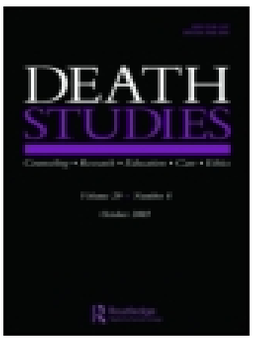

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Assessment of psychometric characteristics of the Coronavirus Anxiety Scale in patients with preexisting psychiatric disorders

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ABSTRACT

This study aimed to evaluate the psychometric characteristics of the Turkish version of the CAS in a Turkish psychiatric outpatient setting. A total of 198 patients with a preexisting psychiatric disorder completed the CAS scale. The scale's validity and reliability were evaluated using convergent and concurrent validity, internal consistency, exploratory and confirmatory factor analyses, and ROC analysis. The Turkish version of CAS might help physicians assess the COVID-19 associated anxiety in patients with psychiatric comorbidities.

As of 22 November 2020, there have been 440,805 confirmed cases and 12,219 deaths in Turkey (World Health Organization, 2020). The pandemic has affected both the physical and psychiatric well-being of individuals and is a significant threat to mental health globally (Talevi et al., 2020). Moreover, assessment of the psychiatric health of individuals and identifying those needed interventions are not only crucial for providing immediate support, but it is also essential to prevent post-traumatic stress and anxiety-related disorders that may extend beyond pandemic (Lee et al., 2020). This becomes more important if individuals already have underlying anxiety symptoms.

During the COVID-19 pandemic, several scales were developed to evaluate individuals' psychiatric conditions, and the Coronavirus Anxiety Scale (CAS) was developed to identify the cases with dysfunctional anxiety due to COVID-19 (Lee, 2020). The CAS has five items, and each item assesses distinct fear or anxiety conditions in reaction to COVID-19-associated thoughts or information. The CAS was previously translated into Turkish and found to be a valid and reliable scale to evaluate dysfunctional Coronavirus-related anxiety (Evren et al., 2020). Nevertheless, it has not been studied in patients with psychiatric disorders. This study aimed to evaluate whether CAS can identify Coronavirus associated anxiety in psychiatric outpatients. For this aim, the Turkish version of the CAS's psychometric characteristics were evaluated in a clinical sample of Turkish patients with preexisting psychiatric disorders.

Materials and Methods

Participants and procedure

This study was performed on 198 patients who were consecutively admitted to the Psychiatry Department of a State Hospital, between 15 July 2020 and 15 August 2020. Patients who had been followed up in a psychiatric outpatient clinic for at least 6 months diagnosed with anxiety disorders and mood disorders before the pandemic were eligible and illiterate participants were not. Patients were informed about the study and those who gave consent to participate were included. Patients were evaluated by a psychiatrist in a face-to-face interview and Clinical Global Impression Scale ([CGI], Guy, 1976) scores recorded. Patients' pre-pandemic CGI scores were on file records. Whether the patients' condition worsened compared to the pre-pandemic period was decided according to the CGI scores. Sociodemographic data form and CAS were applied to the participants in the interview. The local ethical committee of Prof. Dr. Cemil Tascioglu City Hospital approved the study protocol (approval number: 48670771-514.10).

Measures

We asked participants to report their age, gender, marital status, education level, and employment, as measures of sociodemographic variables. We also asked the participants if they tested positive for

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COVID-19 and if they knew someone with COVID-19 as measures of the COVID-19 factors.

Global clinical condition

The CGI (Guy, 1976) was developed to evaluate the condition of all psychiatric disorders. We used it to make a global assessment of study patients' condition before and then after the initiation of a study. The CGI has three components and we used two components in our study. The CGI-Severity (CGI-S) rates illness severity which is rated on the following seven-point scale: 1 = normal, not at all ill; 2 = borderline mentally ill; 3 = mildly ill; 4 = moderately ill; 5 = markedly ill; 6 = severely ill; 7 = among the most extremely ill patients, and the CGI-Improvement (CGI-I), rates change from the initiation (baseline) of treatment which this patient's condition is: 1 = very much improved since the initiation of treatment; 2 = much improved; 3 = minimally improved; 4 = no change from baseline; 5 = minimally worse; 6 = much worse; 7 = very much worse.

Coronavirus anxiety

The CAS (Lee 2020) is a valid and unidimensional tool that assesses the physiological reactions of fear and anxiety related to the COVID-19 pandemic. This dysfunctional coronavirus anxiety scale has 5 items rated on a 5-point Likert-type scale from 0 (not at all) to 4 (nearly every day over the last 2 weeks). Evren et al. (2020) examined the psychometric properties of the measure with the general Turkish population, indicating that the scale had a strong internal reliability estimate with the target sample.

Statistical analyses

Descriptive statistics were presented using means and standard deviations, or median and interquartile range or range. Categorical variables were presents as frequency and percent. Total CAS scores were compared using the Mann–Whitney *U* test and the Kruskal–Wallis test between two and more than two independent groups, respectively.

Being diagnosed or having a relative diagnosed with COVID-19 was considered a surrogate marker for COVID-19 anxiety. This surrogate marker was used for both convergent validities and for determining a Turkish version of CAS's cutoff value. The CGI–I scale was used as a gold-standard measure to evaluate concurrent validity. Confirmatory factor analysis (CFA) was used to assess construct validity. The normality of the data was evaluated and confirmed using Kolmogorov–Smirnov test of normality. Model fit was evaluated based on Chi-square/Degree of freedom (cmin/df), Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Root Mean Square Error of Approximation (RMSEA) and p of Close Fit (PCLOSE) indices. Convergent validity was evaluated using point biserial correlation analysis between total CAS score and surrogate marker of anxiety in patients. Concurrent validity was assessed by the correlation between the CAS score and CGI-I scores. ROC analysis was used to determine a cutoff value for CAS to identify anxiety. Statistical analyses were conducted using SPSS 25 software, and CFA was conducted using AMOS Graphics 21 (IBM Inc, Armonk, NY, USA).

Table 1. Demographic characteristics of patients.

Characteristic	*n* (%)
Sex	
Male	46 (23.2)
Female	152 (76.8)
Education	
Primary school	85 (42.9)
Secondary school	28 (14.1)
High school	40 (20.2)
University	15 (7.7)
Marital status	
Married	121 (61.6)
Single	48 (24.2)
Divorced	25 (12.1)
Widow	4 (2.2)
Occupation	
Not working	101 (51.5)
Working	82 (41.4)
Student	15 (7.7)
Income status	
Poor	70 (35.3)
Moderate	104 (52.5)
Good	24 (12.1)

Results

The mean age of the patients was 41.5 years (SD = 12.7), and 76.8% were females (Table 1). Table 2 summarizes the medical and family history and clinical evaluation of the patients. About one-third of the patients were diagnosed with a generalized anxiety disorder ($n = 62$, 31.3%), and the second most frequent diagnosis was panic disorder in one-fifth of the patients ($n = 40$, 20.2%). The median disease duration was 28 months (range 8–190). The majority of the patients had no psychiatric comorbidity ($n = 150$, 75.8%), and the most frequent one was obsessive-compulsive disorder ($n = 15$, 7.6%).

The CGI-S assessments revealed that 74 patients (37.4%) were mildly ill, and 40 patients (20.2%) were moderately ill. Follow-up CGI-I assessments showed

Table 2. Clinical characteristics of patients.

Characteristic	*n* (%)
Comorbidity	
None	141 (71.2)
Hypertension	10 (5.1)
Cancer	10 (5.1)
Asthma	10 (5.1)
Diabetes	7 (3.5)
Goiter	7 (3.5)
Epilepsy	5 (2.5)
Multiple comorbidities	4 (2.0)
Multiple sclerosis	1 (0.5)
Other	3 (1.5)
Family history	100 (50.5)
Diagnosis	
Generalized anxiety disorder	62 (31.3)
Major depression	55 (27.8)
Panic disorder	40 (20.2)
Anxiety, not otherwise specified	24 (12.1)
Bipolar disorder	9 (4.5)
Social phobia	8 (4.0)
Psychiatric comorbidity	
None	150 (75.8)
Obsessive-compulsive disorder	15 (7.6)
Depression	10 (5.1)
Anxiety	7 (3.5)
Conversive disorder	7 (3.5)
Alcohol abuse disorder	4 (2.0)
Generalized anxiety disorder	3 (1.5)
Social phobia	1 (0.5)
Panic disorder	1 (0.5)
Current suicidal thoughts	19 (9.6)
Current suicidal attempt	3 (1.5)
Previous suicidal thoughts	59 (29.8)
Previous suicidal attempt	12 (6.1)
Medication	
Sertraline	44 (22.2)
Escitalopram	42 (21.2)
Fluoxetine	34 (17.2)
Paroxetine	28 (14.1)
Venlafaxine	20 (10.1)
Duloxetine	19 (9.6)
Aripiprazole	6 (3.0)
Vortioxetine	3 (1.5)
Quetiapine	1 (0.5)
None	1 (0.5)
Clinical Global Impression-Severity	
Normal, not at all ill	1 (0.5)
Borderline mentally ill	37 (18.7)
Mildly ill	74 (37.4)
Moderately ill	40 (20.2)
Markedly ill	36 (18.2)
Severely ill	9 (4.5)
Most extremely ill	1 (0.5)
Clinical Global Impression-Improvement	
Very much improved	19 (9.6)
Much improved	33 (16.7)
Minimally improved	43 (21.7)
No change from baseline	60 (30.3)
Minimally worse	34 (17.2)
Much worse	7 (3.5)
Very much worse	2 (1.0)
COVID-19 diagnosis	5 (2.5)
COVID-19 diagnosis of relative	53 (26.8)
Having a loss due to COVID-19	13 (6.6)
Living with a COVID-19 patient in the same house	4 (2.0)

that 59 patients (29.8%) had minimally worsened, 43 patients (21.7%) had no change in their symptoms, and 53 patients (26.8%) had improvement at various levels.

Assessments regarding COVID-19 status in patients revealed that 5 (2.5%) were diagnosed with the disease, 26.8% ($n = 53$) had a relative with COVID-19 positivity, 2% ($n = 4$) were living in the same house with their COVID-19 positive relative, and 6.6% ($n = 13$) had lost their relative due to COVID-19 infection.

Table 3. The CAS scores according to prognostic subgroups.

	CAS score		
	Median	IQR	*p*
Sex			0.67
Male	3	1–9	
Female	3	1–9	
Marital status			0.9
Married	3	1–9	
Single/divorced/widow	3	1–8	
Occupation			0.76
Not working/student	3	1–9	
Working	4	0–9	
Income status			0.11
Poor	4	2–10	
Moderate	3	0–9	
Good	2.5	0–4.5	
Diagnosis			0.15
Generalized anxiety disorder	4.5	1–10	
Panic disorder	4.5	1.5–10.5	
Anxiety disorder not otherwise specified	3	0.5–5.5	
Major depression	3	1–6	
Bipolar disorder	3	0–6	
Social phobia	2	0.5–2.5	
COVID-19 diagnosis			0.06
No	3	1–9	
Yes	12	5–14	
COVID-19 diagnosis of relative			<0.001
No	2	0–5	
Yes	9	4–11	
Having a loss due to COVID-19			0.08
No	3	1–9	
Yes	9	4–9	
Living with a COVID-19 patient in the same house			0.19
No	3	1–9	
Yes	11.5	4.5–14	

The median CAS score was 3 (IQR: 1–9). Comparison of total CAS scores between independent prognostic subgroups revealed that having a relative with COVID-19 diagnosis significantly increased the CAS scores (median 9 vs. 2; $p < 0.001$) and but being diagnosed with COVID-19 did not substantially increase the CAS scores, although this was approaching significance (median 12 vs. 3; $p = 0.06$). Having a loss due to COVID-19 ($p = 0.08$) and living with a COVID-19 patient in the same house ($p = 0.19$) was also associated with increased CAS scores without statistical significance. Sex ($p = 0.67$), marital status ($p = 0.9$), occupation ($p = 0.76$), income status ($p = 0.11$), and diagnosis ($p = 0.15$) were not associated with the total CAS scores (Table 3).

The reliability of the CAS was evaluated using internal consistency and split-half methods. The Cronbach alpha for the CAS's internal consistency was 0.859, which suggested that the scale had good internal consistency. The split-half method for the reliability analyses revealed that the Spearman–Brown

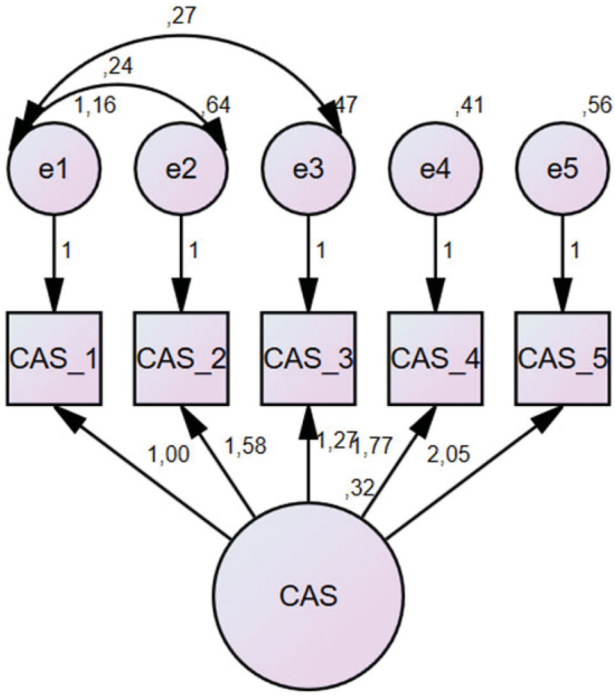

Figure 1. Confirmatory factor analysis using structural equation modeling. *Note*. The factor loadings present non-standardized score estimates.

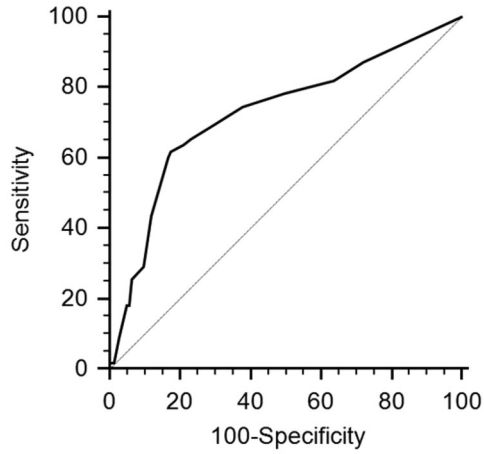

Figure 2. ROC curve for CAS to predict COVID-19 associated anxiety.

coefficient was 0.80. The correlation between half-forms was 0.70, which both suggested acceptable reliability.

The CAS's factor structure was analyzed in exploratory factor analysis (EFA) using a principal component analysis (PCA). The Kaiser–Meyer–Olkin measure of sampling adequacy was 0.824, and Bartlett's test of sphericity was <0.001, which showed that the PCA analysis was valid. A single-factor structure explained 65% of the total variance of the construct.

The single-factor structure was further assessed in confirmatory factor analysis (CFA) (Figure 1). The model-fit indices were cmin/df = 1.3, CFI = 0.998, GFI = 0.992, AGFI = 0.96, RMSEA = 0.04, PCLOSE = 0.47, which all suggested that the model was perfectly fit and confirmed the single-factor structure of the CAS.

We considered that being diagnosed or having a relative diagnosed with COVID-19 was a surrogate marker for COVID-19 anxiety. The CAS's convergent validity was also evaluated using a point biserial correlation between the total CAS score and being diagnosed or having a relative diagnosed with COVID-19. The correlations between these parameters suggested a convergent validity of the CAS ($r = 0.38$, $p < 0.001$). Concurrent validity was evaluated by correlations of CAS scores with CGI-I, which revealed a satisfactory concurrent validity ($r = 0.49$, $p < 0.001$). ROC analysis using the presence of the surrogate marker of COVID-19 anxiety to determine the cutoff value of CAS revealed that scores higher than 7 had an AUC of 0.73 (Youden index: 0.44; $p < 0.001$), which corresponded to 62% of sensitivity, and 83% of specificity (Figure 2).

Discussion

This study aimed to evaluate the psychometric characteristics of the Turkish version of the CAS in a sample of patients with various psychiatric disorders. Both the original and the validated Turkish versions of the CAS were unidimensional scales with a robust internal consistency. The Cronbach alphas were 0.93 and 0.80 in the original development and Turkish validation studies, respectively, and both of those studies confirmed the single-factorial structure of the scale (Evren et al., 2020; Lee, 2020). Our study confirmed these results with a more satisfactory α value of 0.86 than the Turkish validation study. The single-factor scale uniformly assessed the COVID-19 anxiety across all demographic subgroups of sex, marital status, occupation, and income status. More importantly, and in accordance with the aim of this study, the CAS successfully evaluated the COVID-19 anxiety in our sample population of patients with a psychiatric disorder, regardless of the diagnosis.

The CAS items are focused on expressions of somatic symptoms, which may be anticipated to be exaggerated in patients with already have anxious backgrounds (Balaratnasingam & Janca, 2006). Since the global consequences of the pandemic is a multifaced situation that involves economic, social, financial, and health aspects, which may all escalate the

anxiety in every individual regardless of the presence of a psychiatric condition (Dubey et al., 2020), the CAS may aid physicians especially dealing with patients with psychiatric conditions for evaluating the changes in the anxious conditions are related to the COVID-19 pandemic or the actual psychiatric disorders itself.

Besides the promising results for the CAS's applicability for patients with psychiatric disorders, several limitations must be considered when interpreting our results. First, it would be beneficial to compare the CAS assessments with an established COVID-19 specific anxiety scale, but this was not possible since a validated gold-standard scale into Turkish was not available at the study period. Second, it was not possible or convenient to include every psychiatric disorder in the study population. Our results and inferences from the analyses may differ among other psychiatric conditions not included in our study population. Third, the administration of a re-test procedure might add to the psychometric assessments. Nevertheless, the Turkish version of the 5-item CAS exhibited favorable psychometric characteristics and may help health professionals evaluate whether the anxiety of patients with psychiatric diagnoses is related to COVID-19.

Ethical approval

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (The institutional review board of Prof. Dr. Cemil Tascioglu City Hospital approved the study protocol) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study. Additionally, informed consent was obtained from all individuals for whom identifying information is included in this article.

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