



## State-trait anxiety levels in Turkey during COVID-19 pandemic and its relationship to somatosensory amplification

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### ARTICLE INFO

### ABSTRACT

#### Article History

Received 22 / 09 / 2020  
Accepted 02 / 12 / 2020  
Online Published 26 / 01 / 2021

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#### Keywords:

Coronavirus  
COVID-19  
Somatosensory amplification  
State anxiety  
Turkey

Novel Coronavirus (COVID-19) pandemic which is a global public health problem continues to affect humans both physically and psychologically all around the world. So, it is important to diagnose and manage the anxiety while fighting the COVID-19 pandemic. The present study aimed to separately evaluate state and trait anxiety in the COVID-19 pandemic in Turkey. In addition, it was aimed to investigate the relation of demographic variable with state anxiety in the COVID-19 pandemic, as well as the relationship between trait anxiety and somatosensory amplification with state anxiety. 726 participants who responded to online survey between March 30<sup>th</sup> and April 20<sup>th</sup>, 2020 were evaluated. All participants answered the survey that covered sociodemographic data and questions specifically about COVID-19 pandemic as well as State-Trait Anxiety Inventory and Somatosensory Amplification Scale. Pearson test was used for correlation analysis, ordinal variables were analyzed with Spearman correlation test. State anxiety is higher, if the participant is woman, has an acquaintance with the COVID-19 positivity, has a chronic medical condition and currently receiving or has history of psychiatric treatment. Age, monthly income, trait anxiety level and somatosensory amplification are also factors related to state anxiety. In conclusion, it is considered that those populations may be more vulnerable to the psychological effects of pandemic and they should be closely followed up for longer periods.

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### 1. Introduction

Novel Coronavirus (COVID-19) pandemic continues to affect humans both physically and psychologically all around the world. Disease and uncertain future are major psychological stress factors for populations; moreover, social isolation precautions during the pandemic also seem a threat to public mental health (de Medeiros Carvalho et al., 2020). Considering prior pandemics, it is known that people may vary in terms of their anxiety levels (Wheaton et al., 2012), some people experience very intense anxiety and manifest clinically significant distress which may even require treatment

(Rubin et al., 2009). While a moderate anxiety can generally motivate people to cope with health threats, it is also known that severe anxiety might be overwhelming (Kilgo et al., 2019).

Somatosensory amplification (SSA), a concept related to somatization, refers to a tendency to experience physical sensations more intensely and disturbing than usual (Barsky et al., 1988). SSA is shown to be related to both health anxiety and general anxiety levels in the literature (Korkmaz et al., 2017). Ability to conceive somatic sensations functions as an important construct for people in a pandemic that

is characterized by intense anxiety. People with high anxiety levels can consider symptoms that indicate presence of the COVID-19 for somatic signs, such as transient and harmless dizziness or fatigue and they may behave nonfunctionally. When misconception of somatic sensations is associated with increased anxiety, people may seek healthcare services which may not only increase the risk of spread, but also hinder duly delivery of healthcare services to patients who actually need them.

Studies conducted during the COVID-19 pandemic evaluated general anxiety level in populations and factors associated with this anxiety (Huang and Zhao, 2020; Shevlin et al., 2020). In addition, we believe that more realistic data on state anxiety which may be related to the pandemic can be obtained if pre-pandemic anxious nature of people and the condition-based anxiety are addressed separately, when anxiety is evaluated during a pandemic. Spielberger et. al. suggests division of anxiety conditions into state anxiety (SA) and trait anxiety (TA). SA implies transitory psychological reactions that are directly related to negative conditions at a certain interval of time, while TA points to a personal trait that identifies personal variations and it is conceptualized as the tendency to perceive the threat and affect the SA (Spielberger, 1970).

It is important to diagnose and manage the anxiety while fighting the COVID-19 pandemic which is a global public health problem. Psychoneuroimmunological studies demonstrated that high stress level can suppress the immune system and therefore, make the individual more vulnerable to the infection (Kiecolt-Glaser, 2009). In the light of these data, we aim to separately evaluate SA and TA levels in Turkey during the COVID-19 outbreak using a web-based cross-sectional study. Our objective was to evaluate the relation of demographic with state anxiety in the COVID-19 pandemic, and to determine whether TA and SSA are related to the SA. We hope that the study findings will give an opinion on understanding the SA during a pandemic and provide data support for targeted interventions in the field of psychological health.

## 2. Materials and methods

### Study design and participants

“Survey monkey”, an online survey software and tool (<https://tr.surveymonkey.com/>), was used to prevent spread of COVID-19 via droplet and contact. The link of questions created with the online survey software was sent online to users over various social media platforms. This web-based questionnaire was completely voluntary.

### Data collection

The participants anonymously answered the survey questions from March 30th to April 20<sup>th</sup>, 2020. The

survey was either e-mailed to participants or sent to them over various social media platforms. Inclusion criteria were residents who: 1) aged 18 years and older, 2) aged 75 years and younger; (2) living in Turkey during the outbreaks of COVID-19; (3) have provided informed consent electronically prior to registration. Since it is aimed to evaluate the general population, exclusion criteria other than being under 18 years old or over 75 years old were not determined. All participants answered the survey that covered sociodemographic data and questions specifically about COVID-19 pandemic as well as State-Trait Anxiety Inventory (STAI) and Somatosensory Amplification Scale (SSAS).

### Ethical statement

This study was conducted in accordance with the Declaration of Helsinki and it was approved by the Ethical Committee of Üsküdar University. Electronic informed consent was obtained from each participant before they were enrolled.

### Measures

#### Demographic data and questions about COVID-19

Demographic variables include gender, age, marital status, place of residence, working status, history of chronic medical disease and history of psychiatric treatment. Participants were asked whether they should be in crowded places due to work after the COVID-19 outbreak and whether they have an acquaintance in their neighborhood with the COVID-19 positivity.

#### The state and trait anxiety inventory (STAI)

The scale was developed by Spielberger et al. to evaluate the state and trait anxiety levels separately (Spielberger, 1970) and it was adapted to Turkish population (Öner, 2006). State Anxiety Inventory determines how a person feels at a certain time, while Trait Anxiety Inventory indicates how a person feels in general regardless of situations and conditions. Both are 1-to-4 Likert scales that have 20 items and they include reverse-scored items. Total score of the scales varies from 20 to 80 points. Higher scores indicate higher anxiety level. Internal consistency coefficient varies from 0.94 to 0.96 for Turkish version of STAI-State and from 0.83 to 0.87 for Turkish version of STAI-Trait.

#### Somatosensory amplification scale (SSAS)

SSAS evaluates the extent a person amplifies somatic sensations. It is a Likert-type self-report instrument that consists of 10 items and the score varies from 1 to 5 points. Total score is regarded as the amplification score. It was developed by Barsky et al. and Turkish reliability study was conducted by Sayar et al. (Barsky et al., 1988; Sayar et al., 2003).

### Statistical analysis

Descriptive statistics were used to analyze sociodemographic data and answers of participants to questions about COVID-19. Distribution of variables was measured with Kolmogorov–Smirnov test. Student-t test and one-way ANOVA were used for comparative analysis of quantitative independent data. If significant difference was found between groups, pair post-hoc comparisons were made with Tukey's test. Pearson test was used for correlation analysis, while ordinal variables were analyzed with Spearman correlation test. A p-value less than 0.05 was considered statistically significant.

### 3. Results

Seven hundred and 26 participants aged between 18 and 75 ( $37.4 \pm 12.4$ ) were enrolled. Table 1 reports the distribution of participants across socio-demographic variables and answers to COVID-19 pandemic-related questions (Table 1).

Average STAI-State, STAI-Trait and SSAS scores of participants are  $46.2 \pm 10.8$ ,  $41.9 \pm 7.9$  and  $26.3 \pm 7.1$ , respectively. STAI-State ( $p < 0.001$ ), STAI-Trait ( $p < 0.001$ ) and SSAS ( $p < 0.001$ ) scores of female and male participants were significantly different and scores of female participants were higher. No significant

difference was noted in STAI-State scores of married and single participants ( $p > 0.05$ ); however, STAI-Trait and SSAS scores were different. STAI-Trait and SSAS scores of single participants were significantly higher comparing to married ( $p = 0.02$ ,  $p = 0.001$ ). No statistically significant difference was noted between STAI-State, STAI-Trait and SSAS scores of participants living in Marmara region and other regions. When anxiety levels of participants were compared in terms of their working status, no significant difference was observed between STAI-State scores ( $p > 0.05$ ), while STAI-Trait and SSAS scores were different ( $p = 0.02$ ,  $p = 0.004$ ). Post-hoc analysis revealed out that STAI-Trait and SSAS scores of the non-working group were significantly higher than other groups. Moreover, no significant difference was observed between STAI-State, STAI-Trait and SSAS scores of groups that consist of participants who have to be in crowded places due to their work and who do not ( $p > 0.05$ ). STAI-State scores of the group of participants who have an acquaintance in their neighborhood diagnosed with COVID-19 were significantly higher than the group of participants who do not have; however, no significant difference was found between STAI-Trait and SSAS scores of two groups ( $p > 0.05$ ). STAI-State scores of participants with chronic medical condition were significantly higher than scores of participants without a chronic disease

**Table 1.** Comparison according to demographic data and coronavirus related variables.

	%	STAI-State		STAI-Trait		SSAS	
		Mean±SD	<i>p</i>	Mean±SD	<i>p</i>	Mean±SD	<i>p</i>
<b>Gender</b>			<b>&lt;0.001<sup>t</sup></b>		<b>&lt;0.001<sup>t</sup></b>		<b>&lt;0.001<sup>t</sup></b>
Female	59	47.9±10.5		42.8±7.5		27.7±7.1	
Male	41	43.7±10.7		40.5±8.3		24.2±6.6	
<b>Marital Status</b>			0.16 <sup>t</sup>		<b>0.02<sup>t</sup></b>		<b>0.001<sup>t</sup></b>
Married	61	45.7±10.8		41.3±7.9		25.6±7.1	
Not married	29	46.9±10.7		42.8±7.9		27.4±7.0	
<b>Living region in Turkey</b>			0.92 <sup>t</sup>		0.19 <sup>t</sup>		0.70 <sup>t</sup>
Marmara region	50	46.2±11.0		41.5±7.9		26.4±7.0	
Outside the Marmara region	50	46.2±10.5		42.2±8.0		26.2±7.2	
<b>Chronic medical disease</b>			<b>0.04<sup>t</sup></b>		0.16 <sup>t</sup>		0.49 <sup>t</sup>
Yes	25	47.6±11.3		42.6±8.3		26.6±7.5	
No	75	45.7±10.5		41.6±7.8		26.2±7.0	
<b>Psychiatric treatment history</b>			<b>&lt;0.001<sup>A</sup></b>		<b>&lt;0.001<sup>A</sup></b>		<b>&lt;0.001<sup>A</sup></b>
Maintained treatment	8	50.9±10.7		47.7±9.2		27.4±7.7	
Treatment history in the past	24	47.5±10.9		43.9±7.7		27.5±6.7	
Treatment-naïve group	68	44.3±10.6		40.6±7.4		25.8±7.1	
<b>Working status</b>			0.87 <sup>A</sup>		<b>0.02<sup>A</sup></b>		0.004 <sup>A</sup>
Not currently working	24	45.8±10.8		43.3±8.6		28.1±7.4	
Working in government institutions	22	46.6±11.0		42.2±8.4		25.7±7.3	
Working in private institutions	41	46.1±11.2		40.8±7.4		25.6±6.7	
Working in their own business	13	46.6±8.9		41.8±7.0		26.4±6.9	
<b>Do you have to continue to be in crowded environments because of your job?</b>			0.65 <sup>t</sup>		0.34 <sup>t</sup>		0.37 <sup>t</sup>
Yes	53	46.4±10.9		41.6±8.1		26.1±7.2	
No	47	46.1±10.7		42.2±7.8		26.6±7.0	
<b>Do you have any acquaintances in your neighborhood who are positive for COVID-19?</b>			<b>0.01<sup>t</sup></b>		0.36 <sup>t</sup>		0.30 <sup>t</sup>
Yes	20	48.2±10.9		42.4±8.3		26.9±7.5	
No	80	45.7±10.7		41.7±7.8		26.2±7.0	

<sup>t</sup> Student t test, <sup>A</sup> ANOVA

( $p=0.04$ ); however, no significant difference was noted between STAI-Trait and SSAS scores of two groups ( $p>0.05$ ). Participants were divided into three groups according to their history of psychiatric treatment: 1-those who are maintained on psychiatric treatment, 2-those with history of psychiatric treatment, but no actual treatment, 3-those who are naïve to psychiatric treatment. A statistically significant difference was noted between STAI-State ( $p<0.001$ ), STAI-Trait ( $p<0.001$ ) and SSAS ( $p=0.01$ ) scores of these groups. It was revealed out that the psychiatric treatment-naïve group was responsible for the intergroup differences in terms of scores; STAI-State, STAI-Trait and SSAS scores of this group were significantly lower than scores of other groups (Table 1).

According to results of correlation analysis, there was a negative correlation between ages of participants and STAI-State ( $r=-0.11$ ,  $p=0.002$ ), STAI-Trait ( $r=-0.13$ ,  $p=0.001$ ) and SSAS ( $r=-0.13$ ,  $p=0.001$ ) scores. There was negative correlation between income levels and STAI-State ( $r=-0.11$ ,  $p=0.005$ ), STAI-Trait ( $r=-0.26$ ,  $p<0.001$ ) and SSAS ( $r=-0.27$ ,  $p<0.001$ ) scores and it was noted that as income levels increase, anxiety and SSA levels decreased. In addition, there was a significant positive correlation between STAI-State scores and STAI-Trait ( $r=0.51$ ,  $p<0.001$ ) and SSAS scores  $r=0.34$ ,  $p<0.001$ ) (Table 2).

**Table 2.** Correlation of age, monthly income level, STAI-trait and SSAS scores with STAI-State scores (r).

Age	-0,11**
Monthly income level	-0,11**
STAI-Trait	0,51**
SSAS	0,34**

Pearson correlation analysis.

Spearman correlation analysis was applied for Monthly income level and STAI-State relationship.

STAI: State and Trait Inventory, SSAS: Somatosensory Amplification Scale

\* $p<0.05$ , \*\* $p<0.01$

#### 4. Discussion

According to results of the study, SA is higher, if the participant is woman, has an acquaintance in their neighborhood with the COVID-19 positivity, has a chronic medical condition and receiving or has history of psychiatric treatment. In addition, age, monthly income, TA level and SSA level are also the factors related to the SA.

Results of this study revealed that female and single participants have higher TA and SSA levels. Findings related to those two variables which dates back to the pre-pandemic period and are also accepted as personal trait are as expected and consistent with the literature. Studies have reported that both incidence of anxiety disorders and levels of TA are generally higher in women (Peleg and Messerschmidt-Grandi, 2019). Pre-pandemic studies have also demonstrated that psychological load and TA level are higher in single

individuals (Lindström and Rosvall, 2012). Similarly, it has been shown that SSA levels are higher both in women and in single participants (Nakao et al., 2005; Kivrak et al., 2016). In this study, SA, which can be helpful to evaluate effects of the pandemic more specifically, is also significantly higher in female participants. When the pandemic data reported in the literature are reviewed, women feel more anxious and stressed during pandemic period (Taha et al., 2014). Animal studies have shown that female rats demonstrated stronger emotional changes against the stressor comparing to male rats (Yang et al., 2019). Some evidences regarding the more potent response to the stressor in women were linked to the fluctuation of ovarian hormones due to the menstrual cycle and it has been argued that those fluctuations lead to tendency for psychiatric pictures (Soni et al., 2013).

In this study, it is observed that SA level is negatively correlated to age of participants. Studies conducted in both previous pandemic periods and the COVID-19 pandemic showed that anxiety levels were higher in younger individuals (Matsuishi et al., 2012; Limcaoco et al., 2020). Higher anxiety levels in younger population is somewhat a discrepancy, as it was reported that elderly population was at higher risk. However, considering that individuals who stay more focused on the outbreak in the pandemic period experience more severe anxiety (Huang and Zhao, 2020), we believe that the relation between age and SA may be caused by the fact that younger people follow the social media news more frequently and they are exposed to pandemic-related information more than the elderly population. In addition, previous studies have demonstrated that psychological resilience defined as the ability to cope with various challenges and trauma experienced in their lives is higher in elderly people comparing to younger ones (Gooding et al., 2012), and it is considered that this situation may be a protective factor for elderly people during the pandemic period. Results of our study have shown that SA of people who have a relative or friend with the COVID-19 positivity is higher. This condition is considered secondary to the fact that the pandemic risk is more closely and more seriously perceived by such people and it is also related to the concern of being infected by such immediate circle. Although there is no detail on this subject in literature, it is generally considered that negative conditions related to health problems of individuals' relatives and friends, especially the family members, play a critical role on health anxiety (Fernandez et al., 2005).

It is expected that the COVID-19 pandemic will affect individuals' economic status and may generally result in decreased income due to less working hours (Hafiz et al., 2020). According to this study, income level is negatively related to the SA that seems higher

in people with lower income level. Similar to our study, a U.K. study evaluated the COVID-19 related anxiety and found that lower income level is a predicting factor for higher anxiety (de Medeiros Carvalho et al., 2020). In the period of pandemic which is expected to cause negative economic influences, the fact that income level is related to SA of individuals is considered to be related to concerns about future and the feeling of uncertainty in people with low income levels. Moreover, when the working status of participants is taken into consideration, no difference has been noted in the SA among groups of people who work in governmental organizations or private sector or who are self-employed or unemployed; however, it was observed that TA and SSA levels of unemployed individuals were higher. Those results suggest that the COVID-19 pandemic affect all people similarly irrespective of working status and psychological problems of unemployed individuals have already been persisting before the pandemic and can be generalized.

Furthermore, this study has demonstrated that participants with a chronic medical condition have higher SA levels. The literature has also shown that individuals who have a medical condition and specified poor health status in previous pandemic periods were more anxious. For example, in a study that assessed the factors affecting the perception of risk for pandemic influenza in Australia, it was determined that the group that reported negative health status and had diseases was more concerned about their own and their families' health compared with the group that had a good health status (Jacobs et al., 2010). And also, it is considered that people with psychiatric diseases are more vulnerable to the pandemic and will be affected more profoundly during the COVID-19 pandemic (Yao et al., 2020). This study has demonstrated that anxiety levels are higher in individuals who receive or has history of psychiatric treatment.

Our study has determined a positive relation between TA and SA. Spielberger et.al. suggested that people with higher levels of TA are more prone to the stress, they perceive threat in various conditions and show SA reactions more frequently (Spielberger, 1970). The literature has shown that the higher TA levels are, the more SA increases in different threatening conditions (Leal et al., 2017). In this study, the relation between TA and SA is also shown in the pandemic period which is perceived as a serious threat. Moreover, a positive relation is observed between SSA level and SA level in our study. It is well known that psychological problems are related to increased physical symptoms (Katon and Walker, 1998). After the anxiety is divided into state and trait forms, another study group demonstrated that anxiety can be manifested by a wide spectrum of symptoms and attention has been drawn to the somatic component of the anxiety (Ree et al., 2008). SSA

represents learned automated and emotional evaluation pattern of the body. In other words, it is suggested that the less strict evaluation criteria for body in individuals with high SSA level aggravate the anxiety by causing higher expectations regarding potential damages (Köteles and Witthöft, 2017). When this fact is taken into consideration, it is understandable that individuals with high SSA in the pandemic period experience more intense SA due to their tendency to perceive their somatic symptoms and disease-related potential harms more negatively.

In conclusion, the COVID-19 pandemic is a source of potential direct and indirect trauma for many people; however, the effect of pandemic on mental health draws more attention due to disturbing case reports of suicides caused by the fear of getting sick or transmit the disease (Montemurro, 2020). Therefore, developing and implementing mental health check-up and intervention programs for seem important. We hope that our study provides data support for interventions in the field of mental health. Among all findings of our study, the higher SA in people who receive or have history of psychiatric treatment seem important. In addition, the fact that SA is higher in people with high TA and SSA levels is important to determine the people who are at higher risk regarding the mental health. It is considered that those populations may be more vulnerable to the effects of pandemic and they should be closely followed up for longer periods.

This study has some limitations. First, the data submitted in this study is based on a short-term observation; therefore, it is difficult to make causative inferences and long-term follow-up studies are warranted to evaluate longer term effects of the pandemic. Moreover, the data have been collected in early stage of the pandemic and they are important to evaluate the initial reactions of the general population to the pandemic; however, it should be repeated in late phases of the pandemic. Second, the study used a web-based survey method. This survey method results in over-representation of the people who use online tools more frequently; therefore, a selection bias should be taken into consideration. Third, pre-pandemic mental conditions of individuals could not be evaluated, as the outbreak occurred suddenly; this fact hinders stating a certain opinion about effects of the COVID-19 pandemic on mental condition.

#### **Acknowledgement**

There are no any acknowledgements.

#### **Financial support and sponsorship**

Nil.

#### **Conflict of Interest**

There is no conflicts of interest.

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