DEVELOPMENT OF PERCEPTION AND ATTITUDE SCALES RELATED WITH COVID-19 PANDEMIA

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Abstract

Aim: The aim of this study is to develop scales that can enable to evaluate perceptions and attitudes associated with the outbreak during the COVID-19 pandemic.

Materials and Methods: The research sample was composed of 352 healthcare workers and 507 non-healthcare workers. In the study, perceptions and attitudes regarding COVID-19 were evaluated on five scales: Perception of COVID-19 (P-COVID-19), Perception of Causes of COVID-19 (PCa-COVID-19), Perception of Control of COVID-19 (PCo-COVID-19), Avoidance Attitudes from COVID-19 (AA-COVID-19) and Attitudes Towards the COVID-19 Vaccine (ATV-COVID-19). In the study, scales were evaluated with appearance validity, content validity, structural validity (explanatory and confirmatory factor analysis) and Cronbach alpha internal reliability coefficients.

Results: After the explanatory factor analysis, the scales were found to be suitable for factor analysis and had sub-dimensions. The P-COVID-19 scale had "Dangerousness" and "Contagiousness", the PCo-COVID-19 scale had "Macro Control", "Personal Control" and "Controllability", the PCa-COVID-19 scale had "Conspiracy", "Environment" and "Faith", the AA-COVID-

19 scale had "Cognitive" and "Behavioral avoidance", and the ATV-COVID-19 scale had "Positive" and "Negative Attitude" subscales. The determined sub-dimensions were evaluated by confirmatory factor analysis and good fit indexes were observed. Cronbach alpha coefficients were 0.74 for the P-COVID-19 scale, 0.79 for the PCo-COVID-19 scale, 0.88 for the PCa-COVID-19 scale, 0.88 for the AA-COVID-19 scale, and 0.80 for the ATV-COVID-19 scale.

Conclusion: When the validity and reliability analyze of the scales are evaluated together, it can be said that the scales have a valid and reliable structure that measures the perceptions and attitudes regarding COVID-19 both in healthcare workers and non-healthcare workers.

Key Words: COVID-19; perception; attitude; avoidance behavior; social perception

INTRODUCTION

Coronaviruses is a common virus family which is known for a long period and has an infection potential on all living things. Human type coronaviruses have been detected since mid-1960s, and there are seven types of coronavirus except New Type Coronavirus-19. Coronaviruses were considered among the factors of human cold for many years, it has been determined that coronaviruses which have entered our lives with Severe Acute Respiratory Syndrome (SARS) since 2003 cause cold as well as severe clinical manifestations. It was determined that SARS in 2003 and Middle East Respiratory Syndrome (MERS) diseases and coronaviruses with the possibility of transmission from animal to human and between humans were determined in 2012 (1). Studies were started in order to identify the microorganism and pandemic control by development of pulmonary infection in employees and visitors of a market which sell seafood and living animals in Wuhan, China in December, 29, 2019. 12. World Health Organization (WHO) called the virus as new coronavirus (2019-nCoV) in January, 12, 2020. The New Type Coronavirus Disease (COVID-19) which rapidly spreads was declared as pandemic in March, 11, 2020 (2, 3).

COVID-19 pandemic has negative effects on mental health of the community (4). All countries including our country have focused on effects of pandemic on physical health (1, 5). However, psychosocial aspect should urgently be discussed. Previous studies reported psychological effects of pandemic and changes in perception and attitudes of individuals during pandemics (6, 7). When outbreaks occur, public health agencies implement a variety of pharmaceutical and non-pharmaceutical interventions to prevent the spread of the epidemic, such as vaccination, school closures, social distancing measures, hygienic measures (8). Knowledge, attitudes and practices of the general population are the most critical factors in preventing infection during pandemic periods (9, 10). Research has shown that the lack of knowledge about the transmission and prevention methods of infectious agents increases the likelihood of the spread of the epidemic (11). It was emphasized that informing society about the infectious agent causing the epidemic is the most basic need in order to control the epidemics (7, 12). Individuals behave according to the representation of diseases in their minds. Outbreaks are perceived as a situation that threatens their health and harms the environment of trust in their lives for many individuals (13, 14). In this case, individuals generally experience anxiety and fear. This situation also

affects the behavior of individuals (15). In a study conducted during the avian flu epidemic, it was shown that the perceptions of the lethality and stress associated with avian flu are increased in individuals. It has been stated that this stress causes avoidance behaviors in individuals such as not going to hospital, not eating poultry meat, and not using public transportation (16). Success in combating the epidemic is closely related to individuals' compliance with the measures. Therefore, how individuals perceive the epidemic and their attitudes for control of the epidemic are important. In addition, the awareness of these perceptions and attitudes by health authorities is very valuable in both managing the epidemic and achieving success in combating the epidemic.

In a previous study conducted in Hong Kong after SARS, more than 90% of the participants reported that public health measures were effective for prevention, 40.4% reported that the disease would come back, and 70% stated that they needed to wear masks in public places, and the disease is spread by droplets as well as non-living objects, sewage water or from animals. In the present study, 16% of the sample experienced post-traumatic symptoms, it was stated that 48.4% of them had increased stress in the work and family environment (6). It was shown in another study conducted in Australia that even after the term "pandemic influenza" was explained to the participants, there was an increase in the behaviours of individuals such as complying with quarantine at home, staying away from public space and restricting their social relations (7). This study is obvious evidence that the disease perception in the community may play an effective role in the control of the pandemic. Therefore, it is “vital” to evaluate society's perceptions and attitudes about the disease in controlling infectious diseases. Changes in the illness perception may be reflected in the attitudes of individuals and the increasing deaths may be prevented. From this point of view, we aimed to develop scales that evaluate perceptions and attitudes related to COVID-19.

MATERIALS AND METHODS

Study universe and sample

The population of the study consists of the healthcare professionals around the researchers and their relatives. Snowball sampling method was used to reach the participants who would represent the universe. An online questionnaire link created digitally was sent to healthcare professionals electronically via social media platforms. Inclusion criteria were determined as cognitive, being over the age of 18, understanding the Turkish language, and being volunteer to participate in the study. There were 876 individuals who have accepted to participate into the study. Totally 859 questionnaires which include full and complete date were evaluated. Majority of the sample (80.1%) were college graduate. Among the participants, 41% (n=309) were healthcare professionals whereas 59% (n=507) represented a society beyond healthcare sector.

Preliminary study stage

There are many similarities between Swine Flu and Coronavirus Disease. Both diseases are mainly droplet-borne and viral diseases that mainly affect the respiratory system. In order to prevent both Swine Flu (H1N1) and Coronavirus Disease, there are similar measures after contact including frequent hand washing, wearing a mask and paying attention to social distancing (4). That's why we adapted the scales developed by Çırakoğlu

against swine flu in 2011 to COVID-19 (15). Newly developed scales were as follows; Perception of COVID-19 (P-COVID-19), Perception of Control of COVID-19 (PCo-COVID-19), Perception of Causes of COVID-19 (PCa-COVID-19), Avoidance Attitudes from COVID-19 (AA-COVID-19) and Attitudes Towards the COVID-19 Vaccine (ATV-COVID-19)

The expression “swine flu” in Perception and Attitude Scales related to Swine Flu (H1N1) pandemic developed by Cirakoglu. Instead, general terms such as “disease” or “virus” were used. The aim of developed scales was to ensure that the scales developed were used both in the coronavirus epidemic and in other epidemics.

In order to better evaluate this sub-dimension, the item “P-9” was added to the “Contagiousness” sub-dimension of the P-COVID-19 scale. Since places like schools and shopping malls were closed in accordance with the measures taken for pandemic counteracting, "AA-8" and "AA-10" items were removed from the AA-COVID-19 scale. The PCo-COVID-19 was removed due to the fact that PCo-10 item in the "Personal control" sub-dimension is another item with similar content (PCo-8). Since COVID-19 Causes Perception (PCa-COVID-19) Scale "environment" sub-dimension PCa-9 has a similar content (PCa-10, 11, 12) was removed.

The Content and Appearance Validity

During the scope validity phase of these forms, nine experts who had sufficient equipment and knowledge in the fields of psychiatry, psychology and public health and could allocate sufficient time to the study were determined. Six of nine experts were lecturers under different titles. Remaining the individuals were specialists psychiatrists. The content validity of the template form was performed according to Law. According to this technique, the content validity ratio (CVR) performed with nine experts was 0.75. The P-3 item (CVR= 0.55) in the dangerousness sub-dimension of P-COVID-19 scale below this value, AA-6 (CVR = 0.55) and AA-7 (CVR = 0.33) and PCa-COVID-19 scales in the cognitive avoidance sub-dimension of the AA COVID-19 scale, and PCa -10 (CVR = 0.33) and PCa -11 (CVR = 0.55) articles were removed from relevant scales. Brief descriptions of the articles that specialists consider inadequate were in the following:

- Items P-3 and AA-7 were related to healthcare professionals. Conduction of the study on healthcare professionals might have affected the results.
- Since items PCa -10 and PCa -11 of environment sub-dimension of the PCa-COVID-19 scale were similar to each other, they were suggests to be removed as there is another similar item (PCa -12).

A group of healthcare professionals and individuals beyond healthcare professionals were interviewed personally to ensure apparent validity and comprehensibility of the scale items. It was determined that there was no problem of meaning and expression integrity in these interviews.

After the scope and appearance validity studies, P-COVID-19 scale was planned as 8 items, PCo-COVID-19 scale was planned as 13 items, PCa-COVID-19 scale was planned 15 items, AA-COVID-19 scale was planned as 12 items, and ATV-COVID-19 scale was planned in 9 items. A five-point Likert form was used to determine the participation of the participants into the items in the draft scales. These levels of participation were Definitely Disagree (1), Disagree (2), Undecided (3), Agree (4), and Strongly Agree (5) in P-COVID-19, PCa-COVID-19, PCo-COVID-19, and ATV-COVID-19 scales. In the AA-

COVID-19 scale, it was I definitely do not do (1), I do not do (2), I am undecided (3), I do (3) and I absolutely do (5). The total score obtained from each sub-dimension in the scales is divided by the number of items in the sub-dimension and a score between 1 to 5 is obtained.

In the power analysis performed to determine the sample size before the study, it was aimed to access to at least 582 people within the confidence interval of 95%, with an effect size and power by 0.2 and 0.80, respectively. In the calculation of the effect size in the power analysis, the work done by Cirakoglu was taken as a basis (15). Following these studies, validity and reliability studies were started.

Data Collection Tools

Sociodemographic form, P-COVID-19, PCo-COVID-19, PCa-COVID-19, AA-COVID-19, ATV-COVID-19 and Perceive Stress Scale (PSS) were used in the present study (8).

The sociodemographic form included socio-demographic characteristics (age, gender, marital status, educational status, profession, alcohol and smoking) of 7 items prepared by the researchers.

The Perception of COVID-19 (P-COVID-19) scale was designed with eight items and two sub-dimensions (Dangerousness and Contagiousness). The "Dangerousness" sub-dimension evaluates the perceptions and beliefs about the danger posed by the disease; however, the "Contagiousness" sub-dimension evaluates the perceptions about the contagiousness of the disease. Some expressions in the scale is reversely scored. The high scores in both sub-dimensions indicate that the perception in that area is also higher.

The Perception of Control of COVID-19 (PCo-COVID-19) scale evaluates beliefs about the control of the spread of the epidemic at individual, institutional or global level. The template scale consists of thee sub-dimensions and 13 items. The "Macro Control" sub-dimension evaluates the beliefs about the measures taken at institutional, national or global level. The "Personal (Micro) Control" sub-dimension evaluates the beliefs about the personal precautions taken to prevent or catch the disease. The "Controllability" sub-dimension evaluates the beliefs about the controllability of the disease with the measures taken for the disease. Some items in the scale are reversely scored. High scores in the macro and personal control dimension reflect the belief that control may be achieved at a good level with the measures taken, while the high scores in the controllability sub-dimension reflect the belief that the disease may be controlled with the measures taken.

The Perception of Causes of COVID-19 (PCa-COVID-19) evaluates the beliefs related to possible causes of the pandemic. The template scale with three sub-dimensions consists of 17 items. The "Conspiracy" sub-dimension includes beliefs that the virus which is commonly seen in the media regarding the epidemic is a biological weapon, and the epidemic is an attempt to sell vaccines or a political game of developed countries. The "Environment" sub-dimension includes items in which the main cause of the epidemic is suggested like an unhealthy lifestyle, pollution of clean water resources and environmental pollution. The "Faith" sub-dimension evaluates the belief that the epidemic is a punishment of God due to inflicts against religion or social degradation. There is not any opposite item in the scale. High scores in the sub-dimensions show that the belief in that dimension is higher.

Avoidance Attitudes from COVID-19 (AA-COVID-19) scale was designed as a 12-item and five-point likert structure. There is not any opposite item in this scale including three factors as cognitive avoidance, avoidance of common space and personal contact. High scores obtained from sub-dimensions show that avoidance in the relevant area is higher.

Attitudes Towards the COVID-19 Vaccine (ATV-COVID-19) scale has 9 items and two sub-dimensions (positive and negative attitude). The items are scored reversely in the negative attitude sub-dimensions. Higher scores obtained from positive attitude sub-dimension indicate that the attitude towards vaccination is positive. The items in the negative attitude sub-dimension are calculated after reversing, and higher scores in this sub-dimension indicate that the negative attitude towards vaccination is less.

PSS was developed by Cohen et al. (17). ASO consists of 14 items and is designed to measure how some situations in a person's life are perceived as stressful. Higher scores obtained from sub-dimensions show that avoidance in the relevant area is higher. The scale scores on five-Likert type varies between 0 (Never) and 4 (Very common). The expressions included as positive are scored reversely. Validity and reliability study of the scale in Turkish language was performed by Eskin et al (18).

Ethical Dimension of the Study

The study was started by approval 08.05 of Ethical Committee of Social and Human Sciences Researches of XXXX University on June, 5, 2020. The study was conducted between June, 6, 2020 and June, 13, 2020 after approval of the ethical committee. Furthermore, a permit was also obtained for the study from Directorate of Healthcare Services of Turkish Ministry of Health. On the first page of the link posted online, participants were informed about the objectives of the study, and they were instructed that they could withdraw from the study at any stage without stating a reason. The data of the participants who ticked the checkbox that they agreed to participate in the study were evaluated.

Statistical Analysis

SPSS 22.0 and AMOS 22.0 program were used for statistical analysis in the study. Descriptive statistics were shown in frequency, percentage, mean and standard deviation values. Since skewness/kurtosis values of the data on numeric variables are between (±2), data was accepted to be distributed normally (19). Pearson's correlation test was used to assess the association between numeric variables. Descriptive Factor Analysis (DFA) was used to determine the validity of the structure. Cronbach alpha coefficient was calculated for reliability of sub-dimensions and whole of the scale. Principal Components Analysis method and varimax conversion method were used in DFA. After the explanatory factor analysis, Confirmatory Factor Analysis (CFA) was performed in order to test the accuracy of the scale factors structure obtained in the scales. Maximum Likelihood Method Approach was used in CFA. Statistical significance level was accepted as $p<0.05$ in analyses.

RESULTS

Sample characteristics

The participants included 529 (61.6%) females and 448 (52.2%) males. Age average of the participants was 34.04±8.33 (median=32; min.=20, max.= 66) A significant part of the sample is college graduate (80.1%) and undergraduate (15.0%). Healthcare professionals consisted of 41% (n=52) of

the participants; and 59% (n=507) of the participants were individuals other than healthcare professionals. Among healthcare professionals, 16.1% (n=57) were physicians, 50% (n=176) were nurses, and 33.8% (n=119) were other healthcare personnel. Individuals beyond healthcare professionals included 47 (9.2%) unemployed individuals, 141 (27.7%) private sector employees, 78 (15.3%) teachers, 45 (8.8%) academic personnel and 196 (38.5%) public officers. Smoker rate of the sample was 35.4% (n=304), and 41.3% (n=355) of the sample were using alcohol.

Item Analysis

In the present study, the corrected item / total correlation value was taken to determine the scale items, and items with this value above ≥0.25 were included in the scales. P-COVID-19, corrected item / total correlation values were reviewed. Correlation coefficients were found between 0.084 and 0.622. Since the item "P-4" in the Dangerousness sub-dimension of the scale had a correlation coefficient of 0.084, it was excluded from the scale. PCo-COVID-19, corrected item / total correlation values were between 0.102 and 0.582. Since the item " PCo -5" in the Macro-control sub-dimension of the scale had a correlation coefficient of 0.102, it was excluded from the scale. PCa-COVID-19, corrected item / total correlation values were between 0.151 and 0.704. The item " PCa -18" in the Belief sub-dimension of the scale had a correlation coefficient of 0.151; therefore it was excluded from the scale. Since corrected item/total correlation value of ATV-COVID-19 scale was between 0.298 and 0.696, AA-COVID-19 scale correlation value was between 0.515 and 0.728.

Descriptive Factor Analysis and Structure Validity

In Descriptive Factor Analysis, the adequacy of the sample was evaluated through the Kaiser-Meyer-Olkin (KMO) test, and the suitability of the data for factor analysis was evaluated through the Bartlett Sphericity (BS) test.

KMO values for P-COVID-19, PCa-COVID-19, PCo-COVID-19, AA-COVID-19 and ATV-COVID-19 scales were 0.741, 0.872, 0.797, 0.877, and 0.828, respectively. Such analysis demonstrated that the sample size is sufficient. The BS test results performed on P-COVID-19 (X^2=1965.73; df=21; p<0.001), PCa-COVID-19 (X^2=10842.80; df=91; p<0.001), PCo-COVID-19 (X^2=4050.84; df=66; p<0.001), AA-COVID-19 (X^2=9987.88; df=45; p<0.001) and ATV-COVID-19 (X^2=6517.24; df=36; p<0.001) scales revealed that the scales were consistent to factor analysis.

Factor loads of P-COVID-19, PCa-COVID-19, PCo-COVID-19, AA-COVID-19 and ATV-COVID-19 scales were presented in Tables 1, 2, 3, 4, and 5, respectively. Factor loads of the scales were detected as follows; P-COVID-19 scale between 0.629-0.890; PCa-COVID-19 scale between 0.660 and 0.934; PCo-COVID-19 scale between 0.665 and 0.890; AA-COVID-19 scale between 0.824 and 0.972; and ATV-COVID-19 scale between 0.649 and 0.972.

It was found that the items in the P-COVID-19 scale explained 61% of the total variance and the scale had a two-factor structure (Table 1). "Contagiousness" sub-dimension consisted of 4 items; and "Dangerousness" sub-dimension consisted of 3 items. Items in these sub-dimensions explained 42% and 19% of the total variance, respectively. Items on the PCa-COVID-19 scale explained 76% of the total variance (Table 2). The scale consisted of three sub-dimensions including “Conspiracy” (6 items), “Environment” (5 items), and “Faith” (3 items). Items in these sub-dimensions explained 42%, 19% and

14% of the total variance, respectively. Items on the PCo-COVID-19 scale explained 64% of total variance (Table 3). This scale had a three-factor structure including "Macro Control" (4 items), "Personal Control" (4 items), and "Controllability" (4 items). Items in these sub-dimensions explained 32%, 18%, and 13% of the total variance, respectively. It was found that the items in the AA-COVID-19 scale explained 83% of the total variance and the scale had a two-factor structure (Table 4). The sub-dimensions of avoiding common space and avoiding personal contact were evaluated under one dimension as "Behavioural Avoidance". Items of "Behavioural Avoidance" (5 items) and "Cognitive Avoidance" (5 items) sub-dimensions respectively explained 49% and 33% of the total variance. It was found that the items in the ATV-COVID-19 scale explained 70% of the total variance and the scale had a two-factor structure (Table 5). “Positive Attitude” sub-dimension consisted of 4 items; and “Negative Attitude" sub-dimension consisted of 5 items. Items in these sub-dimensions respectively explained 41% and 28% of the total variance. Screen plot graphics of the scales were also presented in figures (Figure 1).

Confirmatory Factor Analyses

Confirmatory factor analysis (CFA) was performed on the same data set to verify the factors obtained from the scales as a result of DFA.

Goodness of fit indices of P-COVID-19 scale (X^2=30.336, df=13, p=0.004, X^2/df=2.334,Root Mean Square Error of Approximation (RMSEA) = 0.039, Standardized Root Mean Square Residual (SRMR) =0.026, Goodness of fit Index (GFI) = 0.990, AGFI (Adjusted Goodness of fit Index) = 0.978; Normed Fit Index (NFI)=0.985 and Comparative Fit Index (CFI)=0.991) was detected quite well.

It was detected from review of goodness of fit indices of PCo-COVID-19 scale that ratio of X^2/df (X^2=268.040, df=51, p<0.001) was slightly over 5 which is acceptable in a wide sample (5.256). Other fit indices of this scale (RMSEA = 0.070, SRMR = 0.054, GFI = 0.949, AGFI = 0.921; NFI = 0.934 and CFI = 0.946) were at acceptable levels. Modification suggestions were reviewed. It was determined that the error correlation between " PCo -11" and " PCo -12" items in the Inevitability sub-dimension was higher. An error association was made for these items and CFA was re-evaluated. After the analyses, fit indices (X^2=236.450, df=50, p<0.001, X^2/df=4.729, RMSEA=0.066, SRMR=0.051, GFI=0.956, AGFI=0.932; NFI=0.942 and CFI=0.953) were detected improved and data presented a better compliance.

The goodness of fit indices of the PCa-COVID-19 scale were reviewed. X^2/df ratio was 6.560. Other fit indices of the scale (RMSEA=0.080, SRMR=0.039, GFI=0.920, AGFI = 0.886; NFI = 0.956 and CFI = 0.962) were at acceptable levels. Review of modification suggestions reviewed that the error correlation between "PCa-4" and “PCa-5”" items in the Inevitability sub-dimension was higher. An error association was made for these items and CFA was reviewed. In the new model obtained, the fit indices (X^2 = 341.604, df = 73, p <0.001, X2 / df = 4.680, RMSEA = 0.065, SRMR = 0.039, GFI = 0.942, AGFI = 0.917; NFI = 0.969 and CFI = 0.975) were detected improved.

It was detected from review of the goodness of fit indices of the AA-COVID-19 scale that X^2/df ratio was 11.880. Since this value was above the acceptable limit, modification suggestions were considered. Error correlations were made between items AA-1 and AA-2 in the Cognitive Avoidance sub-dimension. In the analysis after this association, X^2/df ratio was detected 5.583. Although it is close to an acceptable limit, error correlations were also

performed between items AA-9 and AA-11 within the "Behavioural Avoidance" sub-dimension. Fit indices of the scale were observed at acceptable levels (X^2=133.621, df=32, p<0.001, X^2/df=4.176, RMSEA=0.061, SRMR=0.022, GFI=0.972, AGFI=0.951; NFI=0.987 and CFI=0.990) after such association.

Review of the goodness of fit indices of the ATV-COVID-19 scale revealed that X^2/df ratio was 5.302. Other fit indices of this scale (RMSEA=0.071, SRMR=0.046, GFI=0.966, AGFI=0.942; NFI=0.979 and CFI=0.983) were at acceptable levels. Modification suggestions were reviewed. It was determined that the error correlation between "ATV-8" and "ATV-9" items in the negative attitude sub-dimension was higher. An error association was made for these items and CFA was re-evaluated. After the analyses, fit indices (X^2=93.805, df=25, p<0.001, X^2/df=3.752, RMSEA=0.057, SRMR=0.039, GFI=0.977, AGFI=0.959; NFI=0.986 and CFI=0.989) were detected improved and data presented a better compliance. Corrective factor analyses of the scales were presented (Figure 1).

Reliability Analysis Results

According to the results obtained from the factor analysis, the sub-dimensions of the scales and the internal consistency of the whole scale were evaluated through Cronbach alpha coefficient. The Cronbach alpha coefficient was detected as 0.74 for P-COVID-19 scale, 0.88 for PCa-COVID-19, 0.79 for PCo-COVID-19, 0.88 for AA-COVID-19 and 0.80 for ATV-COVID-19 (Tables 1, 2, 3, 4 and 5, respectively). The Cronbach's alpha internal consistency coefficient in the sub-dimensions of the scales ranged between 0.64 and 0.97.

Correlations Between sub-dimensions of the scales

Results of correlation analysis between the scales used in the study were provided in the table (Table 6). The main objective of the scales used in this study was to reach descriptive data evaluating perceptions and attitudes about Coronavirus Disease. No cut-off score was calculated in the scales. The relationships between the scale sub-dimensions are in an expected direction (presence of a significant relationship between the sub-dimensions that make up the scale); this shows that the scale is adequate for the study objective. There was a positive and significant association between Perceives Stress scale scores and Dangerousness (r = 0.087; p <0.05) and Contagiousness (r = 0.080; p <0.05) sub-dimensions of the P-COVID-19 scale; the Conspiracy (r = 0.081; p) of the PCa-COVID-19 scale; <0.05), Behavioural Avoidance (r = 0.071; p <0.05) and Total Avoidance (r = 0.073; p <0.05) subscale scores of the AA-COVID-19 scale. A significantly negative association was detected between ASÖ scores and Macro Control (r = -0.120, p <0.01), Personal Control (r = -0.081, p <0.05), and Controllability (r = -0.140, p <0.01) sub-dimension scores of PCo-COVID-19 scale.

DISCUSSION

Perceptions and attitudes about infectious diseases are affected by many individual and social factors. Feeling in-danger and helplessness is effective on past experiences, beliefs, perceptions and attitudes of the individual in her/his social and cultural environment (20). Increasing anxiety and fear during pandemic periods change the perception and attitude of illness (6). For instance; it may not be questioned whether the influenza flu seen every year is a biological war or whether the governments have taken adequate measures in the control of the disease. However, as in the past swine flu epidemic, there are many inquiries about these issues in both social media and traditional

media for COVID-19 (21, 22). Previous studies indicated that a positive change in the perception of individuals and societies is also effective in epidemic control (7). Therefore, in our study, the aim was to develop scales to evaluate perceptions and attitudes associated with pandemic of COVID-19.

In the item pooling phase of scale development, the scale items developed by Çırakoğlu who was one of our researchers in 2010 were used after rearrangement (15). In the literature, it was stated that methods such as asking open-ended questions, benefiting from similar studies in the literature and starting from clinical observations may be used during creation of an item pool (23). Swine flu and COVID-19 are very similar for basic organs affected by the disease, the route of transmission and, measures taken (4). Therefore, we used scales in which perceptions and attitudes about H1N1 are evaluated in this study.

Validity is a concept related to the degree to which the individual correctly evaluates the feature of a scale. Among the validity techniques, appearance, scope and structure validity are usually preferred (24). The appearance validity of a scale is that the characteristics requested to be measured by the scale may be clearly understood (25). Validity of the scope is an indicator of whether the items of the scale are sufficient in terms of quantity and quality in order to measure the feature to be measured. In particular, it was stated that one of the logical ways to test the validity of scope in measurement tools with more than one sub-dimension is to seek expert opinion (24). In our study, personal validity of personal interviews was performed with twelve people; and content validity was carried out with nine experts in the field outside the research team. In line with expert opinions, one item was removed from the P-COVID-19 scale, and two items were removed from each of the PCa-COVID-19 and AA-COVID-19 scales.

Structural validity and reliability analyses were performed on the data obtained from 859 participants via online connection. One of the important validity techniques in the scale validity stage is to evaluate the construct validity. Factor analysis is often used for construct validity. In the descriptive factor analysis, factors are tried to be found depending on the association between variables (25). Therefore, descriptive factor analysis was used in the present study. The data compliance for factor analysis was examined through KMO coefficient and the Barlett Sphericity (BS) test. In factor analysis, KMO is expected to be higher than 0.60 for suitability in terms of sample size (25). KMO values were found between 0.741 and 0.877 in the scales of our study. This result shows that scales are adequate for factor extraction. The BS test reviews the relationship between variables on the basis of partial correlations, and a significant chi-square value indicates the suitability of the data matrix (23-25). BK test results of the scales in our study were found to be significant ($p<0.001$, for each). This significance indicates that the data in our study are suitable for factor analysis.

Although there are many techniques used in factorization, the most frequently used one is Principal Component analysis. Load values in the factor are very important to determine which sub-factor the items in the scale belong to. The value at and above 0.45 is a criterion for selection (24). The factor values in the scales in our study were found between 0.629 and 0.972. Another important parameter in factor analysis is the variance ratio explained. The variance rate explained in one-dimensional scales is expected to be at least 30%; however, this rate is expected to be higher in

multidimensional scales (24, 25). The variance rate explained was 61% for the P-COVID-19 scale, 76% for the PCa-COVID-19 scale, 64% for the PCo-COVID-19 scale, 83% for the AA-COVID-19 scale, and 70% for the ATV-COVID-19 scale. According to these results, it was detected that factors in the scale explain a significant portion of total variance in the items and variance related to the scale.

CFA was performed to verify the factorial structure and goodness of fit obtained with DFA. The chi-square value was detected significant in all scales developed. It was stated that this value could be significant in larger sample groups (26). When the X^2/df ratios were examined, this value was detected below five in the P-COVID-19 scale. In other scales, it was observed that items with high error correlation decreased X2 / df values and it indicates the good fit after error correlation. When other fit indices in the scales are examined, the RMSEA value is below 0.80 in all scales, and the GFI, NFI and CFI values are above 0.90 demonstrating that the model fit is very good (27).

Reliability is defined as the consistency between the responses of the individuals in the scale items. Cronbach alpha internal reliability coefficient and item-total item score correlation coefficients are generally used in reliability analysis. A reliability coefficient calculated for a psychological test of 0.70 or higher was reported to be adequate for the reliability of the scale scores (25). The cronbach alpha internal reliability coefficients of the scales in our study ranged between 0.74 and 0.88. Item / total correlation explains the relationship between the scores obtained from the scale items and total score of the scale. Elevation of these correlation coefficients indicates that the item is adequate for general structure of the scale and its internal consistency is high. It was reported that the corrected item / total correlation value must be 0.20 and above (24, 25). We took the lower limit of this value as 0.25. As a result of the analyses performed in our study, item P-4 in P-COVID-19 scale (0.084), item PCo -5 of PCo-COVID-19 scale (0.102), and item PCa -18 of COVID-19 PCa (0.151) were excluded from the study since their correlation coefficient is below 0.25. In the analysis performed after excluding these items, it was found that the corrected item / total correlation coefficients in the scales were between 0.296 and 0.728 in our study. According to these results, it is seen that all scales in our study have higher internal consistency and reliability in their final form.

When the relationships between the scales and their sub-dimensions are examined; the high dangerousness and contagiousness perceptions about COVID-19 have been found to be associated with high stress. A similar relationship has been observed in many past epidemics (6, 28). In individuals with high perceptions of dangerousness, contagiousness, and lethality related to the infectious agent, stress and psychiatric disorders were found to be more common (28-30). In addition to this relationship, it has been observed that individuals with high perceived stress have more conspiracy thoughts about the causes of COVID-19. Conspiracy thoughts have been on the agenda in many past epidemics (15, 31). It has been observed that these conspiracy thoughts disrupt the relationship of trust at both individual and social levels. In addition, research has shown that dominating conspiracy thoughts leads to being closed to the innovations brought by science and rejecting science (32). This is a serious problem during epidemic periods. Because during these periods, individual and social cohesion is very valuable. Disruptions in social cohesion lead to bias and refusal of treatments. For example, many

conspiracy theories have been proposed regarding vaccines developed in past epidemic periods, and these theories have been observed to reduce vaccination rates (33). In our study, it was observed that the positive attitude towards the COVID-19 vaccine decreased with the increase of conspiracy thoughts. This relationship may be a finding that can be addressed by health authorities. One of the results determined in our study that should be taken into consideration by health authorities is that as the perception of stress increases, individuals find the measures taken by health authorities to be insufficient. No matter how effective measures are taken by health authorities, if the stress and anxiety of individuals are not addressed, individuals may not see the measures taken as sufficient. In a study conducted during the MERS epidemic, it was observed that generally sensitive individuals were 17.8 times more stressed than non-sensitive individuals. It has been observed that these differences in stress levels among individuals cause significant differences in reliability of preventive behaviors, application of preventive behaviors, handwashing and reliability of policies (34). Similar to the results of this study, in our study, it was found that the perception that the personal precautions taken would not be sufficient to control the epidemic and that the epidemic could not be controlled was dominant in stressed individuals. The hopeless approach of individuals with these perceptions, the epidemic may adversely affect the outcome in combating the epidemic. Past research has shown that the higher the community participation in struggles, the higher the success (16). One of the areas where social participation plays an important role in combating the epidemic is vaccine therapy (8). It is stated that vaccination rates have decreased in our country in recent years (35). It is currently unclear what attitudes will the individuals take in to account about the vaccine which is going to be developed for COVID-19. Along with this uncertainty, it was found in our study that individuals with high perception of stress have a higher negative attitude towards vaccination. This also is one of the results to be taken into account. Among the scales, there are important results, both sociologically and psychologically. For example, individuals who have more religious faiths about the causes of COVID-19 think that health authorities are sufficient to combat and personal precautions may be sufficient to control the epidemic, but they think it may be difficult to control the epidemic. Many comments can be made for these important relationships detected between the sub-dimensions of the scales. However, since the main purpose of this study is to develop scales to determine perceptions about COVID-19, these comments will not be interpreted.

Our study has some limitations. First, it may be assumed that we have reached a more educated population, considering that 80.1% of our sample is college graduates and the study is conducted online in an electronic environment. Therefore, findings obtained from the scales in further studies on other parts of the society should be interpreted carefully. Second, even if the reliability coefficient of the Dangerousness sub-dimension of the P-COVID-19 scale is at an acceptable level, this partial decrease should be considered during use of the scale. Third, the present study depends on self-report scales. Lack of clinical interviews can be considered as a limitation. Fourth limitation of the present study not providing a sufficient space for findings and discussion of associations in sub-dimensions since the actual objective of the study was to develop perception and attitude scales related to

COVID-19 pandemic. Discussion of such associations in further studies would make a great contribution to the literature.

CONCLUSIONS

P-COVID-19, PCa-COVID-19, PCo-COVID-19, AA-COVID-19 and ATV-COVID-19 scales have considerably higher validity and reliability. Scales developed may evaluate individual and social perceptions and attitudes during the COVID-19 pandemic. These evaluations may play an important role in disease counteracting both in the COVID-19 pandemic and in future epidemics. However, it should be considered that valid and reliable structures of all developed scales may also change in the long term, as perceptions and attitudes of individuals on the pandemic may change in the future.

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TABLES AND FIGURES

Table 1. Validity and Reliability Analysis of P-COVID-19

Items no	Items	Mean ± SD	Dangerousness	Contagiousness	AI/TC
P-1	This disease is not as dangerous as told. (O)	4.24±1.08	0.731		0.296
P-2	Media exaggerates the pandemic. (O)	4.25±0.94	0.817		0.443
P-3*	Healthcare professionals exaggerate the pandemic. (O)	-	-	-	-
P-4**	This disease has a treatment. (O)	3.46±1.12	-	-	-
P-5	Virus causes a fatal disease.	4.61±0.60	0.759		0.501
P-6	This disease may spread to anybody.	3.89±1.06		0.629	0.426
P-7	The disease spreads easily.	4.50±0.87		0.890	0.659
P-8	Possibility of spread to women and men is similar.	4.50±0.84		0.875	0.629
P-9	The virus may spread via cargo or any shopping product	3.87±1.14		0.644	0.381
	Eigenvalue		1.340	2.976	
	Variance		19.148	42.516	
	Cronbach alpha		0.64	0.75	

Total Scale values; Content Validity Index=0.85; Variance=61.664; Cronbach alpha=0.74

P: Perception of COVID-19, AI/TC: Adjusted Item/Total Correlation, O: Opposite Item, df: degrees of freedom, SD: Standard Deviation

*Items excluded from the scale due to CVR smaller than 0.75

** Items excluded from the scale due to Adjusted Item/Total Correlation value below 0.25

Table 2. Validity and Reliability Analyses of PCa-COVID-19

Item No	Item		Components			AI/TC
		Mean ± SD	Conspiracy	Environment	Faith	
PCa -1	This disease is a political game revealed by developed countries.	2.26±1.12	0.924			0.691
PCa -2	The cause of this pandemic is the effort of developed countries to sell drugs and vaccines	2.20±1.08	0.919			0.719
PCa -3	This virus is spread on purpose in order to make a contribution to economic system	2.15±1.07	0.915			0.703
PCa -4	This disease was produced as a biological weapon.	2.39±1.18	0.916			0.696
PCa -5	This pandemic is a part of a great experiment.	2.31±1.15	0.913			0.698
PCa -6	The cause of this disease is economic crisis.	2.09±1.05	0.797			0.680
PCa -7	Environmental pollution is one of the important causes of the disease.	3.00±1.24		0.847		0.477
PCa -8	One of the causes of the pandemic is contamination of water resources.	2.77±1.20		0.865		0.492
PCa -9***	This pandemic appeared because of unhealthy nutrition	-	-	-	-	-
PCa -10*	Hormones in vegetables and fruits cause the disease	-	-	-	-	-
PCa -11*	Foods with additives provided spread of the disease.	-	-	-	-	-
PCa -12	This disease is caused by the unhealthy life style.	2.86±1.27		0.753		0.435
PCa -13	Global warming is one of the causes of the pandemic.	2.60±1.18		0.805		0.489
PCa -14	These pandemics are effort of the nature to establish a balance.	2.93±1.20		0.660		0.345
PCa -15	Such pandemics are God's punishment for departure from religion.	1.72±1.13			0.932	0.493
PCa -16	This pandemic is a wrath of God against social degradation.	1.74±1.14			0.934	0.481
PCa -17	This pandemic is in our destiny.	1.83±1.16			0.825	0.397
PCa -18**	Consumption of wild animal (bat, etc.) meat causes illness.	3.33±1.18	-	-	-	-
	Eigenvalue		5.948	2.749	2.069	
	Variance		42.487	19.638	14.781	
	Cronbach alpha		0.96	0.85	0.90	

Total Scale Values; Scope Validity Index = 0.84, Variance = 76.906, Cronbach alpha = 0.88

PCa: Perception of Causes of COVID-19, AI/TC: Adjusted Item/Total Correlation, df: degrees of freedom, SD: Standard Deviation

*Items excluded from the scale due to CVR smaller than 0.75

** Items excluded from the scale due to Adjusted Item/Total Correlation value below 0.25

*** It was removed from the draft form during the preliminary study phase by the researchers.

Table 3. Validity and Reliability Analyses of PCo-COVID-19

Item No	Item	Mean ± SD	Components			AI/TC
			Macro Control	Personal Control	Controllability	
PCo -1	Preventive studies in our country are enough.	2.09±1.03	0.871			0.503
PCo -2	What is done to stop the spread of the disease is sufficient	1.94±0.94	0.890			0.507
PCo -3	The work of health institutions is sufficient to fight against the disease.	2.55±1.11	0.768			0.444
PCo -4	Preventive studies in the world are enough.	2.08±0.84	0.665			0.344
PCo -5**	Vaccination would prevent spread of the disease	3.28±1.02	-	-	-	-
PCo -6	I do not get the disease if I care my personal hygiene	2.90±1.00		0.819		0.567
PCo -7	If I care about my diet, the disease does not affect me	2.77±0.99		0.814		0.455
PCo -8	It is possible to prevent the disease by taking personal precautions.	3.13±1.06		0.727		0.512
PCo -9	It is enough for everybody to wash their hands frequently to stop the pandemic.	2.43±1.06		0.723		0.387
PCo -10***	The personal precautions taken are sufficient to avoid this disease.	-	-	-	-	-
PCo -11	The individual cannot control to get the disease (O)	2.75±1.16			0.768	0.389
PCo -12	It is not possible to avoid a virus that you have not seen. (O)	3.33±1.26			0.800	0.316
PCo -13	Although we take precautions, we may not be able to prevent the transmission of the disease. (O)	2.66±1.19			0.766	0.407
PCo -14	The personal precautions I take will be insufficient to protect me from the disease. (O)	2.83±1.08			0.749	0.514
	Eigenvalue		3.877	2.224	1.608	
	Variance		32.308	18.532	13.339	
	Cronbach alpha		0.83	0.80	0.78	

Total Scale Values; Content Validity Index = 0.90, Variance = 64.238, Cronbach alpha = 0.79

PCo: Perception of Control of COVID-19, O: Opposite Item, AI/TC: Adjusted Item/Total Correlation, df: degrees of freedom, SD: Standard Deviation

** Items excluded from the scale due to Adjusted Item/Total Correlation value below 0.25

*** It was removed from the draft form during the preliminary study phase by the researchers.

Table 4 Validity and Reliability Analysis of the AA-COVID-19

Item No	Item	Mean ± SD	Components		AI/TC
			Cognitive Avoidance	Behavioural Avoidance	
AA-1	Distracting your attention when exposed to news about the disease	2.46±1.26	0.872		0.541
AA-2	Thinking about other things when talking about illness	2.30±1.20	0.886		0.547
AA-3	Not reading news about pandemic	2.34±1.26	0.824		0.515
AA-4	Changing the channel when news about the disease appears on TV	2.15±1.16	0.891		0.516
AA-5	Changing the subject to terminate talks about the disease	2.24±1.18	0.884		0.547
AA-6*	Getting away from the environment when there are conversations about the disease around	-	-	-	-
AA-7*	Avoiding to go to hospital or doctor to prevent the disease	-	-	-	-
AA-8***	Avoiding to go to shopping malls to prevent the disease	-	-	-	-
AA-9	Avoiding to participate into social activities to prevent the disease (movie, theatre etc.)	4.09±1.33		0.939	0.702
AA-10***	Avoiding to go to work/school to prevent the disease	-	-	-	-
AA-11	Avoiding to take public transport to prevent getting sick	3.97±1.35		0.919	0.655
AA-12	Not kissing when greeting people, you know to avoid being sick	4.12±1.33		0.972	0.728
AA-13	Not shaking hands when greeting people to avoid being sick	4.12±1.32		0.966	0.715
AA-14	Avoiding to go to use public toilets to prevent the disease	3.94±1.37		0.914	0.672
	Eigenvalue		3.361	4.943	
	Variance		33.607	49.434	
	Cronbach alpha		0.92	0.97	

Total Scale Values; Scope Validity Index = 0.88, Variance = 83.041, Cronbach alpha = 0.88

AA: Avoidance Attitudes from COVID-19, AI/TC: Adjusted Item/Total Correlation, df: degrees of freedom, SD: Standard Deviation

*Items excluded from the scale due to CVR smaller than 0.75

*** It was removed from the draft form during the preliminary study phase by the researchers.

Table 5. Validity and Reliability Analyses of ATV-COVID-19

No	Item	Item	Mean ± SD	Components		AI/TC
				Positive Attitude	Negative Attitude	
1	ATV-1	I want my family to have the vaccine **to be developed / developed** for this disease.	3.50±1.30	0.966		0.689
2	ATV-2	I want to have the vaccine **to be developed / developed** for this disease as much as possible.	3.49±1.31	0.972		0.696
3	ATV-3	I think everybody should have the vaccine **to be developed / developed** for this disease.	3.51±1.29	0.970		0.689
4	ATV-4	I trust to explanations made for the vaccine to be developed/developed	3.24±1.25	0.865		0.538
5	ATV-5	The vaccine **to be developed / developed** may cause spread of the disease (O)	3.38±1.12		0.725	.298
6	ATV-6	I think the vaccine to be developed / developed will not / does not have a protective effect. (O)	3.34±0.99		0.754	0.478
7	ATV-7	The vaccine to be developed / developed is dangerous (O)	3.31±1.14		0.867	0.464
8	ATV-8	I think the effectiveness of the vaccine to be developed / developed will not be/has not been tested adequately. (O)	2.67±1.20		0.674	0.336
9	ATV-9	I think I may survive the epidemic without a vaccine. (O)	2.74±1.10		0.649	0.306
		Eigenvalue		3.759	2.579	
		Variance		41.762	28.653	
		Cronbach alpha		0.96	0.78	

Total Scale Values; Scope Validity Index = 0.89, Variance = 70.415; Cronbach alpha = 0.80

ATV: COVID-19 Vaccination Attitude Scale, O: Opposite Item, AI/TC: Adjusted Item/Total Correlation, df: degrees of freedom, SD: Standard Deviation

Table 6 Correlations Between Sub-dimensions of scales

Scales and sub-dimensions		1	2	3	4	5	6	7	8	9	10	11	12	13	14
P	(1) Dangerousness	1													
	(2) Contagiousness	0.330**	1												
PCa	(3) Conspiracy	-0.260**	-0.159**	1											
	(4) Environment	-0.067*	-0.006	0.250**	1										
	(5) Faith	-0.188**	-0.192**	0.332**	0.174**	1									
PCo	(6) Macro Control	-0.238**	-0.138**	0.159**	0.028	0.258**	1								
	(7) Personal Control	-0.130**	-0.033	0.150**	0.082*	0.116**	0.354**	1							
	(8) Controllability	0.022	-0.071*	-0.121**	-0.117**	-0.096**	0.139**	0.244**	1						
AA	(9) Cognitive Avoidance	0.006	-0.027	0.057	-0.074*	0.016	0.033	0.037	0.107**	1					
	(10) Behavioral Avoidance	0.070*	0.011	0.015	-0.035	0.047	0.012	-0.016	0.004	0.176**	1				
	(11) Total Avoidance	0.053	-0.008	0.044	-0.068*	0.042	0.028	0.011	0.066	0.717**	0.812**	1			
ATV	(12) Positive Attitude	0.169**	0.066	-0.089**	-0.094**	-0.024	0.002	-0.049	0.024	0.006	-0.024	-0.013	1		
	(13) Negative Attitude	-0.086*	-0.072*	0.121**	0.043	0.054	0.029	0.013	-0.035	-0.010	-0.027	-0.025	0.122**	1	
(14) PSS		0,087*	0.080*	0.081*	0.048	0.022	-0.120**	-0.081*	-0.140**	0.038	0.071*	0.073*	0.049	-0.080*	1
Mean		4,37	4.19	2.23	2.83	1.76	2.17	2.81	2.89	2.30	4.05	6.35	3.43	3.09	26.80
Standard Deviation		0,68	0.75	1.02	0.97	1.05	0.80	0.81	0.91	1.06	1.27	1.79	1.22	0.81	9.02
Scale Score Range		1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	2-10	1-5	1-5	0-56

*p <0,05, **p <0,01

P: Disease Perception of COVID-19, PCo: Perception of Control of COVID-19, PCa: Perception of Causes of COVID-19, AA: Avoidance Attitudes from COVID-19, ATV: Attitudes Towards the COVID-19 Vaccine, PSS: Perceived Stress Scale

Figure 1. Screen Plot Graphs of Scales and Confirmatory Factor Analysis