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THE EFFECT OF A COGNITIVE-BEHAVIORAL THERAPY-BASED E-PSYCHOLOGICAL SUPPORT PROGRAM FOR HEALTHCARE PROFESSIONALS DURING THE COVID-19 PANDEMIC: A RANDOMIZED CONTROLLED TRIAL

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Abstract

The global COVID-19 pandemic has exerted profound physical and psychological tolls on healthcare professionals, underscoring the urgent need for their mental health support. The objectives of this research are twofold: first, to develop an e-psychological support program based on Cognitive-Behavioral Therapy tailored specifically for healthcare professionals during the COVID-19 pandemic; second, to assess the program's effectiveness in reducing secondary traumatic stress, depression, anxiety, and stress levels, as well as improving healthcare professionals' perception of coping with trauma. Designed as a randomized controlled trial, the study was conducted with 71 healthcare workers employed in a hospital in Gaziantep, Turkey. The developed e-psychological support program consists of six modules: stress

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model, self-monitoring skills, coping with anxiety, behavioral activation skills, and cognitive restructuring (two modules). The results showing a significant decrease in anxiety, depression, stress and secondary traumatic levels in the intervention group compared to the control group are encouraging. This suggests that the CBT-based e-psychological support program has the potential to have a positive impact on the mental well-being of healthcare professionals. Also, the improvement in healthcare professionals' perception of coping with trauma is an important outcome.CBT has a strong evidence base for treating mental health issues, and adapting it for the specific needs of healthcare workers during a crisis like the pandemic is a promising approach. The development of online interventions for healthcare professionals is valuable not only for the current pandemic but also for future crisis situations. These programs can serve as a template for addressing mental health needs during other global health emergencies.

Keywords: Cognitive Behavioral Therapy (CBT), e-psychological support, healthcare professionals, secondary trauma, anxiety.

The COVID-19 pandemic was declared by the World Health Organization (WHO) on March 11th, 2020, due to its rapid spread (World Health Organization, 2020a). Health-care workers have borne the brunt of this crisis, facing both physical and psychological challenges (World Health Organization, 2020b). Studies have shown that healthcare professionals battling COVID-19 report experiencing intense stress and anxiety (Mar-valdi et al., 2021; Pappa et al., 2020) and exhibit symptoms such as depression, anxiety, burnout, and hopelessness (Lai et al., 2020; Xiang et al., 2020).

Working in high-risk environments during the pandemic, healthcare professionals have struggled to care for critically ill patients, often working long hours under increasing workloads (Deng & Peng, 2020; Kang et al., 2020; Lai et al., 2020; Shechter et al., 2020). They have experienced physical fatigue, isolation from loved ones, and the dis-comfort of wearing protective equipment. Additionally, they have faced constant infection risk due to contact with highly infected individuals.

It seems important to know the intensity of the pandemic in Türkiye at the time this research was conducted. December 2020 is the period when the COVID-19 pandemic reached its second peak in Türkiye. The number of individuals infected with COVID-19 was unknown since the daily numbers of cases were not announced by the Ministry of Health of the Republic of Türkiye between the dates of October 2020 and November 2020. During this period, the Ministry only announced the number of patients who showed serious symptoms and were hospitalized daily as a

result of the COVID-19 diagnosis. In October 2020, the average number of deaths per day was 66, and the average number of patients per day was 1829. In November 2020, the average number of deaths per day is 110, and the average number of patients per day is 4183. In December 2020, the average number of deaths per day is 230, the average number of patients per day is 4612, and the average number of cases per day is 30804 (https://covid19.saglik.gov.tr).

During this period when the pandemic was intense, the Ministry of Health prohibited healthcare professionals from resigning and using their right to take a leave. During this period, none of the healthcare professionals participating in the study were vaccinated, because the vaccination process had not started in Türkiye, yet.

Healthcare professionals (HCP) face the psychological burden of aiding individuals exposed to trauma, which encompasses events causing mental and physical harm. This includes direct exposure (primary trauma) and indirect exposure through witnessing or knowledge (secondary trauma) (Figley, 2013). Secondary trauma's negative effects are akin to primary exposure (Bride et al., 2004). During the pandemic, HCPs working with traumatized individuals endure intense secondary traumatic stress (Lu et al., 2020; Orru et al., 2021; Vagni et al., 2020).

The COVID-19 crisis disproportionately affects frontline caregivers like nurses and doctors, leading to higher secondary trauma and stress levels (Bao et al., 2020; Li et al., 2020; Vitali, 2021; Zhang et al., 2020). Urgent global action is crucial to mitigate the acute stresses faced by these professionals and support their mental health (Shah et al., 2020; Vitali & Casolaro, 2021). Minimizing stress reactions from secondary trauma in treating professionals during the pandemic is vital, requiring immediate therapeutic interventions. Positive coping methods such as social support and problem-solving predict lower stress levels (Lai et al., 2020; Maiorano et al., 2020).

The ability to cope with trauma is perceived as a flexible structure encompassing both “trauma-focus” and “forward-focus” coping processes (Bonanno et al., 2011). While trauma-focused coping is necessary, a forward-focused approach is also vital for gaining a positive perspective and coping flexibility. Evaluating cognitive and coping flexibilities through both trauma and forward focus is crucial. A flexible coping perception can enhance coping skills, especially in dealing with secondary trauma and its associated stress, anxiety, and depressive symptoms. Cognitive-behavioral therapy (CBT) is a widely recommended approach for coping with trauma perception (Ehlers et al., 2005; Hofmann et al., 2012).

CBT, a short-term and cost-effective psychotherapeutic approach, is grounded in scientific principles such as learning theories. It is effective in treating various mental disorders by teaching problem-solving methods and skills (Beck, 2020; David et al., 2018). Research supports the efficacy of CBT in treating

depression, anxiety disorders, and PTSD (Cuijpers et al., 2013; Carpenter et al., 2018; Barrera et al., 2013). Amid the COVID-19 pandemic, intervention methods belonging to CBT, known for their short-term, solution-oriented nature, are recommended (Benhamou & Piedra, 2020; Shah, 2020; Shi & Hall, 2020). Utilizing the cognitive-behavioral approach can effectively reduce stress, anxiety, and depression levels among those affected by the pandemic (Li et al., 2020; Sugiyama, Kaseki, & Kishino, 2023).

Interventions for COVID-19-affected individuals, including healthcare professionals facing time constraints, are recommended to be accessible online or via telephone/computer-assisted applications (Reay et al., 2020; Shi & Hall, 2020; Xiang et al., 2020). This facilitates rapid assistance to a larger number of professionals, potentially alleviating psychological symptoms (Shechter et al., 2020). Healthcare workers show interest in online support (Shechter et al., 2020). Cognitive-Behavioral Therapy, with its structured nature, seamlessly integrates into online platforms, offering wider application and proven effectiveness in trauma treatment (Sijbrandij et al., 2016).

During the COVID-19 pandemic, there are limited studies based on Cognitive Behavioral Therapy (CBT) aimed at reducing stress symptoms among healthcare workers. Upon examination of these studies, it is observed that they were developed almost simultaneously in different countries and their initial results were published (Bureau et al., 2021; Jovarauskaite et al., 2021; López-del-Hoyo et al., 2022; Serrano-Ripoll et al., 2021; Weiner et al., 2020). In this study, the effects of the e-psychological support intervention developed during the peak of the pandemic in Türkiye are investigated concerning healthcare workers' levels of secondary traumatic stress, depression, anxiety, and stress, as well as their coping perceptions in dealing with trauma.

The objectives of this research are to develop an E-Psychological Support Program based on Cognitive-Behavioral Therapy, which is specific to healthcare professionals and compatible with computer-assisted and smartphone technologies, and to test its effectiveness.

Method

Design

In the present study, a Cognitive-Behavioral Therapy Based E-Psychological Support Program specific to healthcare professionals was developed, and its effectiveness was tested. In the study, a 2x2 split-plot, mixed experimental

design with pretest-posttest, intervention and control groups were used (Büyüköztürk, 2016).

The independent variable of the study is the Cognitive-Behavioral Therapy Based E-Psychological Support Program, which was developed by the researchers. The dependent variables are the secondary trauma levels, the perception levels of coping with trauma, depression, anxiety, and stress levels.

Participants

Criteria of inclusion in the research group are as follows:

1) Working as a healthcare professional at Gaziantep University, Şahinbey Training and Research Hospital,

2) Having access to the Internet and telephone/computer,

3) Having scored above the cut-off point for at least one of the depression, anxiety, or stress subscales of the Depression Anxiety Stress Scale (DASS-21); having a score of one standard deviation above the mean on the Secondary Traumatic Stress Scale (STSS).

4) Volunteering to participate in the study.

Criteria of exclusion from the research are as follows:

1) Presence of any organic, bipolar, or psychotic disorder, substance abuse, or risk of suicide

3) Receiving psychological intervention or using psychiatric medication at the time of inclusion

In the study, a power analysis was performed first to determine the size of the research group. The analysis was performed in G*power version 3.1, and the minimum required number of participants in each group was determined to be 36 for the NRF2 measurement of 0.8±1.28 units to be statistically significant between the groups (α=0.05, 1-β=0.90).

The Secondary Traumatic Stress Scale (STSS), the Perceived Ability to Cope with Trauma Scale (PACT), and the Depression Anxiety Stress Scale (DASS-21) were sent to all healthcare professionals working at Gaziantep University, Şahinbey Training and Research Hospital. All three scales were sent via e-mail to all 2545 healthcare professionals working in the hospital, and a total of 529 individuals filled in the scales. 48.9% of these 529 individuals were women, their average age was 33.33 years. In addition, 50.1% of these people were doctors, 16.8% were nurses, and 33.1% were other healthcare professionals. Based on the inclusion and exclusion criteria, 42 individuals were randomly assigned to the intervention group and 36 individuals to the control group in order to prevent dropping below the critical value of 36 individuals in case of finding 78 individuals meeting the criteria and a

loss of subjects in the intervention group. 5 out of 42 people in the intervention group did not complete the application and thus were excluded from the study. One participant in the intervention group and one participant in the control group were excluded from the analysis since they did not complete the post-test application. By the way, the intervention group was determined as 36 individuals and the control group as 35 individuals.

While 52.8% of the participants in the intervention group were women, this rate was 28.5% in the control group. The mean age of the participants in the intervention group was 34.05 years, while the mean age of the participants in the control group was 32.89. There was no significant difference between the intervention group and control group in terms of age, gender, educational level, and marital status. While 3 (8.4%) individuals in the intervention group were infected with the COVID-19, 2 (5.8%) individuals in the control group were infected with the COVID-19. The sociodemographic characteristics of healthcare professionals in the intervention and control groups are presented in Table 1.

Table 1. Sociodemographic characteristics

	CBTBE-SP Intervention Group		Control Group	
	N	%	*N*	%
Gender				
Male	17	47.2	25	71.4
Female	19	52.8	10	28.5
Profession				
Medical Doctor	19	52.7	13	37.1
Nurses	8	22.2	13	37.1
Other HCPs	9	25.0	9	25.7
Age	34.05±7.7		32.89±7	
Marital Status				
Married	21	58.3	21	60.0
Single	15	41.6	14	40.0
Educational Level				
Secondary school	1	2.7	1	2.8
High School	2	5.5	3	8.5
University	33	91.6	31	88.5
Duration of experience				
Less than 1 year	3	8.3	3	8.5
1-3 years	2	5.5	5	14.2
3-5 years	3	8.3	4	11.4
5-10 years	9	25.0	8	22.8
Above 10 years	19	52.7	15	42.8
Mean working hours in a day	X=10.54±3.6		X=12.24±5.7	
0-7 hours	2	5.5	3	8.5
8-12 hours	29	80.5	20	57.1

	CBTBE-SP Intervention Group		Control Group	
13-16 hours	3	8.3	6	17.1
Above 17 hours	2	5.5	6	17.1
COVID-19 infection				
Present	3	8.4	2	5.8
Absent	33	91.6	33	94.2
Death of a relative (Parents, siblings, children) because of COVID-19				
Present	10	27	4	11.4
Absent	26	73	31	88.5

Outcome Measures

Personal Information Form: The present form including demographic information of the participants was developed by the researchers. It includes information such as age, gender, education level, and marital status, working hours, presence of COVID-19 infection and death of a relative because of COVID-19.

Secondary Traumatic Stress Scale (STSS): The scale was developed by Bride et al. (2004) and was adapted into Turkish by Yildirim et al. (2018). It is a 17-item, five-point Likert-type data collection tool. The scale has three subscales: emotional violation, avoidance, and arousal. The score that can be obtained from the scale varies between 17 and 85 with high scores indicating high levels of exposure to secondary trauma. The internal consistency coefficients of the original scale were 0.94 for emotional violation, 0.83 for avoidance, 0.89 for arousal subscales and 0.85 for the total scale. The Cronbach's alpha reliability coefficient value for the total scale was found as 0.96 within the scope of the present study.

Perceived Ability to Cope with Trauma Scale (PACT): It is a 7-point Likert-type scale developed by Bonanno et al. (2011) to evaluate the perception of coping with traumatic life. It consists of 20 items and 2 subscales (Bonanno et al., 2011). These subscales are "Forward-Focus" and "Trauma-Focus". The score that can be obtained from the scale ranges between 20 and 140. High scores on the scale indicate that the perceived ability to cope with trauma is high. The Cronbach's alpha internal consistency coefficients of the scale were found to be 0.91 for the "Forward Focus" subscale, and 0.79 for the "Trauma Focus" subscale. The scale and was adapted into Turkish by Arı and Soysal (2019). The Cronbach's alpha reliability coefficient for the forward focus was found to be 0.91, and 0. 84 for the trauma focus subscale within the scope of the present study.

Depression Anxiety Stress Scale (DASS-21): The scale was developed by Lovibond and Lovibond (1995). Psychometric properties of the Turkish version of the DASS-21 in normal and clinical samples were conducted by Sarıçam (2018).

This scale is a 4-point Likert-type scale consisting of 21 questions measuring "dimensions of depression, stress, and anxiety". A score of 5 points or more from the subscale of depression, 4 points or more from anxiety, and 8 points or more from stress indicates that the patient has the related problem. The internal consistency coefficients of the scale in the clinical sample were calculated as 0.87 for the subscale of depression, 0.85 for the subscale of anxiety, and 0.81 for the subscale of stress. Test-retest correlation coefficients in the normal sample were calculated as r = 0.68 for the subscale of depression, r = 0.66 for the subscale of anxiety, and r = 0.61 for the subscale of stress. As a result of the reliability analysis conducted within the scope of the present study, Cronbach's alpha coefficients were calculated as 0.85 for the subscale of anxiety, 0.90 for the subscale of depression, and 0.90 for the subscale of stress.

In their study evaluating the clinical significance of treatment outcomes using the DASS-21, Ronk et al., (2013) found out that it was effective in the clinical evaluation of inpatients and outpatients as well as in identifying functional and non-functional ones. For this reason, in order to be able to demonstrate the effectiveness of the intervention, the cut-off scores of DASS-21 were considered as criteria, and it was preferred that it showed higher symptoms in the least area. In addition, the fact that the secondary traumatic stress levels of healthcare professionals are one standard deviation above the mean was used as a criterion to determine the effectiveness of the intervention in terms of showing that these symptoms were more intense.

Structured Clinical Interview for DSM-5: After determining 78 individuals according to the inclusion and exclusion criteria, the Structured Clinical Interview for DSM-5 Disorders was conducted by the second author of the study. The objectives of this interview were to understand possible overlooked psychopathologies within the framework of inclusion and exclusion criteria, recognize and exclude traumas outside of the Covid-19 pandemic, in case of violation of exclusion criteria, to identify psychiatric disorders, and detect suicidal tendencies, individuals were informed and excluded from the study. The Turkish adaptation of the Structured Clinical Interview for DSM-5 Disorder interview was conducted by Elbir et al. (2019). In the Turkish adaptation study, the diagnostic agreement and accuracy among the raters were calculated with the Cohen kappa coefficient. According to the results obtained, the kappa values were statistically significant and the Turkish version was found suitable for the clinical practice and use (Elbir et al., 2019).

The Intervention

Cognitive-Behavioral Therapy Based E-Psychological Support Program (CBTBE-SP): The Cognitive-Behavioral Therapy Based E-Psychological Support Program has been developed based on studies that have been shown to be effective in randomized controlled trials (Moberg et al., 2019; Possemato et al., 2016; Roepke et al., 2015; Titov et al., 2009). Based on these programs, modules of a CBT-based program have been developed. When examining the content of these programs, it is evident that they include fundamental knowledge and skills such as CBT and psychoeducation related to symptoms, emotion awareness, self-assessment, symptom management, cognitive restructuring, behavioral activation, recognizing positive and negative beliefs, modifying core beliefs, meditation/relaxation exercises, health behaviors (sleep, caffeine consumption, and exercise), and information about relapse prevention.

The Cognitive Behavioral Therapy Based E-Psychological Support Program (CBTBE-SP) was designed with 6 modules using the secondary trauma-focused cognitive-behavioral therapy based on psycho-education and mobile application. The program is completely structured on the basis of the needs, characteristics, and experiences of HCPs. Thus, at the first stage of the program development process, 26 HCPs (7 doctors, 8 nurses, 11 other healthcare professionals) were asked three open-ended questions and their thoughts on the COVID-19 pandemic were determined. The dysfunctional thoughts were determined by applying content analysis to the obtained data. All of these dysfunctional thoughts have been used in examples, practices, and activities within modules. The dysfunctional thoughts were detected by carrying out content analysis on the obtained data. These thoughts are as follows:

1. I am very worried about transmitting the disease and infecting my relatives or loved ones with the virus.
2. I am afraid that bad things are going to happen to me and my loved ones if the virus infects me.
3. No matter how many precautions I take, as a healthcare professional, the risk of infected with the disease is very high.
4. It is uncertain when the pandemic is going to end, which makes me very scared, what if the second wave comes?
5. The virus is not going to infect me only if I take too many precautions.
6. Even if the chance is one in ten million, the virus is going to come and find me.

7. It seems to me that this virus is much more dangerous than I thought.
8. If I have a fever, headache, and muscle pain, it means that I am definitely infected with the virus.
9. The virus is going to affect my life irreversibly and my life is not going to be the same again.

Separate versions of the application have been developed for Android and iOS. There is an admin panel in the program. Hence, researchers could see if each participant has completed the module and could examine the completed module. The program allowed healthcare professionals to enter the system and participate in the application whenever they wanted.

The Program's Content

Module 1: Stress model: Participants understood their stress responses, the physical, emotional, behavioral, and cognitive effects of stress, the methods they have used to cope with stress until now, other healthy ways to cope with stress, and acquire information on body awareness exercises.

Module 2: Self-monitoring skills: The participants learned the CBT perspective to make their own case conceptualizations, and to view their problems from five different (situation, emotions, thoughts, behaviors, physical reactions) perspectives.

Module 3: Coping with anxiety: The participants learned behavioral skills to cope with their anxiety as healthcare professionals, and they learned the methods of coping with anxiety.

Module 4: Behavioral activation skills: Participants learned to increase behavioral activation, activities they enjoyed and found worthy of doing.

Modules 5-6: Cognitive restructuring skills: In these two modules, participants learned to recognize their thoughts in general and on the pandemic, learned about the benefits and negative impacts of thoughts, found evidence that did and did not support their thoughts, in addition to learning about ways to question a thought, and how to develop alternative thoughts. Since dysfunctional thoughts were discussed in detail, the cognitive restructuring module was structured as two modules. The modules of the Cognitive-Behavioral Therapy-Based Psychological Support Program applied to the intervention group are given in Table 2.

Table 2. The Cognitive Behavioral Therapy-Based E-Psychological Support Program's modules

1st Module: Stress Model	Understanding the stress model, Being able to recognize the physical, emotional, behavioral and cognitive effects of stress Being able to recognize the ways they have used to cope with stress Learning other healthy coping ways to cope with stress Recognizing the importance of body awareness exercises Being able to practice body awareness exercises Assessment and summary of the module
2nd Module: Self-Monitoring Skills	Being able to recognize the relationship between thought, emotion, and behavior (ABC model) Ability to apply the ABC model from examples specific to healthcare professionals To be able to see the effects of thoughts on daily life Being able to notice thoughts and mistakes in thoughts Recognizing the necessity of questioning to thoughts Assessment and summary of the module
3rd Module: Coping with Anxiety	To be able to recognize behavioral skills to cope with anxiety during the pandemic period, Being able to practice changing the focus of attention, which is an important technique for coping with anxiety, Ability to use coping cards when anxious, To be able to apply the breathing exercise, To be able to apply the relaxation exercise, Assessment and summary of the module
4th Module: Behavioral Activation Skills	Realizing what can be done to take action, Making an activity plan To be able to implement the activity plan To be able to apply mindfulness exercise Creating goals in line with his/her values Assessment and summary of the module
5th Module: Cognitive Restructuring	Being able to recognize dysfunctional thoughts related to the pandemic Identifying the benefits and harms of dysfunctional thoughts Finding evidence that supports and does not support dysfunctional thinking Learning how to question a thought Ability to develop alternative thoughts Flexible and multi-choice thinking Assessment and summary of the module
6th Module: Cognitive Restructuring	Being able to recognize dysfunctional thoughts related to the pandemic Identifying the benefits and harms of dysfunctional thoughts Finding evidence that supports and does not support dysfunctional thinking Learning how to question a thought Ability to develop alternative thoughts Flexible and multi-choice thinking Assessment all modules.

Procedure

The present study's groups consisted of healthcare professionals working at Gaziantep University, Şahinbey Training and Research Hospital, providing healthcare services for the COVID-19 pandemic, and volunteering to participate in the research. The participants were randomly assigned to the intervention and control groups. There are two reasons for choosing this hospital: Gaziantep University, Şahinbey Training and Research Hospital is one of the largest hospitals in the region. For this reason, it is one of the hospitals where cases have been frequently accepted and treated due to the COVID-19 pandemic. Secondly, cases that are difficult to care for and have a high probability of death are treated in this hospital. Gaziantep University, Şahinbey Training and Research and Hospital employs a total of 2545 individuals, including 595 doctors (97 professor doctors, 26 associate professor doctors, 71 assistant professor doctors, and 401 assistant doctors), 450 nurses, and 1500 other healthcare professionals.

The researchers sent data collection tools to 2545 healthcare professionals in the hospital via e-mails and messages during the participant selection process. A total of 529 HCPs participated in the online data collection program. The data collection tools were applied to 529 HCPs in a hospital between the dates of September 9th, 2020 and September 28th, 2020. Of the 529 participants, 68 were excluded directly due to missing scales or information. 461 participants filled the assessment tools completely. Accordingly, within the inclusion criteria, 85 individuals with moderate or higher anxiety, depression, or stress levels according to the analysis of the DASS 21 (Anxiety score above 7 or stress score above 14 or depression score above 9), accompanied by secondary trauma stress scale above +1 standard deviation were selected. The Structured Clinical Interview for DSM-5 was carried out on 85 participants who met the criteria by the second author of the study. In this interview, the fifth author evaluated the participants in terms of DSM-5 criteria. The SCID was used to evaluate participants' psychiatric or psychological disorders other than anxiety, stress, or depression. 7 individuals were excluded because of the use of psychiatric medication, although they did not express this in the personal information form. Finally, 78 participants were assigned to the intervention and control groups. Simple randomization was utilized in the study, using a random number table. Blinding was used in the research for the participants, the data collection tools, and the experts who carried out the data analysis. Although the participants in the intervention group were not given the information that they were in the intervention group, it can be stated that there exists a risk in terms of blinding since they personally used a mobile application. Since the authors of the study personally followed the e-psychological support application, blinding could not be done. It has been stated that blinding the evaluators who analyze the output and perform the analysis in non-drug studies is effective in reducing the bias in the effect size (Hróbjartsson et al., 2013). A total of 42 individuals were randomly

assigned to the intervention group and 36 individuals to the control group in order to avoid decreasing below the critical value of 36 in the case of loss of subjects from the intervention group. Accordingly, the intervention and control groups were comprised of 36 and 35 individuals respectively (Figure 1).

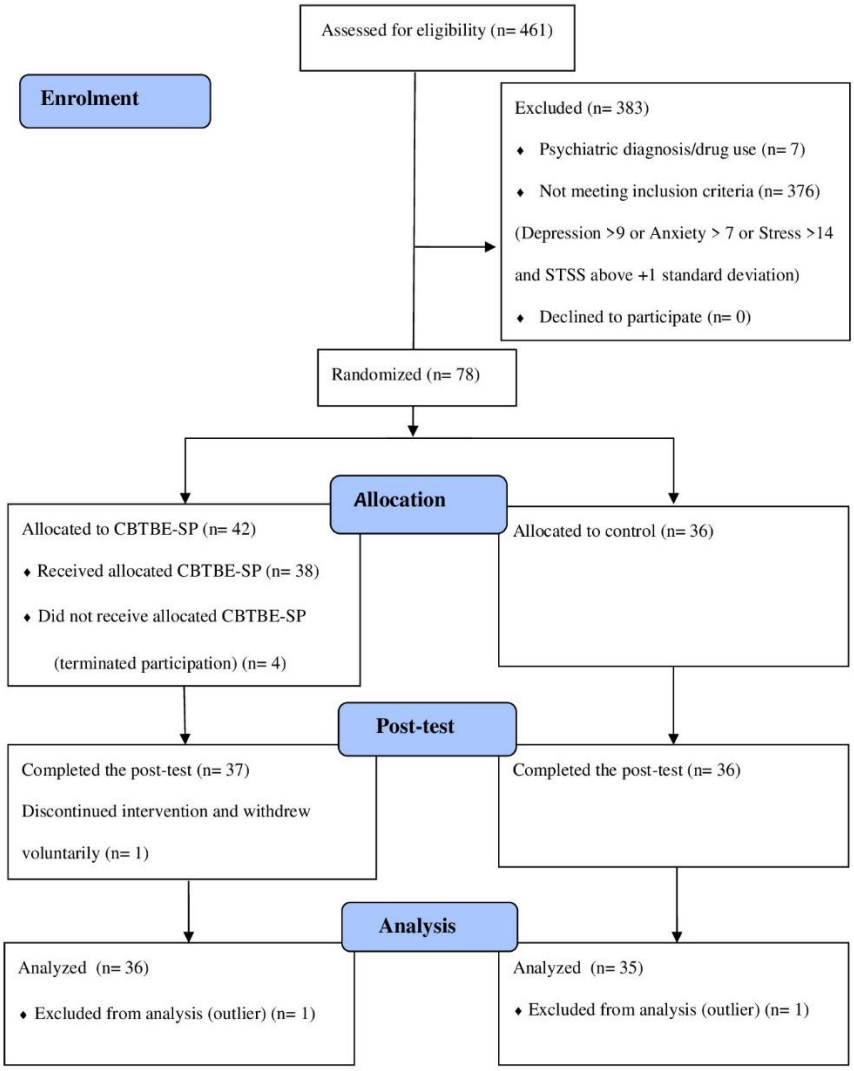

Figure 1. Study flowchart and design

The Secondary Traumatic Stress Scale (STSS), the Perceived Ability to Cope with Trauma Scale (PACT), and the Depression Anxiety Stress Scale (DASS-21) were used for collecting the data before and after the application of CBTBE-SP. An intervention and a control group were included in the study. The CBTBE-SP was applied to the intervention group for a period of 6 weeks with no interventions made to the control group during this process. The implementation of the program was carried out between the dates of October 30th, 2020 and December 1st, 2020. Healthcare professionals were requested to complete one module within a week. Warning and reminder messages were sent to the participants who did not complete the module.

Following the application to the intervention group, the data collection tools were re-applied to the intervention and control groups immediately following the first application. Post-test implementations were carried out between the dates of December 5th and December 20th, 2020. Healthcare professionals in the control group would be on the waiting list and implementation started for this group as well following the CBTBE-SP.

Data Analysis

The 2*2 (group*time) Repeated Measures ANOVA test was used to compare the scale scores obtained at different measurement times according to intervention groups. In the present study, a per-protocol analysis was performed, and those who did not complete the study, showed significant incompatibility with the protocol, had filled the scale incompletely or incorrectly or had extreme values by marking all items as 1 or 5, and who did not meet the inclusion criteria were not included in the final analysis. Bonferroni test, one of the multiple comparison tests (post-hoc tests), was used to determine the statistical difference between the different measurement times. Before the analysis, the assumptions such as normality and homogeneity of the variances were tested, and it was determined that the assumptions were met. The analyzes were carried out using SPSS 22.0 and STATISTICA programs. A significance level of $p < 0.05$ was chosen. The effect size was also calculated in the present study.

Results

The pre-test and post-test mean scores and standard deviations of the participants in the CBTBE-SP intervention and control groups obtained from all scales are presented in Table 3.

Table 3. Pre-test and post-test mean scores and standard deviations obtained from the participants in the intervention and control groups from all scales

			Pre-test	Post-test				
Scales	Groups	*N*	$\overline{X}$± *SD*	$\overline{X}$± *SD*	Source of Variance	*F*	*p*	*η p2*
STSS Total	Intervention	36	64.30± 6.20	41.88± 17.01	Time	78.718	.000	.55
	Control	35	68.00± 8.33	56.14± 17.38	Time*Group	7.472	.008	.98
STSS-Avoidance	Intervention	36	26.75± 3.20	17.86± 6.98	Time	62.570	.000	.47
	Control	35	28.31± 4.07	23.45± 7.25	Time*Group	5.383	.023	.07
STSS-Arousal	Intervention	36	20.47± 2.59	13.11± 5.48	Time	71.071	.000	.50
	Control	35	21.40± 2.88	17.57± 5.88	Time*Group	7.083	.010	.09
STSS-Intrusion	Intervention	36	17.11± 3.12	10.91± 5.35	Time	59.445	.000	.46
	Control	35	18.25± 3.91	15.11± 5.53	Time*Group	6.349	.014	.08
DASS-21 Total	Intervention	36	40.75± 8.85	23.72± 14.42	Time	48.093	.000	.41
	Control	35	43.17± 10.09	34.94± 15.31	Time*Group	5.838	.018	.07
DASS-21 Anxiety	Intervention	36	10.77± 4.32	5.63± 4.53	Time	33.378	.000	.32
	Control	35	12.34± 4.06	10.14± 5.42	Time*Group	5.353	.024	.07
DASS-21 Stress	Intervention	36	15.16± 2.90	9.61± 5.36	Time	37.486	.000	.35
	Control	35	15.31± 4.26	12.60± 5.27	Time*Group	4.425	.039	.06
DASS-21 Depression	Intervention	36	14.80± 4.02	8.47± 6.19	Time	46.002	.000	.40
	Control	35	15.51± 4.16	12.20± 5.67	Time*Group	4.505	.037	.06
PACT Total	Intervention	36	86.83± 15.45	93.13± 20.10	Time	.575	.451	.00
	Control	35	92.54± 25.41	81.62± 26.20	Time*Group	8.028	.006	.10
PACT Forward Focus	Intervention	36	38.41± 8.65	37.97± 8.98	Time	6.137	.016	.08
	Control	35	40.02± 8.30	33.65± 10.36	Time*Group	4.641	.035	.06
PACT Trauma Focus	Intervention	36	48.41± 15.06	55.16± 16.60	Time	.269	.605	.00
	Control	35	52.51± 19.37	47.97± 18.79	Time*Group	7.052	.010	.09

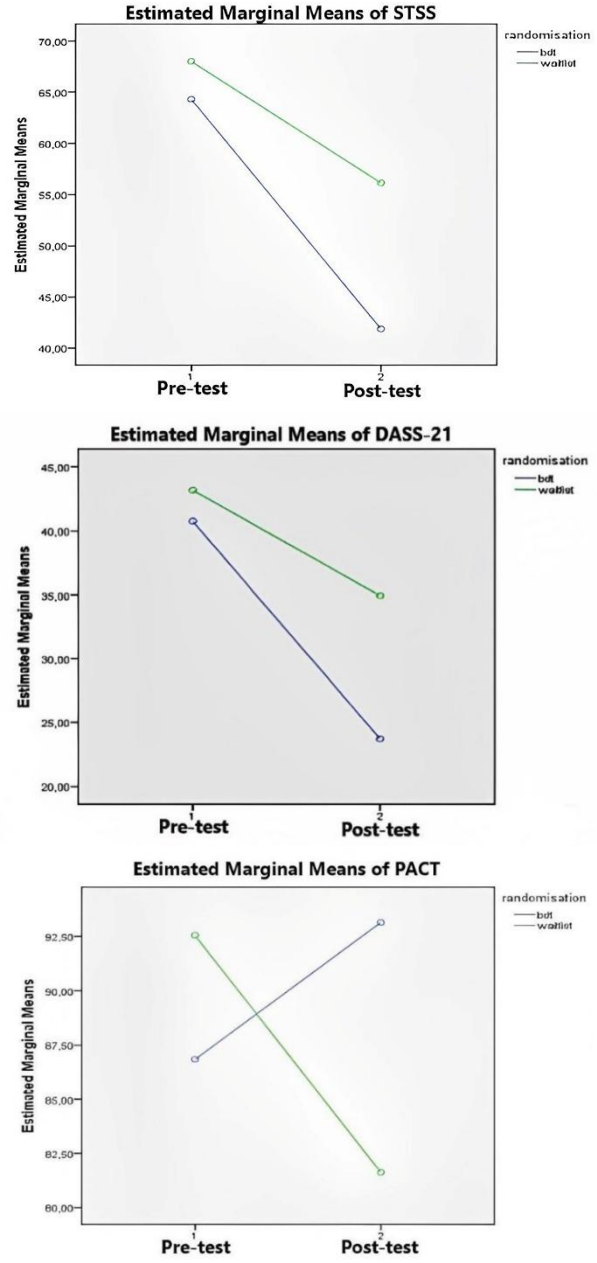

Figure 2. The change in the STSS, DASS-21 and PACT mean scores of the participants in the CBTPE-SP intervention and control groups

The means and standard deviations of both measurement times as well as the pre-post comparison for the Secondary Traumatic Stress Scale are presented in Table 3. When Table 3 is examined, it has been seen that there is a statistically significant difference between the STSS and its subscales post-test mean scores of the healthcare professionals in the CBTBE-SP intervention and control groups. In addition, The group*measurement interaction effects showed that the decrease in secondary traumatic stress scores of the individuals in the experimental group was significantly higher than the individuals in the control group ($F_{(1, 69)}$=7.472 p<0.05, n^2= 0.09). These results are also included in Figure 2.

The means and standard deviations of both measurement times as well as the pre-post comparison for the the Depression Anxiety Stress Scale are presented in Table 3. When Table 3 is examined, it has been seen that there is a statistically significant difference between the DASS-21 and its subscales post-test mean scores of the healthcare professionals in the CBTBE-SP intervention and control groups. It was found that the group*measurement interaction effects of the DASS-21 total score decrease of the individuals in the experimental group was significant compared to the control group ($F_{(1, 69)}$=5.838, p<0.05, n^2= 0.07. These results are also presented in Figure 2.

The means and standard deviations of both measurement times as well as the pre-post comparison for the the Perceived Ability to Cope with Trauma Scale are presented in Table 3. When Table 3 is examined, it has been seen that there is a statistically significant difference between the PACT post-test mean scores of the healthcare professionals in the CBTBE-SP intervention and control groups. While the mean scores of the perception levels of coping with trauma of the individuals in the experimental group increased significantly, the mean scores of the individuals in the control group decreased significantly as a result of the group*measurement interaction effects ($F_{(1, 69)}$=7.472 p<0.05, n^2= 0.09). These results are also presented in Figure 2.

Discussion

The COVID-19 pandemic has taken a toll on global physical and mental health, emphasizing the need to safeguard frontline healthcare workers. Long-term studies are essential to comprehend its effects fully. This research aims to create an e-psychological support program based on Cognitive-Behavioral Therapy tailored to healthcare professionals during the pandemic, testing its efficacy on secondary traumatic stress, depression, anxiety, and trauma coping perceptions.

In the study, anxiety, stress, and depression levels of the healthcare professionals in the control group also decreased. However, the decrease in anxiety,

stress, and depression levels observed in the intervention group was higher when compared to the control group. Factors contributing to the decrease in anxiety, stress, and depression levels of the healthcare professionals in the control group include the elimination of information deficiencies and reduction of information pollution at the beginning of the pandemic, the provision of protective equipment (De Kock et al., 2021; Yin & Zeng, 2020), distribution of treatment guidelines (Cai et al., 2020), start of vaccine application for healthcare professionals during the program implementation, reduced uncertainty due to this situation (Cai et al., 2020), establishment of teamwork, institutional and social supports (De Kock et al., 2021; Sun et al., 2020; Xiao et al., 2020), and according to the information obtained during the application, the fact that most of the healthcare professionals have infected with COVID-19 has contributed to the decrease in their anxiety, stress, and depression levels. Another reason can be expressed by the results of two longitudinal studies. Accordingly, there are also studies suggesting that the depression and anxiety levels of healthcare professionals have been high during the pandemic period and have decreased over time (Sun et al., 2020; Xu et al., 2020). There are very few studies in related publications to compare the results of the present study. When the programs developed during the pandemic are examined, it can be stated that the research processes continue and the first results aim to increase the psychological well-being of health workers and reduce the levels of stress, anxiety, and depression. (Bureau et al., 2021; Jovarauskaite et al., 2021; López-del-Hoyo et al., 2022; Serrano-Ripoll et al., 2021; Weiner et al., 2020). In one of these studies, Wahlund et al. (2020) found that the online intervention, which was developed based on a cognitive-behavioral approach for individuals affected by the COVID-19 pandemic, led to a positive improvement in reducing the anxiety levels of individuals, similar to the results of the present study. In meta-analysis studies showing the effectiveness of CBT in the treatment of depression and anxiety, it has been presented to be a highly effective intervention (Cuijpers et al., 2013; Cuijpers et al., 2014; Cuijpers et al., 2016; Li et al., 2018; Wersebe et al., 2013). The effectiveness of the intervention program based on CBT as an evidence-based therapy method has proven to be an effective support program according to the relevant literature. In addition, it has been considered that it would be important for future studies that all examples, practices, and structures in the intervention program developed in the present study are specific to healthcare professionals and the COVID-19 pandemic.

In this study, the CBT-based e-psychological support program (CBTBE-SP) was effective in reducing secondary traumatic stress levels among healthcare workers in the intervention group. While secondary traumatic stress levels decreased in the control group, the reduction was significantly higher in the intervention group. Although no comparative study exists in the literature regarding the effects of online therapy programs on secondary traumatic stress, cognitive therapies' effectiveness in treating post-traumatic stress disorder (PTSD) is well-documented (Barrera et al.,

2013; Men-des et al., 2008; Shi & Hall, 2020). The observed decrease in secondary traumatic stress levels in the intervention group, compared to the control group, may be attributed to improved coping skills, depersonalization of severely ill COVID-19 patients, effectiveness of new treatments, and decreased mortality rates due to COVID-19. However, research on the effects of CBT on secondary traumatic stress is limited, necessitating further investigation (Graham, 2012). This study may serve as a guide for future research on secondary traumatic stress. Despite the inevitability of healthcare professionals being exposed to secondary trauma during the pandemic, offering CBT-based e-psychological support programs tailored to healthcare professionals can effectively mitigate its effects.

A notable finding of this study is the significant increase in healthcare professionals' perceptions of coping with trauma following receipt of e-psychological support, compared to the control group, with a notably high impact. No literature was found analyzing the effects of online therapy programs on coping with trauma perception. The perceived ability to cope with trauma scale assesses coping flexibility through trauma-focus and forward-focus factors (Bonanno et al., 2011). Those utilizing trauma-focus coping may reduce activities post-trauma, while forward-focus copers maintain normal activities and create goals to overcome distress. Flexibly employing coping strategies is associated with better trauma adaptation (Park et al., 2015). Forward-focus coping, not trauma-focus, is linked to lower depressive symptoms (Rodin et al., 2017), aligning with the study's findings of improved forward-focus coping perception among healthcare professionals. CBT, though not directly targeting coping flexibility, promotes cognitive flexibility by challenging dysfunctional thoughts (Soltani et al., 2013; Kahrizi et al., 2011). Online interventions teaching stress coping techniques and cognitive interventions addressing anxiety-inducing thoughts may enhance trauma coping perception.

There is a possibility that healthcare professionals could have caught COVID-19 due to the pandemic during the research process, and this situation could not be considered as a control variable. Within the scope of the research, the status of having COVID-19 in the groups before and after the intervention was examined, as having gone through COVID-19 may affect the results of the analysis. The status of having had the COVID-19 was analyzed with the Chi-square test. The chi-square analysis of whether the healthcare professionals in the intervention and control groups differed according to the COVID-19 infection status before and after the intervention has indicated that they have not presented statistically significant differences according to the pre-intervention COVID-19 infection status and post-intervention COVID-19 infection status.

The study acknowledges the potential impact of COVID-19 infection on participants, yet found no significant differences in infection rates between intervention and control groups. However, the research, limited to 71 healthcare professionals (HCPs) at one hospital, couldn't monitor long-term effects of the

program due to project duration. Factors like personal losses or patient overload may affect HCPs' mental health, not fully explored. Rapid COVID-19 developments and unanalyzed primary trauma levels pose limitations. Conducted in Gaziantep, a metropolitan city possibly with lower HCP pressure compared to other Turkish cities, further affecting generalizability. Monitoring during data collection wasn't feasible, hindering long-term analysis. Despite efforts to assess COVID-19 impact, broader contextual factors influencing mental health outcomes remain unexplored.

In conclusion, the Cognitive-Behavioral Therapy-based E-Psychological Support Program, compatible with computers and smartphones, appears effective in reducing depression, stress, anxiety, and secondary traumatic stress among healthcare professionals, enhancing their coping with trauma. Literature suggests such online therapy programs for healthcare professionals are in development and trial phases, highlighting the pioneering role of this study. It may serve as a guide for future research. Global adoption of similar practices in health policies is crucial, especially for potential future crises, promoting mental health. Online interventions offer accessible alternatives for busy healthcare professionals constrained by work schedules and social distancing rules, potentially bridging gaps in mental health support.

Author's note

Data Availability: The dataset that supports the findings of the current study is available from the corresponding author upon reasonable request.

Conflict of Interest: On behalf of all authors, the corresponding author states that there is no conflict of interest with the respect to the research, authorship, and/or publication of this article.

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Ethical Approval: Ethical and application permissions of the project were obtained prior to the implementation. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee, and with the 1964 Helsinki Declaration, and its later amendments or comparable ethical standards. Approval was granted by the Clinical Research Ethics Committee of Gaziantep University (Decision Number: 2020/203). This was followed by obtaining the application permission from Gaziantep University, Sahinbey Training and Research Hospital's Chief Physician (Number: 91786782/020/26742).

Informed Consent: Informed consent was obtained from all participants included in the study.

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