

PSYCHOMETRIC EVALUATION OF THE TURKISH VERSION OF THE COVID-19 INDUCED ANXIETY SCALE AND PROTECTIVE BEHAVIORS TOWARDS COVID-19 SCALE

Abstract: The purpose of the present study was to adapt COVID-19 Induced Anxiety Scale (CIAS) and Protective Behaviors towards COVID-19 Scale (PBCS) into Turkish language, and to investigate their psychometric properties. 593 adults participated in the study. Data were collected through CIAS and PBCS as well as The Fear of COVID-19 Scale (FCS). Cronbach alpha (α) and McDonald's Omega (ω) coefficients were utilized for reliability of the Turkish forms of the scales, and validity of the scales was tested with exploratory factor analysis, confirmatory factor analysis and criterion validity. The analysis showed that α and ω reliability coefficients of both scales were over .70. The results of exploratory and confirmatory factor analyses revealed that CIAS had a single factor structure while PBCS had three dimensions as indicated in original forms of the scales. Significant and positive relationships were also found between the scores obtained from CIAS and PBCS and fear scores. To conclude, Turkish forms of CIAS and PBCS were proved to be valid and reliable tools to measure severity of COVID-19 induced anxiety through CIAS and individuals' protective behaviors towards COVID-19 through PBCS.

Keywords: COVID-19, Protective Behaviors, Induced Anxiety, Scale

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INTRODUCTION

COVID-19 infection, which was emerged in Wuhan city of China and turned into a global outbreak, poses a serious threat on individuals' physical and mental health (Canady, 2020; Holmes et al., 2020; Moghanibashi-Mansourieh, 2020; Pancani et al., 2020). The results of survey research conducted on large samples demonstrated that psychopathological symptoms were observed in 53% (Wang et al., 2020) up to 70% (Tian et al., 2020) of individuals. Furthermore, depression and anxiety symptoms are more frequently experienced when compared to other mental health problems (Ahmed et al., 2020; Wang et al., 2020).

Anxiety symptoms observed during COVID-19 outbreak were intended to be examined in the research conducted in different countries and various populations. In those research, prevalence and levels of generalized anxiety (Arpacioğlu et al., 2021; Ebrahimi, Hoffart, & Johnson, 2020; Huang, & Zhao, 2020; Weilenmann et al., 2020) and state anxiety (Germani, et.al, 2020; Kaparounaki et al., 2020) symptoms were frequently investigated. Additionally, researchers focused on the depression, stress (Bitan et al., 2020; Yılmaz-Karaman & Yastıbaş; Zhang et al., 2020), post-traumatic stress disorder (Liu et al. 2020), anger and sleeping problems (Lee et al., 2018) accompanied by anxiety.

Anxiety and Depression Association of America (ADAA, 2020) reported that an increase was observed in generalized anxiety level besides COVID-19 related specific anxiety level in population during COVID-19 pandemic. Fear and concern about infection, fears related to economic outcomes, compelling self-control, attempt to seeking assurance, xenophobia and traumatic stress symptoms are among the novel coronavirus anxiety symptoms (Nikčević, & Spada, 2020). Such fears might be conceptualized as experiences derived from the interaction of physical, interpersonal, cognitive and behavioral traits (Schimmenti et al., 2020). COVID-19 anxiety that individuals experience about their own behaviors and others' behaviors in different areas and various rates (Grover, et al., 2020) has a significant relationship with professional position, age, being a parent and work environment (Saricam, 2020).

COVID-19 induced anxiety significantly affect individuals' social attitudes (Lee, 2020). Intense stress, state of uncertainty and complex flow of information which appear in outbreak times lead individuals to develop some behavior patterns about the outbreak. Protective behaviors that are legally made compulsory in some circumstances (Republic of Turkey Ministry of Health, 2020) might enable to prevent pandemic diseases with non-pharmacological methods and bring those diseases under control. Protective behaviors could be discussed under three headings as preventive, avoidant, and management of disease behaviors (Bish, & Michie, 2010). Preventive behaviors incorporate hygiene precautions (such as handwashing, closing mouth while coughing and cleaning surfaces), wearing masks and being vaccinated. Avoidant behaviors involve avoiding being in crowded environments, obeying quarantine rules and avoiding travelling by public transport. Management of disease behaviors include using the required medicine or receiving help from a professional. The research that investigated people's adaptation to protective behaviors during COVID-19 pandemic demonstrated that misinformation and disinformation were particularly strong predictors (Faasse, & Newby, 2020; Mya et al., 2020). It was also found that people at risk group (i.e. the elderly, the chronically ill), women, and highly educated people did better in adapting to protective behaviors (Bish, & Michie, 2010). Nonetheless, men and 18-29-aged group were reported to adapt to protective behaviors at lesser degrees (Faasse, & Newby, 2020). It was concluded that the more individuals had anxiety and perception of risk, the more meticulously they showed protective behaviors (Van der Pligt, 1996), which led to an increase through the trust placed in the authority and reliable information campaigns (Bish, & Michie, 2010).

THE PRESENT STUDY

Several measurement tools were developed to examine the emotional effects of COVID-19. Ahorsu and colleagues (2020) focused on the symptoms of coronavirus specific fear with Fear of COVID-19 Scale developed by themselves. The validity and reliability studies of that scale were conducted in many different languages (Bitan et al., 2020; Harper et al, 2020; Sakib et al., 2020; Soraci et al., 2020) including Turkish language (Bakioğlu, Korkmaz, & Ercan, 2020; Satıcı et al., 2020) in a short while. Besides, scale development studies called “coronaphobia” (Asmundson & Taylor, 2020) were carried out and those scales were adapted to Turkish culture, as well (Arpacı, Karataş, & Baloğlu, 2020). Studies also existed on the novel coronavirus induced anxiety alongside the symptoms of fear and phobia. For instance, Lee (2020) intended to develop a clinical diagnosis tool by focusing on the physical symptoms arising from anxiety in the five-item Coronavirus Anxiety Scale. Whereas several researches investigated the effects of COVID-19 on behaviors -particularly people’s behaviors for protecting themselves during the pandemic – by utilizing short answer questions, Riad and colleagues (2020) developed the Protective Behaviors towards COVID-19 Scale.

As of May 2021, the number of patients is 5.139.485 and the number of deaths is 45.186 due to COVID-19 in Turkey (Republic of Turkey Ministry of Health, 2021). Furthermore, the number of the infected and dead individuals is still increasing. This case poses a serious threat on individuals’ psychological adaptations, thereby emphasizing the importance of examining the emotional and behavioral effects of coronavirus on individuals in Turkey and developing measurement tools for that purpose or adapting the tools used in different cultures into Turkish language. The present study seeks to adapt COVID-19 Induced Anxiety Scale (CIAS) and Protective Behaviors towards COVID-19 Scale (PBCS) into Turkish language and to investigate their psychometric properties.

METHOD

STUDY GROUP

593 adults participated in the present study. 250 participants (Female=175, Male=75) were randomly assigned for conducting Exploratory Factor Analysis (EFA) and 343 participants (Female=223, Male=120) were selected for employing Confirmatory Factor Analysis (CFA) out of the same dataset. Individuals between the ages of 17 and 73 participated in the study. While the average age for EFA sample is 31.81, it is 32.84 for the CFA sample. Some of the characteristics of the participants are summarized in Table 1.

Table 1. Demographic Characteristics of the Participants

Factor	Variable	EFA		CFA	
		f	%	f	%
Gender	Female	175	70	223	65
	Male	75	30	120	35
Level of Education	High School or	25	10	24	7
	Undergraduate	225	90	319	93
Marital Status	Single	154	61.6	177	51.6
	Married	96	38.4	166	48.4
Being A Parent	Yes	81	32.4	143	41.7
	No	169	67.6	200	58.3
Having a Family Member or Relative at Risk Group	Yes	151	60.4	247	72
	No	99	39.6	96	28
Having Lost Anyone due to COVID-19	Yes	17	6.8	21	6.1
	No	233	93.2	322	93.9
Age		Min-Max. (Mean, SD)		Min-Max. (Mean, SD)	
		17-22 (31.81, ±11.10)		18-73 (32.84, ±10.47)	

DATA COLLECTION INSTRUMENTS

1. PERSONAL INFORMATION FORM (PIF)

PIF was designed by the researchers to obtain demographic information of the participants. PIF included questions on age, gender, level of education, marital status, being a parent, having lost anyone due to COVID-19, and having a family member or relative who is at risk group for outbreak.

2. COVID-19 INDUCED ANXIETY SCALE (CIAS)

Developed by Riad et al. (2020), CIAS is intended to measure anxiety felt against specific COVID-19 related situations such as going outside home, having contact with people coming from the affected areas and having clinical symptoms. As a 5-point Likert scale (1= “Totally disagree” and 5= “Totally agree”) with six items, CIAS has a single factor structure. Some of the items in the scale are: “It is a disgrace to get infected by COVID-19” and “Anxiety and worries of others around me can increase my fear of COVID-19 outbreak”. Cronbach Alpha internal consistency coefficient of CIAS is .78. Reverse-coded items do not exist in CIAS and an increase in the scores obtained from CIAS means an increase in COVID-19 induced anxiety of individuals.

3. PROTECTIVE BEHAVIORS TOWARDS COVID-19 SCALE (PBCS)

PBCS was developed by Raid at al. (2020) to examine individuals’ protective behaviors towards COVID-19 infection. As a 5-point Likert scale (1= “Not at all like me, and 5= “Just like me”), PBCS has a three-factor structure as Routine Protective Behaviors (RPB), Post-exposure Protective Behaviors (PPB), and Post-exposure Risky Behaviors (PRB). Some of the items in the scale are: “I cover my mouth and nose whenever I go out or in public” and “I do not visit any relatives or friends during the outbreak”. Cronbach Alpha internal consistency coefficient of the whole scale is .85. The items in post-exposure risky behaviors dimension of PBCS must be reverse-coded to obtain a total score from PBCS. An increase in the total score obtained from PBCS indicates an increase in the level of individuals’ displaying protective behaviors towards COVID-19.

4. FEAR OF COVID-19 SCALE

Fear of COVID-19 Scale developed by Ahorsu et al. (2020) was adapted to Turkish culture by Satici et al. (2020). As a 5-point Likert scale with seven items, the Fear of COVID-19 Scale has a single factor structure. “It makes me uncomfortable to think about coronavirus-19” and “I cannot sleep because I’m worrying about getting coronavirus-19” are example of this scale’s items. Cronbach Alpha internal consistency coefficient of the scale is .85. An increase in the scores obtained from the scale means that individuals’ fears of COVID-19 increases, as well. The adaptation study in which the scale was adapted to Turkish culture concluded that scores of fear of COVID-19 had significantly positive correlations with depression, anxiety and stress; and had significantly negative correlation with life satisfaction (Satici et al., 2020).

PROCEDURE

Initially, permission was asked from Abanoub Riad, who is the corresponding author on behalf of the researchers who developed CIAS and PBCS which were planned to be adapted to Turkish culture, and Trabzon University Ethics Board. During the translation of the scale items into Turkish, the approach known as the forward and backward translation method (Hambleton, 1996) was used. Firstly, the English forms were translated into Turkish language by six faculty members with good level of English. Secondly, the original and the translated items were compared by 5 counseling and 2 measurement and evaluation experts, who have command of both languages, and were examined the translated items in terms of content and understandability. Afterwards, those Turkish versions were translated back into English, thereby examining the consistency between Turkish and English forms. Finally, Turkish

forms of the scales were reviewed in terms of meaning and grammar, and pilot study was conducted in July 2020 with 100 adults (Female=74, Male=26). Some items of the scales were revised based on participants’ opinion and results of the pilot study. Data of the present study were collected through an online form in August 2020. Individuals were involved in the study based on voluntary participation.

DATA ANALYSIS

Data of the study were analyzed with IBM AMOS and SPSS 23.0 package programs. Descriptive information of the group was presented with basic statistical techniques. For the validity of the scales, criterion validity, exploratory and confirmatory factor analyses were utilized whereas internal consistency coefficient was used for reliability analyses.

Before the analyses, normal distribution of data obtained from the study groups was tested and normal distribution properties were verified. KMO ($KMO_{CIAS} = .87$, $KMO_{PBCS} = .77$) and Bartlett’s test of sphericity ($\chi^2_{CIAS} = 541.65$, $df=15$, $p<.001$, $\chi^2_{PBCS} = 716.53$, $df=9$, $p<.001$) were used to determine whether the sample size was appropriate for EFA, and it was found that criteria were met for factoring (Tabachnick, & Fidell, 2007). Chi-square goodness of fit test, GFI, AGFI, CFI, RMSEA and SRMR goodness of fit indices frequently used in testing the models with CFA (Byrne, 2010; Hu, & Bentler, 1999) were considered in the present study.

FINDINGS

In the first stage, Principal Components Analysis was initially conducted to determine the factor structure of CIAS. Factor analysis revealed a single-factor structure with an eigenvalue over 1.00 (3.4) which explained 56.66% of total variance. Factor loadings of the items varied from .65 to .82. EFA results of CIAS are summarized in Table 2.

Table 2. EFA Results of COVID-19 Included Anxiety Scale

Items	Factor Load	Communality
Item 1	.73	.54
Item 2	.81	.65
Item 3	.82	.67
Item 4	.79	.62
Item 5	.71	.50
Item 6	.65	.42

Principal Components Analysis was also performed by utilizing Promax rotation method to determine the factor structure of PBCS. The analysis showed a structure with four factors with an eigenvalue over 1.00. It was observed that some items were loaded in two factors with values close to each other in the four-factor structure which explained 55.92% of total variance. However, the variance explained by the fourth factor was only 1.14%, and the items there were loaded more strongly on other factors. In social sciences, it is expected that the variance explained by a factor should not be less than 5% (DeVellis, 2014). Considering cross-loadings and the original structure of the scale, the structure was compelled to three factors.

The structure with three factors explained the 47.77% of total variance. Factor loadings of the items ranged from .32 to .81 and items were not loaded in more than one factor concurrently. 25.53%, 12.76% and 9.48% of the total variance were explained by the first, second and third factor, respectively; thereby making the variance explained by each factor convenient (>5%) (DeVellis, 2014). The variance values of all items except the first item are above .30. Field

(2009) recommends that items in a scale should have a communality value above .30. According to Child (2006), items with a communality value below .20 should be removed from the scale. The factor loads and item-total score correlations of the first item in this scale were examined by assessment experts and authors. It was decided that the item contributed to the scale and remained on the scale. EFA results of PBCS are summarized in Table 3. Examining the item distributions obtained from EFA, it was observed that the sixth and seventh items in the second factor of the original scale were compiled into the “Routine Protective Behaviors” sub-dimension with the first five items. Considering that those two items contributed significantly to the factor, experts decided to include them in the first factor. Thus, Turkish form of PBCS was found to have a similar factor structure with the original scale except for the two items in the second factor that were loaded in another factor.

Table 3. EFA Results of Protective Behaviors towards COVID-19 Scale

Items	Factor Load			Communality
	I	II	III	
Factor I. Routine Protective Behaviors				
Item 1	.32			.24
Item 2	.68			.49
Item 3	.56			.46
Item 4	.77			.54
Item 5	.56			.42
Item 6	.72			.50
Item 7	.61			.43
Factor II. Post-exposure Protective Behaviors				
Item 10		.63		.48
Item 12		.59		.39
Item 13		.58		.30
Item 14		.81		.63
Factor III. Post-exposure Risky Behaviors				
Item 8			.80	.68
Item 9			.81	.63
Item 11			.69	.52

In the second stage, the structures obtained from EFA for CIAS and PBCS were tested with CFA. Based on the analysis performed for CIAS, error covariances were drawn between i3 and i5 by considering the modification indices. Goodness of fit indices of the model tested with CFA were found as $\chi^2/df= 1.77$ ($\chi^2= 14.17$, $df=8$, $p<.001$), $GFI=.99$, $AGFI=.97$, $CFI=.99$, $RMSEA=.04$ and $SRMR=.03$. Those values indicated a perfect fit between the data and the six-item single-factor model obtained from the Turkish sample (Bayram, 2013; Byrne, 2010; Doll, Xia, & Torkzadeh, 2011; Hu, & Bentler, 1999). Standardized coefficients displaying the relationships of items with their factors varied from .57 to .77 and all were significant at .01 level. Path diagram and factor loads of CIAS are presented in Figure 1.

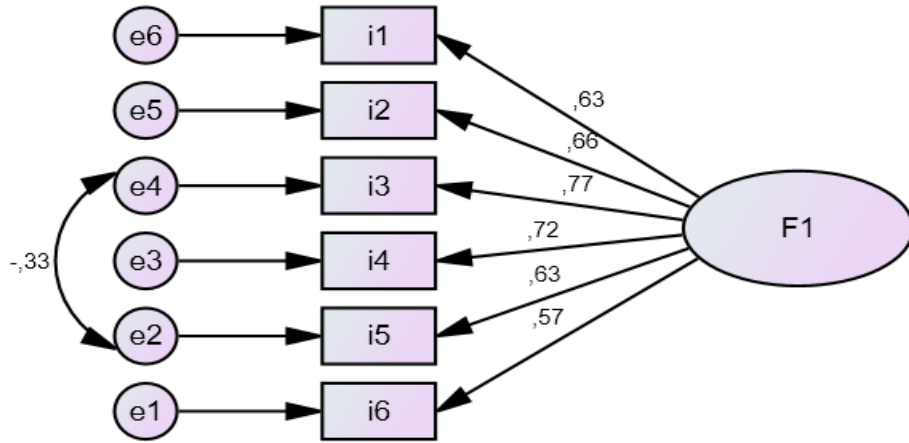


Figure 1: Path diagram and factor loads of CIAS

The three-factor structure of PBCS was tested with CFA and it was found that error covariances of some items would significantly contribute to the model. Error covariances were identified between i2-i3, i6-i7, i10-i13 and i13-i14. Goodness of fit indices of the model retested with CFA were found as $\chi^2/df = 2.43$ ($\chi^2=170.06$, $df=70$, $p<.001$), GFI=.93, AGFI=.89, CFI=.91, RMSEA=.07, SRMR=.06; thus indicating good fit between the model and the data (Bayram, 2013; Byrne, 2010; Doll et al., 2011; Hu & Bentler, 1999). Standardized coefficients showing the relationships of items with their factors varied from .32 to .72 and all were significant at .01 level. Path diagram and factor loads of PBCS are presented in Figure 2.

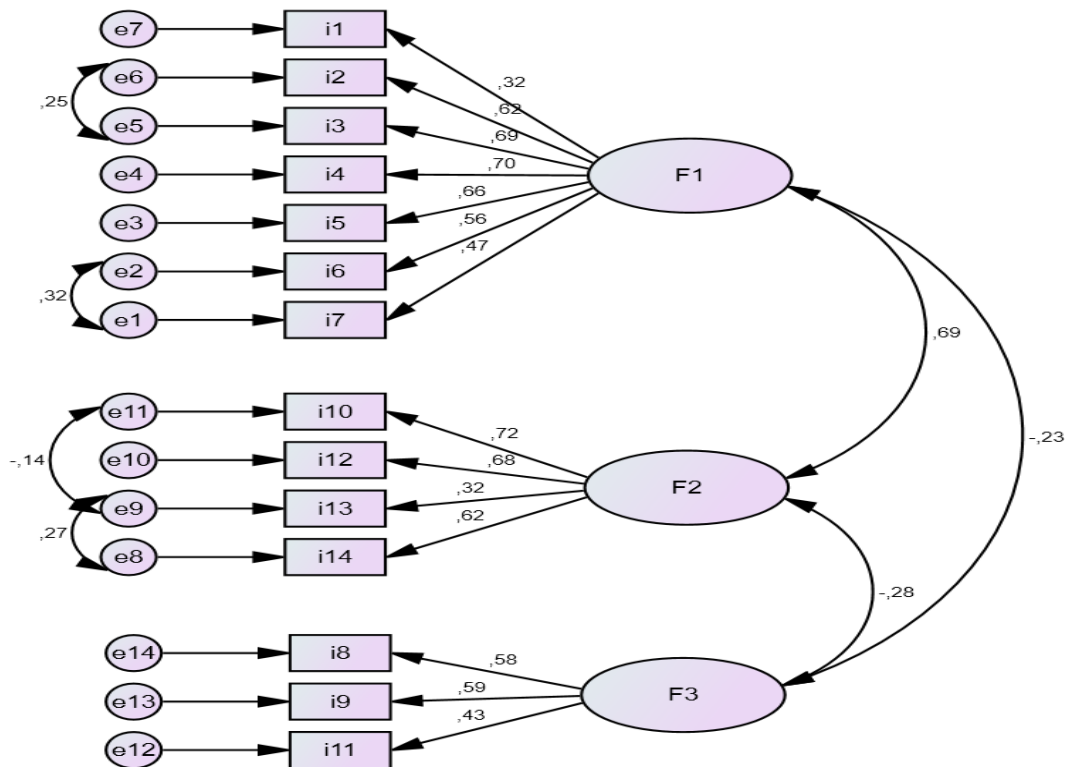


Figure 2: Path diagram and factor loads of PBCS

Turkish form of the Fear of COVID-19 Scale (Satici et al., 2020) was used for the criterion validity in the present study. Significant correlations were found between the Fear of COVID-19 Scale, CIAS (EFA sample $r=.78$, $p<.01$; CFA sample $r=.75$, $p<.01$) and PBCS (EFA sample $r=.24$, $p<.01$; CFA sample $r=.20$, $p<.01$). The correlations calculated between sub-dimensions of PBCS and the Fear of COVID-19 scale in EFA and CFA samples are as follows, respectively: .30 and .31 for “Routine Protective Behaviors”, .24 and .14 for “Post-exposure Protective Behaviors”, .02 and .04 ($p>.05$) for “Post-exposure Risky Behaviors”. Lastly, Cronbach alpha internal consistency coefficient and McDonald’s Omega were calculated for reliability analyses of CIAS and PBCS. Results were summarized in Table 4. Cronbach alpha and McDonald’s Omega coefficients varied from .84 and .81 for CIAS in the EFA and CFA samples. These coefficients varied from .73 and .77 for PBCS in EFA and CFA samples. As seen in the table, sub-dimensions of PBCS have lower reliability values than the total score. However, when looking at the obtained values, it is seen that it has acceptable reliability values (George & Mallery, 2003: 231).

Table 4. Reliability Results of CIAS and PBCS

Scale	EFA Sample		CFA Sample	
	α	ω	α	ω
COVID-19 Included Anxiety Scale (CIAS)	.84	.84	.81	.81
Protective Behaviors towards COVID-19 (PBCS)	.74	.73	.77	.77
Routine Protective Behaviors ^a	.73	.74	.77	.79
Post-exposure Protective Behaviors ^a	.58	.60	.67	.69
Post-exposure Risky Behaviors ^a	.68	.70	.53	.55

a= Sub-dimension of PBCS

DISCUSSION AND CONCLUSION

Although the research history is only based on the last one year, the deleterious mental health outcomes associated with COVID-19 are well documented (Vindegaard & Benros, 2020; Xiong et al., 2020). However, using traditional assessment tools (e.g. PHQ-9, GAD-7) to determine the psychological effects of COVID-19 may result in under-diagnosis or over-diagnosis (Ransing et al., 2020). In fact, several measurement tools such as Fear of COVID-19 Scale (Ahorsu et al., 2020) and Coronavirus Anxiety Scale (Lee, 2020) have been developed to examine the negative impact of COVID-19 on mental health. Moreover, the validity and reliability studies of these new scales were carried out in many different languages (e.g. Bitan et al., 2020; Choi, Lee, & Lee, 2020), including Turkish (e.g. Evren, Evren, Dalbudak, Topcu, & Kutlu, 2020; Satici et al., 2020) in this short period.

It is observed that the number of specific scales developed to measure mental health issues related to COVID-19 is constantly increasing worldwide (e.g. Feng et al., 2020; Nikčević & Spada, 2020; Riad et al., 2020; Taylor et al., 2020). Considering that only a few of these scales were developed in Turkish (e.g. Arpacı, Karataş, & Baloğlu, 2020; Yıldırım & Güler, 2020), it is important to adapt scales in different languages into Turkish. The present study aimed to adapt CIAS which was developed to measure the level of COVID-19 induced anxiety and PBCS which was developed to evaluate the protective behaviors towards coronavirus infection (Riad et al., 2020) into Turkish language and to investigate their psychometric properties. EFA and CFA were firstly conducted to obtain evidence for the construct validity of CIAS and PBCS. The results of EFA showed that CIAS had a single-factor structure with an eigenvalue over 1.00 and 56.66% of total variance was explained, which is in line with the factor structure of the original form of CIAS (Riad et al., 2020). Similarly, the scale developed on fear of COVID-19 is of one dimension (Ahorsu et al., 2020). Coronavirus Anxiety Scale (CAS) developed by Lee (2020) is comprised of four dimensions. The result of EFA performed for PBCS demonstrated that the scale had a

structure with four factors with an eigenvalue over 1.00 and 55.92% of total variance was explained. Considering cross-loadings and original structure of the scale, the model that was established to test the three-factor structure explained 44.77% of total variance. Distribution of all items into the factors was in line with the original form except for the case that two items that were collected under “Post-exposure Protective Behaviors” factor in the original form were compiled into “Routine Protective Behaviors” factor in the present study (Riad et al., 2020). The fit indices that were obtained from CFA conducted for CIAS and PBCS demonstrated that the models that were identified for the original factor structure of both of the scales were validated.

The Turkish form of the Fear of COVID-19 Scale which measures the severity of fear of COVID-19 (Satici et al., 2020) was utilized in the present study to test the criterion validity of CIAS and PBCS. The analysis revealed that the scores obtained from CIAS were significantly and positively correlated with the scores of Fear of COVID-19, which is in line with the findings of the previous research investigating the relationship between generalized anxiety and fear of COVID-19 (Alyami et. al., 2020). Furthermore, the present study found that protective behaviors towards COVID-19 and the level of fear were of a significant relationship. Similarly, Yıldırım, Geçer and Akgül (2020) reported in their study that fear of COVID-19 is significantly and positively correlated with the behavioral precautions taken for not being infected.

In the next stage, Cronbach α reliability coefficient of the measurements obtained from CIAS and PBCS was calculated and the reliability coefficient of the two integrated scales was found to be over .74. Cronbach α coefficients of the sub-dimensions of PBCS ranged from .53 to .77. Those Cronbach α coefficients obtained for the integrated scales in the present study are considerably close to those obtained from Riad et al. (2020).

The study has some limitations; one of which was to use convenient sampling method in the sampling process. Notwithstanding the useful information provided to answer the research questions and hypothesis, it is difficult to maintain that the participants represented the population reliably in convenient sampling (Creswell, 2012). Thus, individuals participating in the present study might not represent the adult population in Turkey. Lastly, any formal diagnosis was not made on the mental health problems of the participants in the present study. However, general mental health of individuals might be related to COVID-19 induced anxiety levels and protective behaviors.

Despite those limitations, this study provides two valid and reliable measurement tools to examine mental health outcomes related to COVID-19 among Turkish-speaking populations. It can be suggested that the researchers might test the psychometric properties of CIAS and PBCS in different subgroups such as children and elderly. Moreover, future research can identify participants using different sampling methods.

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