protective against depression, anxiety, traumatization, stress and obsessive-compulsive symptoms (Hu et al., 2015). Intervening at multiple stages during the stress response process, resilience shapes the way an individual appraises the stressors, influences one's meta-cognitions regarding their emotional response, and guides the selection of coping strategies (Fletcher & Sarkar, 2013). Successful mastering of adversities is a core component of resilience, which subsequently relates to a higher sense of self-efficacy and self-esteem, as well as positive affect and optimism (Lee et al., 2013). Moreover, resilience has been shown to significantly predict positive expectancy regarding health outcomes, the ability to find meaning in challenging circumstances, and less perceived stress (Davydov et al., 2010; Steinhardt & Dolbier, 2008).

Resilience is a key construct in the study of the psychological impact of the COVID-19 pandemic. In line with its theoretical framework, psychological resilience has been shown to protect against psychological distress, depression, anxiety, somatic symptoms, worry about the effects of COVID-19, as well as suicidal ideation (Fernández et al., 2020; Killgore et al., 2020; Ran et al., 2020). Interestingly, since the outbreak of the COVID-19 pandemic, psychological resilience has been found to be negatively affected compared to normative data. It appears that a bombardment of novel daily stressors, including infection fears, frustration, boredom, inadequate information, financial loss, and a fear of outdoor activities and crowded places may have taken a heavy toll on everybody (Brooks et al., 2020), thus making it harder to cope with the ongoing crisis and the accompanying uncertainty (Killgore et al., 2020).

Taken together, psychological resilience represents a protective factor against stress, while IU reflects vulnerability to stress. It is therefore assumed that a negative association should exist between IU and resilience. While research on this topic is relatively scant, existing studies support the proposed negative association. For example, a study with a sample of nursing students found a significant negative correlation between IU and resilience, suggesting that resilient individuals tend to tolerate the adverse effects of uncertainty more effectively (Lee, 2019). Furthermore, a negative relationship between resilience and IU has been shown in studies relating the constructs with burnout (Cooke et al., 2013) and coping with cystic fibrosis (Mitmansgruber et al., 2016).

The Present Study

Given the profound impact the current pandemic exerts on the health, social, and financial domains, it is important to understand the factors that may place some individuals at greater risk for developing long-standing psychological difficulties. To this end, the present study aims to investigate the role of IU and psychological resilience on COVID-19 anxiety. We hypothesized that (a) IU will be negatively associated with resilience; and (b) IU and resilience will have a significant and additive effect on COVID-19 anxiety, controlling for sociodemographic variables.

Methods

Study Design and Participants

The study used a web-based, between-subjects design. It is part of a larger longitudinal online survey administered via social media internationally. In the present study, eligible participants were English-speaking adults who resided in Greece and provided informed consent to participate in the study.

A total of 425 participants (67.5% females, 31.8% males, and 0.7% non-binary/other) who lived in Greece at the time of data collection completed the survey. The mean age was 39 years (*SD* =14.94). The mean age of female participants (*M* = 38.93, *SD* = 14.42) was not significantly different from that of male participants (*M* = 39.26, *SD* = 15.69). The majority of survey respondents lived in large urban centers (74.1%) and had a university degree (75.1%).

Procedure

The web-based, anonymous survey was distributed through social media between April and May of 2020 via the Limesurvey© platform. The survey and all questionnaires used in the study were administered in English, as not all questionnaires were validated for use in the Greek population. The study was conducted in accordance with the Declaration of Helsinki and the study protocol was approved by the Institutional Review Board of the American College of Greece.

Measures

Demographic information. Demographic variables included age, gender, location and population density, education, relationship status, and number of children.

Health and occupational/financial status. A set of health- and occupational/financial-related variables were assessed via a self-report questionnaire developed by the researchers. Health-related items included experiencing COVID-19 symptoms, exposure to COVID-19 (self, family/close friends, wider social network), and concurrent medical problems. Occupational and financial variables included working in the frontline as a health professional, having to work outside of home, and employment status during the pandemic.

COVID-19-related anxiety. Anxiety related to the COVID-19 pandemic was assessed by the Coronavirus Anxiety Scale (CAS; Lee, 2020). CAS is a brief, 5-item mental health screener designed to assess physiological and cognitive reactions to coronavirus. Preliminary evidence gathered in the U.S.A. suggests that the CAS has acceptable psychometric properties (Lee, 2020). In addition, CAS scores were found to be correlated with coronavirus diagnosis, work/social impairment, alcohol/substance coping, religious coping, hopelessness, and suicidal ideation (Lee, 2020). Preliminary evidence suggests that CAS has adequate diagnostic properties (Area Under the Curve-AUC = 0.94, $p < .001$) and with an optimized cut score of ≥9, it has been able to accurately distinguish between persons with and without dysfunctional anxiety (90% sensitivity and 85% specificity). In our study, CAS displayed adequate internal consistency (Cronbach $\alpha = .78$).

Intolerance of uncertainty. To measure IU, we used the Intolerance of Uncertainty Scale-Short Form (IUS-12; Carleton, Norton et al., 2007), which is a validated abridged version of the original 27-item Intolerance of Uncertainty Scale (IUS; Buhr & Dugas, 2002; Freeston et al., 1994). The IUS-12 has two factors: *prospective anxiety* (items 1-7; e.g., "One should always look ahead so as to avoid surprises") and *inhibitory anxiety* (items 8-12; e.g., "When it's time to act, uncertainty paralyses me"). Prospective anxiety reflects fear and anxiety related to future events, whereas inhibitory anxiety reflects the inhibition of action or experience due to uncertainty. Items are rated on a 5-point Likert scale and total scores range between 12 and 60, with higher scores indicating greater intolerance to uncertainty. The scale has demonstrated good internal consistency (Cronbach $\alpha = .85$) and it correlates with the IUS-27 ($r = .96$; Carleton, Norton et al., 2007). In our study, a

good internal consistency was found for the total scale (Cronbach α = .87), as well as for the Prospective IU subscale (Cronbach α = .84) and the Inhibitory IU subscale (Cronbach α = .88).

Resilience. Psychological resilience was assessed by the 10-item Connor-Davidson Resilience Scale (CD-RISC-10; Campbell-Sills & Stein, 2007), which is a self-report questionnaire that assesses resilience, i.e., how well one is equipped to bounce back after stressful events. It is a shortened and refined version of the CD-RISC-25, originally created by Connor and Davidson (2003). The factor structure of the original scale has been shown to be inconsistent across different samples, with several items displaying inconsistent loadings across the four suggested factors (*hardiness, social support/purpose, faith,* and *persistence*). In contrast to the CD-RISC-25, this version is unidimensional. Items are rated on a 5-point Likert scale, with higher scores indicating higher resilience. For this study, we selected the 10-item version of the CD-RISC for the sake of brevity, as it allows for a reliable and efficient measurement of resilience, while maintaining excellent psychometric properties. Additionally, this scale is highly correlated with the original version (r = .92) and can successfully measure a trait that distinguishes people who can maintain their levels of functioning after experiencing stressful events from those who cannot (Campbell-Sills & Stein, 2007). The questionnaire demonstrated good internal consistency in our study (Cronbach α = .87).

Data Analysis

The outcome variable was COVID-19-related anxiety measured by CAS, while predictor variables were the scores in the IUS and the CD-RISC. Various demographic and COVID-19-related variables were explored as putative covariates. The data were analyzed with the SPSS 23 program (Statistical Package for Social Sciences, IBM Inc., Chicago, IL, USA). Histogram, Skewness and Kurtosis values were used in addition to Kolmogorov-Smirnov test for normality distribution. Chi-square was used to compare categorical groups. In correlation evaluation, Pearson correlation for normal distribution values and Spearman correlation for those without normal distribution values were performed. Multiple linear regression analyses were conducted to assess for the predictive power of CD-RISC and IUS scores on CAS anxiety, controlling for sociodemographic variables.

Results

Sample Characteristics

The vast majority of the sample had not been diagnosed with COVID-19, nor had a friend/relative/social acquaintance diagnosed with COVID-19. The majority of the sample had no significant medical history. Over 19% of the sample lost their job or was put on furlough during the lockdown, while approximately 15% of the sample was already unemployed at the pandemic outbreak. Table 1 presents a detailed account of the sociodemographic and health, vocational, and financial characteristics of the sample.

Table 1
Demographic Characteristics of Respondents for the Total Sample (N = 425)

Demographic variables	**Total**
	N (%)
Age (*M*, *SD*)	38.9 (14.94)
Sex	
Male	134 (31.8)
Female	284 (67.5)
Other	3 (0.7)
Density	
The open countryside	24 (5.6)

Population up to 1,000	30 (7.1)
A medium to large town (e.g., population up to 100,000)	56 (13.2)
A city or city suburb (e.g., population >100,000)	315 (74.1)
Education	
Some high school	8 (1.9)
High School Diploma, or equivalent	79 (18.6)
Vocational training	19 (4.5)
Bachelor's degree or equivalent	139 (32.7)
Master's degree or equivalent	146 (34.4)
Doctorate degree or equivalent	34 (8.0)
Relationship status	
Single	134 (31.5)
In a relationship	79 (18.6)
Married/Cohabitation/Domestic Partnership	172 (39.9)
Divorced/separated	38 (9.0)
Widowed	2 (0.5)
Health Variables	
Self-quarantined during COVID-19	74 (21.9)
Tested positive (or believe so) for COVID-19	37 (10.9)
Experienced physical symptoms of COVID-19	73 (21.6)
Were hospitalized during COVID-19	5 (1.5)
Family/friends…	
…tested positive for COVID-19	31 (9.2)
…were hospitalized for COVID-19	10 (3.0)
…died from COVID-19	6 (1.8)
Broader Social Environment…	
…tested positive for COVID-19	97 (28.7)
…were hospitalized for COVID-19	35 (10.4)
…died from COVID-19	15 (4.4)
History of medical problems	96 (28.6)
Respiratory	14 (4.2)
Endocrine	21 (6.3)
Circulatory	25 (7.4)
Immune system disorders	27 (8.1)
Cancer	4 (1.2)
Gastrointestinal	10 (3.0)
Mental health	5 (1.5)
Neurological	2 (0.6)
Other	5 (1.2)
Occupational/Financial Variables	
Worked in the frontline	19 (5.7)
Worked outside of home	43 (12.7)
Unemployed	54 (15.9)
Lost job or furlough	67 (19.8)

**Note.* Data are presented as *n* (%) unless otherwise noted.

Correlates of COVID-19 Anxiety

The mean total score of CAS was 2.24 (*SD* = 3.08), with 4.5% of the sample scoring above the clinical cut-off of 9. Women scored significantly higher than men, $F(1, 413) = 21.098$, $p = .000$, $\eta^2 = .049$. Age, educational level, differences for population density, number of household members, number of children or children below 12 years were not significantly associated with CAS scores. Regarding COVID-19-related factors, having tested positive for COVID-19 was significantly and positively associated with CAS scores ($r = .173$, $p = .001$). CAS was

positively and significantly associated with IUS (r = .31, p < .001) and negatively and significantly associated with resilience (r = -.24, p < .001; see Table 3).

Table 2

Descriptive Statistics and Spearman's Correlations for Study Variables

Variable	*M*	*SD*	1	2	3	4	5
1. CAS	2.24	3.08	—				
2. IUS	33.16	9.87	.271**	—			
3. IUS - prosp	21.23	6.14	.206**	.898**	—		
4. IUS - inhib	11.93	5.05	.297**	.842**	.535**	—	
5. CDR	36.11	7.07	-.217**	−.316**	-.170**	-.412**	—

**Note.* CAS = Coronavirus Anxiety Scale, IUS = Intolerance of Uncertainty Scale. IUS – prosp = Intolerance of Uncertainty Scale, Prospective Anxiety subscale. IUS – inhib = Intolerance of Uncertainty Scale, Inhibitory Anxiety subscale. CDR = Connor-Davidson Resilience Scale, $^{*}p < .05$. $^{**}p < .01$.

The Relationship Between IU, Resilience, and Anxiety

A first hierarchical linear regression analysis was conducted to estimate the degree to which IU and resilience could predict CAS scores, while simultaneously controlling for sex, age, and educational level. In Step 1, sex, age, and educational levels were entered into the model, which was shown to be significant and could explain 6.2% of the variance, $F(3, 331) = 7.293$, $p < .001$. Resilience led to a significant change in step 2, $\Delta R^2 = .049$, $\Delta F = 18.109$, $p < .001$. Lastly, the addition of IU into the model further increased the explained variance, $\Delta R^2 = .054$, $\Delta F = 21.330$, $p < .001$. The results indicated that the final model explained 16.5% of the variance, $R^2 = .165$, $F(5, 329) = 12.996$, $p < .001$. It was found that IU significantly predicted CAS scores, (b = 0.251, t = 4.618, $p < .001$), as did resilience (b = -0.148, t = -2.718, p = .007). The coefficients of both models are shown in Tables 3 and 4. The coefficients of all included variables are shown in Table 4.

A second hierarchical linear regression analysis was conducted with the two-subscales of IU entered in the final step of the model. The results indicated that the final model explained 17% of the variance, $R^2 = .170$, $F(6, 328) = 11.162$, $p < .001$. Inhibitory IU significantly predicted CAS scores, b = 0.212, t = 3.188, p = .02, while prospective IU did not significantly predict CAS scores, b = 0.087, t = 1.448, $p > .05$. No significant differences were observed in any other variable (Table 5).

Table 3

Hierarchical Regression Results Estimating the Association between Demographic Variables, CDR, IUS with COVID-19-Related Anxiety

Variable	*B*	95% CI for *B*		*SE B*	β	R^2	ΔR^2
		LL	*UL*				
Step 1						.062	.062***
Constant	2.101	.845	3.357	.638			
Age	.018	-.006	.041	.012	.085		

Sex (male/female)	1.388***	.696	2.079	.351	.210		
Education levels	-.372*	-.651	-.092	.142	-.153		
Step 2						.111	.049***
Constant	5.277	3.365	7.189	.972			
Age	.023	-.001	.046	.012	.110		
Sex (male/female)	1.246***	.569	1.923	.344	.189		
Education levels	-.287*	-.563	-.012	.140	-.118		
CDR	-.100***	-.146	-.054	.024	-.227		
Step 3						.165	.054***
Constant	1.385	-1.104	3.873	1.265			
Age	.024*	.001	.046	.011	.085		
Sex (male/female)	.996**	.330	1.662	.338	.151		
Education levels	-.258	-.526	.009	.136	-.153		
CDR	-.065**	-.113	-.018	.024	-.148		
IUS	.078***	.045	.111	.017	.251		

**Note.* CAS = COVID-19 Anxiety Scale. IUS = Intolerance of Uncertainty Scale. CDR = Connor-Davidson Resilience Scale, *$p < .05$. **$p < .01$. ***$p < .001$.

Table 4

Hierarchical Regression Results Estimating the Association between Demographic Variables, CDR, the IUS-Subscales with COVID-19-Related Anxiety.

Variable	***B***	**95% CI for *B***		***SE B***	**β**	***R²***	**Δ*R²***
		LL	***UL***				
Step 1						.062	.062***
Constant	2.101	.845	3.357	.638			
Age	.018	-.006	.041	.012	.085		
Sex (male/female)	1.388***	.696	2.079	.351	.210		
Education levels	-.372*	-.651	-.092	.142	-.153		
Step 2						.111	.049***
Constant	5.267	3.365	7.189	.972			
Age	.023	-.001	.046	.012	.110		

Sex (male/female)	1.246***	.569	1.923	.344	.189		
Education levels	-.287*	-.563	-.012	.140	-.118		
CDR	-.100***	-.146	-.054	.024	-.227		
Step 3						.170	.059***
Constant	1.143	-1.367	3.653	1.276			
Age	.024*	.001	.046	.011	.116		
Sex (male/female)	.974**	.309	1.640	.338	.148		
Education levels	-.250	-.518	.017	.136	-.103		
CDR	-.056*	-.105	-.006	.025	-.126		
IUS-prosp	.044	-.016	.104	.030	.087		
IUS-inhib	.127**	.049	.205	.040	.212		

**Note.* CAS = COVID-19 Anxiety Scale. CDR = Connor-Davidson Resilience Scale. IUS – prosp = Intolerance of Uncertainty Scale, Prospective Anxiety subscale. IUS – inhib = Intolerance of Uncertainty Scale, Inhibitory Anxiety subscale, **p* < .05. ***p* < .01. ****p* < .001.

Discussion

Our study aimed to elucidate on the role of risk and protective factors associated with anxiety during the COVID-19 lockdown among Greek adults. Specifically, we aimed to investigate the predictive power of IU and resilience on COVID-19-related anxiety, as measured by a newly developed scale assessing coronavirus anxiety.

The results of the survey confirmed the main hypothesis of our study, namely that IU and psychological resilience would be significantly associated with COVID-19-related anxiety. Specifically, IU was positively associated, whereas resilience was negatively associated with COVID-19-related anxiety. Our findings are in line with previous research examining the role of IU and resilience in anxiety psychopathology (Buhr & Dugas, 2009; Dugas et al., 2001b; Hu et al., 2015) and further corroborated by recent findings specifically assessing IU in the context of the current pandemic (Fernández et al., 2020; Rettie & Daniels, 2020). Furthermore, IU predicted anxiety above and beyond psychological resilience. This finding highlights the importance of specifically targeting intolerance to uncertainty as an underlying vulnerability factor associated with anxiety during the COVID-19 pandemic, above and beyond the protective role of psychological resilience.

Interestingly, exploratory, secondary analysis investigating the relationship between the two subscales of IU (prospective and inhibitory) with COVID-19-related anxiety revealed that the association was primarily accounted for by inhibitory anxiety. Inhibitory anxiety refers to behavioral inhibition in the face of uncertainty and is associated with experiential avoidance and under-engagement strategies to reduce uncertainty (e.g., avoidance). On the other hand, prospective anxiety reflects a tendency to actively seek information in order to increase predictability and is, therefore, associated with over-engagement strategies to overcome uncertainty (Birrell et al., 2011; Bottesi et al., 2019; Hong & Lee, 2015). Furthermore, as noted by McEvoy and Mahoney (2011), inhibitory IU may be more salient to phobic anxiety disorders (e.g., panic disorder, social anxiety disorder), whereas prospective IU seems to be associated with non-phobic anxiety disorders (e.g., generalized anxiety disorder, obsessive-compulsive disorder). Our findings regarding the salience of inhibitory IU over prospective IU with regards to coronavirus anxiety should be interpreted with caution. First, coronavirus anxiety in our study was assessed with a brief mental health screener measuring physiological responses to fear and anxiety related to the coronavirus (Lee, 2020), which does not allow for a sophisticated differentiation

between fear towards the phobic stimulus itself (i.e., SARS-CoV-2 virus) and generalized worries regarding the general context of the pandemic. Second, there is still lack of consensus regarding the dimensional structure of IU, with some studies supporting the two-factor solution (Carleton et al., 2012; Carleton, Norton, et al., 2007) and others suggesting that a unidimensional view of IU might be more appropriate (Bottesi et al., 2019; Hale et al., 2016).

Furthermore, our results showed that resilience was negatively associated with coronavirus anxiety; however, we found a relatively low contribution of resilience to COVID-19 anxiety levels. Several factors should be taken into account to explain this. First of all, capturing the essence of trait resilience is an arduous task. Although CD-RISC-10 does provide a reliable and valid method of measuring the main aspect of resilience, there are multiple types of resilience that are not accurately represented in this study, since the instrument used measures only one dimension (Campbell-Sills & Stein, 2007; Southwick et al., 2014).

Additionally, resilience, as measured in this study, represents a trait that is stable over time. However, its buffering effects are often manifested long after an individual has been exposed to a stressor (Janoff-Bulman, 2004; Lepore & Revenson, 2006). Given the fact that our survey was carried out in April and May of 2020 -the early stages of the pandemic in Greece- it is possible that there had not been enough time for the mitigating effects of resilience to be observed fully. Another possible explanation for our findings lies in the characteristics of the sample. The majority of the participants in our study had attained a university degree. Higher levels of education have been shown to be associated with trait resilience (Campbell-Sills et al., 2009), which could in part explain the low predictive power of this variable in our sample.

Besides the main finding regarding the role of IU and resilience in anxiety, several additional findings deserve some attention. In contrast with the high levels of clinical anxiety reported globally (Lin et al., 2020) and in our country (Fountoulakis et al., 2021; Papadopoulou et al., 2021), our study found a low incidence of COVID-19- related anxiety, as evidenced by the low mean CAS score and the low percentage of clinical COVID-19-related anxiety (CAS score > 9). Such discrepancy may be best understood by the heterogeneity of the anxiety construct investigated in various studies: general indices of distress and worry vs. more focused anxiety, such as health anxiety and health worries. Our study looks at anxiety related to COVID-19 using a unidimensional measure of physiological symptoms triggered by coronavirus-related information and thoughts. The fact that a small number of people were infected in Greece during the first wave of the pandemic (*N* per 100.000 = 13; 1st of April) may help explain the relatively low incidence of coronavirus anxiety endorsed by our sample.

Our study also yielded some interesting findings regarding gender differences in COVID-19-related anxiety, with females scoring higher in CAS compared to males. This finding is in agreement with previous reports showing that the psychological impact of the COVID-19 pandemic is heavier among women (Wang et al., 2020), as well as studies emphasizing the higher prevalence of anxiety and anxiety-related vulnerabilities in women (Li & Graham, 2017; Remes et al., 2016). These findings seem to be in line with existing literature on gender differences in anxiety, according to which women are more vulnerable than men to developing panic disorder, agoraphobia, and generalized anxiety disorder, partly due to the fact that they more frequently endorse the use of maladaptive, emotion-based coping strategies, they are more likely to overestimate the probability of danger, and they exhibit greater worry than men (McLean & Anderson, 2009). At the same time, women are more likely than men to engage in rumination, which can amplify their anxious and depressive states (Nolen-Hoeksema, 2012). Additionally, women have been found to show a more negative problem orientation, as well as greater levels of thought suppression and intolerance of uncertainty (McEvoy & Mahoney, 2013; Robichaud et al., 2003). Although research on gender differences in health anxiety has provided ambiguous evidence so far, women tend to report more somatic symptoms than men as well as higher levels of health anxiety, especially when the interpersonal model of health anxiety is used (Creed & Barsky, 2004; MacSwain et al., 2009). This difference seems to manifest itself in the current situation too, as women report more worry, more anxiety and

depression, as well as psychological distress and insomnia in the times of the pandemic, which was shown in a study that was conducted in a sample of older adults in Greece (Parlapani, Holeva, Nikopoulou, et al., 2020).

Age was found to be positively associated with COVID-19-related anxiety, when controlling for IU and resilience. Previous findings on this topic are mixed. One study found that age was positively associated with more hours per day spent thinking about COVID-19, as well as with the feeling that daily life had been limited by anxiety concerning the pandemic (Petzold et al., 2020). However, most studies that measured psychological distress, anxiety, and depression symptoms showed that younger people overwhelmingly reported more severe symptomatology than older participants (Huang & Zhao, 2020; Lin et al., 2020; Nwachukwu et al., 2020; Özdin & Özdin, 2020; Ran et al., 2020). Older age, living with a loved one, as well as being a parent acted as protective factors against the adverse psychological effects of the pandemic (Conversano et al., 2020). It is possible that the discrepant findings regarding the association between age and anxiety may be due to the operationalization of the "anxiety" construct. It may be hypothesized that older age may be associated with greater coronavirus anxiety, due to higher prevalence of underlying medical conditions and greater vulnerability to post-infection complications, whereas younger people may report more diffuse, generalized anxiety and distress, which may not be directly related to the health threats that the pandemic poses, but to the accompanying stressors, such as isolation and vocational and economic insecurity.

Limitations and Recommendations for Future Research

The present study has some limitations that should be acknowledged. One limitation inherent in anonymous cross-sectional surveys is that the design of the study does not allow causal inferences or at least assumptions about the directionality of associations. Related to this, we did not obtain any baseline data of participants' anxiety levels and trait anxiety. All data were measured with self-report questionnaires, which are subject to desirability effects and recall bias. Another limitation is the non-randomized sampling methodology used, which together with the web-based format of the study, resulted in a less representative sample of the population living in Greece, who were younger, of higher educational background, and living in urban centers. Finally, we decided against translating the questionnaires to Greek to maintain their good psychometric properties, as several questionnaires were not officially validated in Greek; this limited the generalizability of our findings to non-English speakers and introduced possible selection bias.

Future studies should investigate the relationship among stress, resilience, and intolerance of uncertainty in longitudinal designs. As time goes by, stress and anxiety are induced in the context of the current pandemic due to prolonged fatigue, isolation, and financial burden. Measurement of the psychological effects of the pandemic across different time points can help identify longitudinal trajectories of anxiety and understand better who is at greater risk for developing psychopathology. Our study is part of a larger longitudinal research project with an aim to measure the impact of IU and resilience in anxiety over time. Another area where future studies should focus on is the adoption of uniform measurement tools to assess COVID-19-related anxiety, as the current literature has employed various questionnaires, measuring among other physiological symptoms of arousal, fear, worry, and illness anxiety symptoms.

Our findings may inform strategies for clinical care as they underscore the importance of developing preventive strategies and interventions specifically targeting IU, as a possible mechanism to mitigate the adverse psychological effects of the pandemic. Furthermore, our study provides preliminary support for the role of experiential avoidance and under-engagement strategies in COVID-19-related anxiety. Cognitive behavioral therapy (CBT) is an evidence-based therapy and the gold-standard for many anxiety disorders. Evidence shows that CBT may effectively target anxiety disorders (such as generalized anxiety disorder) through decreasing IU, both in non-group and group settings (Dugas et al., 2003; Ladouceur et al., 2000). CBT modules –such as psychoeducation, cognitive reappraisal and awareness training, problem solving training, and cognitive exposure– effectively target IU and worry by decreasing experiential avoidance and rumination, two processes

that often trigger and maintain worry and anxiety. The putative mechanism of action maintains that by changing erroneous beliefs about worry and its relationship to uncertainty and by engaging in problem solving and exposing oneself to feared situations, a decrease in physiological responding, affect, and worry-related behaviors will also occur. Recently, a CBT-IU protocol specifically targeting uncertainty through sole use of behavioral experiments has been developed (Hebert & Dugas, 2019). The protocol has only been validated in a pilot study, but results were in line with previous adaptations of CBT-IU, with the advantage of using only one CBT technique resulting in clearer future replication studies.

Conclusion

Notwithstanding the limitations of a cross-sectional, web-based survey using convenience sampling methodology, our results underscore the importance of developing preventive strategies and interventions specifically targeting IU to mitigate the potential adverse psychological effects of the pandemic. To summarize, IU appears to be a risk factor for anxiety during the COVID-19 pandemic, above and beyond the protective mechanism of psychological resilience.

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ΕΜΠΕΙΡΙΚΗ ΕΡΓΑΣΙΑ | RESEARCH PAPER

Άγχος σχετικά με την πανδημία COVID-19: ο ρόλος της δυσανεξίας της αβεβαιότητας και της ψυχικής ανθεκτικότητας

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άγχος σχετικά με την πανδημία COVID-19, δυσανεξία της αβεβαιότητας, ψυχική ανθεκτικότητα, ενήλικοι

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ΠΕΡΙΛΗΨΗ

Η ασθένεια κορονοϊού 2019 (COVID-19) κηρύχθηκε πανδημία από τον Παγκόσμιο Οργανισμό Υγείας τον Μάρτιο του 2020, προκαλώντας φόβο και ανασφάλεια στην παγκόσμια κοινότητα. Η παρούσα μελέτη έχει στόχο να διερευνήσει τους ψυχολογικούς παράγοντες που σχετίζονται με το άγχος στο πλαίσιο της πανδημίας COVID-19, εξετάζοντας τον ρόλο της δυσανεξίας της αβεβαιότητας και της ψυχικής ανθεκτικότητας. Η παρούσα μελέτη βασίζεται σε δεδομένα από μια διαδικτυακή έρευνα που εκπονήθηκε τον Απρίλιο-Μάιο 2020 σε ενήλικες που διέμεναν στην Ελλάδα. Χρησιμοποιήθηκε η Κλίμακα Άγχους COVID-19 (CAS), η Κλίμακα Δυσανεξίας της Αβεβαιότητας (IUS) και η Κλίμακα Ανθεκτικότητας Connor-Davidson (CD-RISC). Συνολικά συμμετείχαν στην έρευνα 425 άτομα (67.2% γυναίκες) με μέση ηλικία 38.9 ετών. Οι γυναίκες εμφάνισαν στατιστικά υψηλότερο μέσο βαθμό άγχους σχετικά με την πανδημία. Τα αποτελέσματα της ιεραρχικής γραμμικής παλινδρόμησης έδειξαν ότι η δυσανεξία της αβεβαιότητας και η ανθεκτικότητα, ανεξάρτητα η μία από την άλλη, συσχετίστηκαν σημαντικά με το άγχος σχετικά με την πανδημία COVID-19, εξηγώντας το 16.5% της διακύμανσης . Η δυσανεξία της αβεβαιότητας φαίνεται να είναι ένας παράγοντας κινδύνου για το άγχος σχετικά με την πανδημία πέρα από την πιθανή προστατευτική επίδραση της ψυχικής ανθεκτικότητας. Τα ευρήματα της έρευνας υπογραμμίζουν τη σημασία ανάπτυξης ειδικών στρατηγικών πρόληψης και θεραπευτικών παρεμβάσεων με στόχο την άμβλυνση των αρνητικών ψυχολογικών επιπτώσεων της πανδημίας.