RESEARCH ARTICLE

Predictive roles of state hope and cognitive control/flexibility in state anxiety during COVID-19 outbreak in Turkey

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ABSTRACT

Objective: This study aimed to examine the predictive roles of state hope, cognitive control/flexibility and, some sociodemographic characteristics of the participants on state anxiety scores during the initial stage of the COVID-19 outbreak in Turkey.

Method: The study was conducted with 674 individuals in Turkey through online surveys. Personal Data Form, State Hope Scale, Cognitive Control/Flexibility Questionnaire, and State Anxiety Inventory were applied for the evaluation.

Results: In the multiple regression analysis, it was observed that state hope, cognitive control/flexibility, and gender factors predict state anxiety.

Conclusion: The research findings reveal that state hope, cognitive control/flexibility, and gender are important factors affecting the state anxiety during the COVID-19 outbreak in Turkey. Hope and cognitive control/flexibility are important preventive factors related to state anxiety.

Keywords: Cognitive control/flexibility, COVID-19 pandemic, state anxiety, state hope

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease that emerged in China in December 2019 and spread out all over the world. In March 2020, the World Health Organization announced that the COVID-19 could be identified as a pandemic (1). In Turkey, the first COVID-19 case was reported on 10 March 2020. As of November 24, 460.916 cases in Turkey were reported with an estimated 12.672 deaths (2).

COVID-19 is not only a potentially fatal disease, but also a serious risk to the mental health of the population (3). Especially, the uncertainty regarding the pandemic is stressful for many (4). In addition to the uncontrollable spread of the disease in Turkey and the world, the withdrawal from social life as a result of the pandemic is a potential risk factor for mental health. A recent study by Gao et al. (5) reported that there is a high prevalence of mental health problems due to exposure to social media during the COVID-19 outbreak in China. In another study, Li et al. (6) examined the impacts of COVID-19 on people's mental health on a sample consisting of 17,865 active Weibo (a social media platform) users from Eastern China. The

results of the study showed that negative emotions including anxiety and depression increased, while the positive emotions and life satisfaction scores decreased during the COVID-19 pandemic. Anxiety is conceptualized as "an emotional state (A-State), consists of feelings of tension and apprehension and heightened autonomic nervous system activity" (7). As a cognitive process, anxiety refers to negatively evaluated thoughts and images associated with potential threats or dangers (8). Anxiety has an adaptive function as protecting the individual from danger (9), so it is often essential (10). Pathological anxiety, on the other hand, is explained primarily by a high negative affect associated with a sense of uncontrollability (11) and disrupts one's ability to function for a long period in daily life tasks (12). Previous research has provided evidence for the nature of anxiety associated with the pandemic. For example, Wheaton et al. (13) showed that health anxiety, contamination fears, and disgust sensitivity were significant predictors of swine flu-related anxiety during the 2009-2010 H1N1 influenza pandemic. Taha et al. (14) also found that greater intolerance to uncertainty was associated with lower appraisals of control of the self and the others, predicting lower levels of problem-focused coping and greater reports of H1N1-related anxiety. Some authors have also suggested that the anxiety associated with infection and its effects consisted of three factors: health threats, economical concerns, and anxiety about unknown risks (15).

One individual trait negatively associated with anxiety is hope which is considered as a source of human life as well as a healing power that contributes to well-being (16,17). While classical theories conceptualize hope as an optimistic feeling that supports life events, living conditions, and character power (18,19), the cognitive theory of hope conceptualizes it as "a cognitive set that is based on a reciprocally derived sense of successful a) agency (goal-directed determination) and b) pathways (planning of ways to meet goals)." (20). The structure of hope reflects an individual's perceptions of their ability to conceptualize goals, develop strategies to achieve these goals, and maintain the motivation to use strategies (21). According to this theory, individuals have both the "dispositional hope" they apply across situations and times, and also "state hope" reflecting the current goal-directed thinking (22). Snyder (23) stated that higher hope consistently is associated with better outcomes in physical health and psychological adjustment. The research has also

provided evidence for hope, which is negatively correlated with various measures of anxiety (24,25). The study conducted by Arnau et al. (26) demonstrated that the agency structure of hope (goal-directed determination) had a longitudinal effect on later anxiety. It was reported in the literature that hopeful individuals probably make adaptive interpretations to both their surrounding environment and to their internal physiological arousal that prevent the transition to chronic anxiety problems (27). The other variable in the present study is cognitive control/flexibility, which plays a role in the individual's ability to adapt to constantly changing environments and targeted behaviors (28). Martin and Rubin (29) defined cognitive flexibility as a concept that includes the awareness of the individual about the availability of options and alternatives, the willingness to adapt to the situation, and self-eficacy of being flexible. Cognitive flexibility is associated with using different thinking strategies and mental frameworks. Individuals with cognitive flexibility have the ability to research the environment to form multiple strategies to identify the emerging changes, develop a collective understanding of the situations, and be prepared for anything that may develop (30). As previously reported in the literature, cognitive flexibility is negatively correlated with psychological symptoms (31,32). The study conducted by Palm and Follette (33) demonstrated that depression and post-traumatic stress disorder scores were negatively correlated with cognitive flexibility. Johnco et al. (34) investigated anxiety and cognitive flexibility scores in the clinical and non-clinical samples and concluded that the clinical sample reported poorer cognitive flexibility and higher anxiety scores. A recent study by Yu et al. (35) also demonstrated that the low cognitive flexibility level was associated with a high level of anxiety.

Pandemics are not only health-related emergencies where human life is threatened, but also sources for widespread concern, fear, and stress, and thus its psychological consequences are also need to be addressed (36). As reported in the literature, COVID-19 has significantly led to numerous psychological consequences (6). The recent study conducted by Ahorsu et al. (37) revealed that in a sample of 717 Iranian participants, the fear of COVID-19 scores were positively associated with the depression and anxiety scores. This study is the first research to our knowledge revealing the predictive roles of hope and cognitive control/flexibility in anxiety during the initial stage of

the COVID-19 outbreak in Turkey. The present study hypothesized that the participants with low levels of state hope and cognitive control/flexibility are likely to have high state anxiety during the COVID-19 outbreak. As intense anxiety can hinder the current and future well-being and the adaptation of individuals (38), it is important to determine risk and protective factors for anxiety mood in the population.

METHOD

Participants and Procedure
The present study is a cross-sectional research conducted with an online survey (using Google Forms) among volunteers in Turkey. Before the study was carried out, the approval was obtained from the Alanya Alaaddin Keykubat University Ethics Committee (Date: 01/06/2020, Number: 12). The convenience sampling method was used in the study. Using this method, the participants, who could be accessed via social media networks were invited to participate to the research. The researcher announced on the social media accounts (Facebook, Instagram, and WhatsApp) and invited volunteers to participant in the research. The purpose of the study was mentioned in the invitation. The participants received a link for the online survey. The target population was Turkish adults aged 18 years and older. The informed consent was given by the participants before answering the survey. Since the "required" button was active for all the information in the form, the volunteer participants could not submit the form without completing it. With this method, no missing data were left at the end of the survey. The form also included the question of whether the participants or their family members were positive for COVID-19 (yes/mild symptoms, yes/severe symptoms). None of the participants reported positive for COVID-19 for themselves or their family members. A total of 674 individuals participated in the study. The participantsin the research were the individuals from seven regions of Turkey who were volunteers for the study that had been announced via social media platforms. The socio-demographic characteristics of the participants are presented in Table 1.

Measures
Personal Data Form: This form was created by the researcher to collect personal information about the participants. The participants' were asked to answer with this form on their gender, age, education level, marital status, parental status, and the city they live in. There is

Table 1: Sociodemographic characteristics of the participants (n=674)

Age group (years)	Mean	SD
18-69	32.51	12.56
	n	**%**
Gender		
Female	407	60.4
Male	267	39.6
Education level		
Primary and Secondary School	7	1.0
High School	43	6.4
Undergraduate	223	33.1
Graduate	307	45.5
Postgraduate	92	13.6
Marital status (Are you single or married?)		
Single	385	57.1
Married	289	42.9
Having children (Are you a parent?)		
Yes	285	42.3
No	389	57.7
Do you think that the COVID-19 pandemic affects your mental health?		
No	118	17.5
Partially	323	47.9
Yes	233	34.6

SD: Standard deviation

also a closed-ended question: "Do you think that the COVID-19 pandemic affects your mental health?"

State Hope Scale (SHS): The SHS was created by Snyder et al. (22) replacing the original Dispositional Hope Scale (25) focusing on the present. The 6-item scale was designed to assess the hope levels of the individuals with two factors: "agency" and "pathways". An exemplary item of "agency" is " I am energetically pursuing my goals right now" and an example of pathways is "There are many ways around any problem I am facing right now." The Cronbach's alpha coefficient of the scale was reported as 0.88 (22). SHS was adaptedto Turkish by Denizli (39). The author reported that the Turkish form of the scale displayed a two-factor structure as in the original form. In order to evaluate the hope levels of the participants, the total score was calculated in this study. Cronbach's alpha coefficient was calculated as 0.87. Higher scores of the SHS indicate higher levels of hope.

Cognitive Control and Flexibility Questionnaire (CCFQ): Created by Gabrys et al. (28) to evaluate the perceived ability of a person to exercise control over

intrusive thoughts and emotions, and their ability to flexibly cope with a stressful situation. The 18-item scale has two factors: "cognitive control over emotions" (9 items) and "appraisal and coping flexibility" (9 items). The sample items of the questionnaire "I feel like I lose control over my thoughts and emotions." and "I take the time to think of several ways to best cope with the situation, before I act." Cronbach's alpha coefficients were reported as 0.90 and 0.93 for two factors (28). The Turkish form of CCFQ was adapted by Demirtaş (32). It was reported that the Turkish form of the scale presented two-factor structure as in the original form with 18 items, and is a valid and reliable tool. In the present study, the total score was used. The Cronbach's alpha coefficient was calculated as 0.90. Higher scores of the CCFQ indicate higher levels of cognitive control and flexibility.

State-Trait Anxiety Inventory (STAI): The STAI was developed by Spielberger et al. (40) to determine the anxiety levels of the individuals. The scale has 40 items, 20 items for state anxiety, 20 items for trait anxiety. The sample items of the State Anxiety Inventory (SAI) are "I feel safe ", "I have disturbing thoughts". The Turkish version of the STAI was translated by Öner and Le Compte (41). Cronbach's alpha coefficients were reported as 0.94-0.96 (41). In the present study, the 20-item SAI was used. The Cronbach's alpha coefficient was calculated as 0.95. Higher scores of the SAI indicate higher scores of state anxiety.

Statistical Analysis

The data obtained with online google forms were transferred to SPSS 22.0 for Windows and evaluated using this program. The descriptive statistics are given for the sociodemographic variables (Table 1). To determine whether the data had a normal distribution, the kurtosis and skewness values were calculated. As the skewness and kurtosis values showed an acceptable range in the region of ±1 limits, it was concluded that the scores did not show a significant deviation from the normal distribution. Also, Mahalanobis distance values were calculated to determine the outliers and there were no extreme values in the data set that would negatively affect the analyses.. Thus, all participants were included in the analyses. The multiple regression analysis was conducted to determine the predictive roles of independent variables (state hope, cognitive control/flexibility, gender, age, marital status, education level, parental status, and a closed-ended question) on the dependent variable (state anxiety) (Table 2).

RESULTS

The sociodemographic characteristics of the study group are presented in Table 1. Among the 674 participants, 407 were female (60.4%) and 267 were male (39.6%). The age of the study group ranged from 18 to 69, with a mean of 32.51 (SD: 12.56). In terms of education level, 7 (1.0%) of the participants were

Table 2: The predictors of SAI according to multiple regression analysis

Variable	B	Std. error	Beta	t	p	pair r	partial r
Constant	80.883	3.224		25.090	p<0.001	-	-
CCFQ	-0.174	0.023	-0.238	-7.400	p<0.001	-0.511	-0.277
SHS	-1.203	-0.095	-0.387	-12.671	p<0.001	-0.572	-0.443
Gender (F)	-2.273	0.711	-0.093	-3.196	0.001	0.235	0.124
Closed-Ended Response: Partially (1)	4.045	0.929	0.168	4.356	p<0.001	-0.139	0.167
Closed-Ended Response: Yes (2)	10.158	1.038	0.402	9.781	p<0.001	0.445	0.356
Age	0.001	0.045	0.002	0.033	0.974	0.445	0.356
Marital Status	-2.218	1.199	-0.091	-1.850	0.065	0.010	0.072
Being a Parent	-0.084	1.338	-0.003	-0.062	0.950	-0.046	-0.002
Education Level 1	-2.045	1.542	-0.410	-1.326	0.185	-0.064	-0.052
Education Level 2	-2.451	1.404	-0.485	-1.746	0.081	-0.079	-0.068
Education Level 3	-2.761	1.671	-0.577	-1.652	0.099	-0.070	-0.064
Education Level 4	7.365	3.951	1.551	1.864	0.063	-0.069	0.072
Education Level 5	-0.406	3.518	-0.085	-0.115	0.908	-0.070	-0.004

CCFQ: Cognitive Control/Flexibility Questionnaire, SHS: State Hope Scale, SAI: State Anxiety Scale, Gender (F): Being a female, Closed-Ended Response: Partially (1), Yes (2): "Do you think that COVID-19 pandemic affects your mental health?", Marital Status: Being Married, Being a Parent, Education Level 1: Primary and Secondary School, Education Level 2: High School, Education Level 3: Undergraduate, Education Level 4: Graduate, Education Level 5: Postgraduate, $F_{(4.658)}$=55.856, p<0.001, R=0.754, Adjusted R^2=0.525

primary and secondary school graduates, 43 (6.4%) were high school graduates, 223 (33.1%) were undergraduate students, 307 (45.5%) were university graduates and 92 (13.6%) were postgraduates. In terms of marital status and parenthood, 385 (57.1%) of the participants were single, 289 (42.9%) were married, 285 (42.3%) had children and 389 (42.9%) had no children. Also, in the survey, participants were asked to answer whether the COVID-19 pandemic affected their mental health. 118 (17.5%) said "no", 323 (47.9%) said "partially" and, 233 (34.6%) participants said "yes".The predictors of the SAI were examined by the multiple regression analysis (Table 2). The scores of CCFQ, SHS, and gender, closed-ended responses 1 and 2, age, marital status, parental status, and education levels were entered in the analysis as the independent variables. The SAI score was entered in the analysis as the dependent variable. Nominal and ordinal variables were coded as the dummy variables.

As a result of the multiple linear regression analysis conducted to reveal the predictive roles of cognitive control/flexibility, state hope, gender, closed-ended responses 1 (partially) and 2 (yes), age, marital status (being married), being a parent, and education level in state anxiety, all variables (together) showed a significant association (R=0.754, Adjusted R^2=0.525) with state anxiety (F[4.658]=55.856, p<0.001). All variables explain 52% of the variance in state anxiety. Considering the significance tests of the regression coefficients, cognitive control/flexibility (p<0.001), hope (p<0.001), gender (p=0.001), "yes" (p<0.001), and "partially" (p<0.001) responses to the closed-ended question were significant predictors of anxiety. According to the standardized regression coefficients, the significance order of the predictor variables in anxiety was the "yes" response to the closed-ended question (β=0.402), hope (β=-0.387), cognitive control/flexibility (β=-0.238), "partially" response to the closed-ended question (β=0.168) and gender (β=-0.093). When the relationships between the predictor variables and anxiety were examined, a correlation was found between cognitive control/flexibility (r=-0.277), hope (r=-0.443), gender (r=0.124), "yes" (r=0.356) and "partially" (r=0.167) responses to the closed-ended question.

DISCUSSION

The findings of the present research are consistent with the previous studies in which hope and cognitive flexibility correlated negatively with anxiety (24,25,34).

According to Snyder (42,23), hope provides an important way to increase subjective well-being by helping initiate and maintain action towards long-term goals, including the management of factors that may impede success. Previous studies have shown that a high level of hope is linked to a better overall adjustment (43). Similarly, cognitive flexibility is negatively correlated with psychological symptoms (31). Cognitive control/flexibility is involved in the regulation of emotion as well as facilitating targeted behaviors, and the lack of these skills plays an important role in mental health and anxiety disorders (28). Cognitive control/flexibility refers to approach from more than one perspective before reacting stressful situations, to manage negative thoughts, and emotions by re-evaluating stressful situations, and the tendency to create multiple alternative coping strategies before choosing the appropriate one (28).

Gabrys et al. (28) stated that the lower scores on the cognitive control over emotion and appraisal/coping flexibility were associated with more negative stressor appraisals (i.e., greater perceived threat and uncontrollability). The recent study by Buga et al. (44) revealed that students with high cognitive flexibility have more positive attitudes towards a problem than those with low and moderate levels of cognitive flexibility. Johnson (45) found positive correlations between cognitive flexibility and problem-focused coping and suggested that the greater ability to generate and implement effective approaches is linked to greater use of pragmatic strategies to improve a situation. The study by Fu and Chow (46) on a sample of adolescents with earthquake experience showed that the adolescents with high cognitive flexibility thought constructively about the earthquake experience, dealt with challenges effectively, and tolerated the uncertainty. It could be concluded that hopeful and cognitively flexible people have motivations and alternative strategies to control the course of their actions in stressful conditions; thus they might be less anxious in challenging situations

During the COVID-19 outbreak in Turkey, women reported higher anxiety levels. The finding of this study is consistent with previous studies showing that women have higher anxiety scores (47,48). The present result also supports the study conducted by Chang (49) in which men had lower depressive scores. McLean and Anderson (50) reported in their review study that genetic factors, physiological reactivity, hormonal influences, and evolutionary influences are etiological factors in gender differences related to anxiety. Previous studies reported that men get higher cognitive flexibility

scores than women (51-53). The study by Matud (54) demonstrated on a sample of 2816 participants that women reported their life events as more negative and less controllable than men. Hamtiaux and Houssemand (55) argued that gender differences may arise from bias in self-evaluations, as men seem to perceive themselves as having higher capacities.

Another finding of the study is that, 34.6% of the participants reported that the pandemic affected their mental health, while 47.9% reported that the pandemic partially affected their mental health. The previous studies on the psychological impact of outbreaks reported that people's fear and anxiety of getting sick or dying, helplessness, or blaming other people who were sick could potentially trigger a mental breakdown (56). The present results revealed that age, marital status, parental status and education level did not statiscally predict state anxiety. These results are inconsistent with some studies in the literature. For example, there is increasing evidence that emotion regulation is more selective and effective with increasing age (57). Moreover, the study by Guzeltepe (58) reported that cognitive control scores of the post-graduates were the highest, while those of high school graduates were the lowest. The author also demonstrated that the cognitive flexibility levels of married employees were higher than those of single and divorced employees (58). Based on these results, the hypothesis was that these people may use cognitive alternatives stemming from their previous experiences; thus they may better adapt to changing or new task demands and lower anxiety scores.

Limitations and Implications

This study had some limitations. One of them was related to the participants as they were recruited by the convenience sampling method via social media platforms. Another limitation of this study was the cross-sectional design in which the data was collected in a short time and it may be difficult to discuss the determined associations. Therefore, future research should involve longitudinal and experimental studies to investigate causal relationships between variables.

Notwithstanding these limitations, the present research is considered to provide a significant contribution to the psychology literature related to state anxiety during the COVID-19 pandemic. Based on the findings of this study, mental health professionals may be suggested to develop preventive and treatment programs demonstrating that interventions focused on hope and cognitive control/ flexibility can be be effective in coping with state anxiety.

Contribution Categories		Author Initials
Category 1	Concept/Design	A.S.D.
	Data acquisition	A.S.D.
	Data analysis/Interpretation	A.S.D.
Category 2	Drafting manuscript	A.S.D.
	Critical revision of manuscript	A.S.D.
Category 3	Final approval and accountability	A.S.D.
Other	Technical or material support	N/A
	Supervision	N/A

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