

# The Effect of the Progressively Lowered Stress Threshold Model Training Program on Depression and Care Burden in Dementia Patient Caregivers

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## Abstract

**The objective** of this study was to determine the effect of the Progressively Lowered Stress Threshold training program on depression and care burden in dementia patient caregivers.

**Materials and Methods.** We applied an experimental model based on a pretest-posttest control group. The sample consisted of 140 dementia caregivers (the experimental group and the control group with 70 participants per group). The sample size was determined, and the participants were allocated to groups using power analysis. Data of the study were collected between April 15, 2016 and July 15, 2016. For the pre-test, both groups were provided with the Sociodemographic Characteristics Form, the Beck Depression Inventory (BDI), and the Caregiver Burden of Dementia Patient Caregiver Scale (CBDPCS) to be filled in. Then, the experimenter visited the homes of the experimental group patients twice at 2-week intervals to provide nursing care based on the Progressively Lowered Stress Threshold Model. Finally, after 8 weeks, the post-test was conducted by letting both groups complete the Sociodemographic Characteristics Form, the BDI, and the CBDPCS once again. Percentage, chi-square, in independent and dependent sample t-tests were used to evaluate the related data.

**Results.** The mean BDI score was  $15.61 \pm 10.97$  in the pre-test and  $11.08 \pm 8.82$  in the post-test ( $t=6.738$ ,  $p=0.001$ ). The mean pre-test and post-test total CBDPCS scores of caregivers were  $67.02 \pm 16.23$  and  $59.27 \pm 15.25$ , respectively ( $t=5.974$ ,  $p=0.001$ ). The difference between the intergroup comparison of the mean experiment and control group post-test scores was statistically significant ( $p=0.001$ ) on the CBDPCS and the total BDI score.

**Conclusions.** Our results suggest that education provided to caregivers can efficiently decrease their care burden and depression levels.

## Keywords

Dementia; Caregivers; Care Burden; Depression; Education

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## Introduction

Dementia has become a very challenging and significant care issue because it compromises the health of the elderly population [1]. It is estimated that 30 million people in the world suffer from this condition, and it is expected that the rate of this disease will double within the next twenty years [2, 3]. Dementia people require high-level care, which is primarily provided by family members. Caregiver burden and depression are the most common negative consequences identified in caregivers of elderly and chronic patients [3–5]. Caregiver burden can have a devastating effect on the social, professional and personal roles of a caregiver, collectively facilitating the manifestation of

psychological disorders. Consequently, caregivers are left to suffer from stress, depression and other health problems. Caregiver exhaustion and stress have several negative consequences, both for the patient and the caregiver, which may also lead to the development of depression and a significantly reduced quality of life [6].

It is crucial to work with dementia patient caregivers. Training these caregivers for their roles and providing emotional support are essential. Psychoeducation is an example of an intervention strategy used with these caregivers. Psychoeducational interventions seem to aid in reducing burden and depression, improving subjective well-being, and increasing the knowledge and abilities of the caregiver [7, 8].

The Progressively Lowered Stress Threshold Model (PLST) is a psychoeducational approach to empower dementia patient caregivers. The PLST, developed by Hall and Buckwalter in 1987, is used for dementia patients and their caregivers, which provides efficient knowledge and skills to demented individuals, thus enabling them to make the appropriate adjustments while improving their quality of life [9].

The PLST is a theoretical framework that allows caregivers to manage the overall care process, as well as to increase the function of demented individuals and also to reduce their behavioral problems [6, 9]. The PLST is used as the main framework for the design of non-pharmacological interventions, including massage and music, and forms the basis for additional nursing models and book chapters. The model includes community-based psychoeducational intervention for caring for caregivers. While individualized for each caregiver and focused on their psychological support, the intervention aims to support fundamental behavioral techniques, while, at the same time, focusing on reducing the lowered stress threshold, supporting unconditional positive thinking, overcoming a potential lack of communication, balancing orientation functions, as well as reducing stress. In fact, the PLST has a vital influence on caring for caregivers of demented individuals for more than seventeen years. The sustainability of the model continuation is widely applied and defined in systematic tests and nursing practices which was first implemented to assess nurses' effectiveness in special care units for three months. At the end of this period, agitation, intentional wanderings, recurrent questioning, hallucinations, aggressive behaviours and use of psychotic drugs were all significantly reduced [10, 11].

**The objective** of this study was to determine the effect of the PLST training program provided to dementia patient caregivers on reducing the level of caregiver burden and depression.

**Hypothesis:**

1. The PLST training program provided to dementia patient caregivers significantly decreases the level of caregiver burden.
2. The PLST training program provided to dementia patient caregivers reduces the level of depression.

**Materials and Methods**

**Study Design**

A pretest-posttest control group trial was conducted to determine the effect of education on the level of caregiver burden and depression in dementia patient caregivers.

**Participants**

The power analysis indicated that the margin of error was 0.05, the confidence interval was 0.95, the effect size was 0.06, the population representation power was 0.95, and the sample was made up of 140 caregivers. Thus, a total of 140 out of 480 caregivers of dementia patients residing in the city centre of Malatya Province and getting their diagnosis in Turgut Özal Medical Center Dementia Polyclinic of the Neurology Department were included in this study

after defining the sample size. According to the results of the simple random sampling method, 70 caregivers made up the experimental group and 70 caregivers made up the control one. Data were collected between April 15, 2016 and July 15, 2016. The inclusion criteria were as follows: 1) being able to communicate; 2) being a caregiver for at least six months; 3) being the main person responsible for the care of the person; 4) serving as informal caregiver. The exclusion criteria were: 1) the caregiver suffers from a chronic illness; 2) the caregiver performs this task for a fee; 3) the caregiver is illiterate.

The comparison of the control variables of caregivers in the experimental and control groups included in the study is given in Table 1. Accordingly, no statistically significant

**Table 1.** Comparison of control variables of caregivers in the experimental and control groups.

Characteristics	Experimental group n=70		Control group n=70		Test, p value
	n	%	n	%	
<b>Gender</b>					
Female	48	68.6	56	80	$\chi^2=2.393$ p=0.088
Male	22	31.4	14	20	
<b>Marital Status</b>					
Married	57	81.4	60	85.7	$\chi^2=0.468$ p=0.324
Single	13	18.6	10	14.3	
<b>Education status</b>					
Literate	18	25.7	16	22.9	$\chi^2=3.427$ p=0.489
Primary school	23	32.9	33	47.1	
High school	13	18.6	8	11.4	
University	16	22.8	13	18.6	
<b>Employment status</b>					
Employed	17	24.3	16	22.9	$\chi^2=0.040$ p=0.500
Unemployed	53	75.7	54	77.1	
<b>Income level</b>					
Low	5	7.1	8	11.4	$\chi^2=5.262$ p=0.072
Middle	44	62.9	52	74.3	
High	21	30	10	14.3	
<b>Healthcare insurance</b>					
Yes	57	81.4	61	87.1	$\chi^2=0.863$ p=0.243
No	13	18.6	9	12.9	
<b>Existence of someone helping the caregiver</b>					
Yes	39	55.7	38	54.3	$\chi^2=0.029$ p=0.500
No	31	44.3	32	45.7	
<b>Existence of another person who caregivers</b>					
Yes	12	17.1	9	12.9	$\chi^2=0.504$ p=0.318
No	58	82.9	61	87.1	
	Mean±SD		Mean±SD		
Age, years	48.89±13.49		52.17±13.47		t=-1.441 p=0.152
Monthly care time	41.92±28.43		39.91±31.30		t=0.398 p=0.691
Daily care time	8.67±6.33		9.54±7.24		t=-0.758 p=0.205
Children	2.98±1.98		3.02±2.02		t=-0.126 p=0.774
Someone helping the caregivers	1.62±0.92		1.86±1.01		t=-1.106 p=0.674
Another person who caregivers	1.75±0.75		1.00±0.00		t=2.789 p=0.001

cant difference was found between the control variables of the caregivers in the experimental and control groups ( $p > 0.05$ ) (Table 1).

The comparison of the control variables of dementia patients in the experimental and control groups included in the study is given in Table 2. According to this, no statistically significant difference was found between the control variables of the dementia patient experimental and control groups ( $p > 0.05$ ).

**Table 2.** Comparison of control variables of dementia patients in the experimental and control groups.

Characteristics	Experimental group n=70		Control group n=70		Test, p value
	n	%	n	%	
<b>Gender</b>					
Female	35	50	30	42.9	$\chi^2=0.718$ p=0.249
Male	35	50	40	57.1	
<b>Marital status</b>					
Married	50	71.4	53	75.7	$\chi^2=0.331$ p=0.351
Single	20	28.6	17	24.3	
<b>Education status</b>					
Illiterate	38	54.3	28	40	$\chi^2=11.772$ p=0.019
Literate	15	21.4	11	15.7	
Primary school	17	24.3	22	31.4	
High school	0	0	4	5.7	
University	0	0	5	7.2	
<b>Dementia stage</b>					
Early	10	14.3	15	21.4	$\chi^2=2.176$ p=0.337
Middle	36	51.4	28	40	
Late	24	34.3	27	38.6	
<b>Another diagnosis</b>					
Yes	43	61.4	42	60	$\chi^2=0.030$ p=0.500
No	27	38.6	28	40	
	Mean±SD		Mean±SD		
Age, years	77.44±8.65		77.61±9.24		t=-1.110 p=0.910
Dementia duration, months	40.00±27.19		42.37±27.76		t=-0.511 p=0.775

### Data Collection Tool

The Sociodemographic Characteristics Questionnaire, the Caregiver Burden of Dementia Patient Caregiver Scale (CBDPCS) and the Beck Depression Inventory (BDI) were used to evaluate dementia patient caregivers.

### Sociodemographic Characteristics Questionnaire

The Sociodemographic Characteristics Questionnaire was prepared by the researchers to obtain information regarding the sociodemographic characteristics of caregivers and dementia patients. It consists of 26 questions aiming at the caregiver's age, gender, education and marital status, social security, income level, degree of proximity with the patient, number of children, how long and how many hours a day they have been caring for the patient; the dementia patient's age, gender, marital status, income level and time when dementia was first diagnosed.

### Beck Depression Inventory

A 4-point Likert type scale was originally developed by Beck to determine the type and the level of depressive symptoms in individuals. Each item scores between zero and three on the scale and the scale total score ranges between 0 and 63. The Turkish validity and reliability of the BDI was determined by Hisli (1989); the Cronbach's alpha coefficient of the scale is 0.80 and the cutoff score is 17 [12]. In this study, the Cronbach's alpha coefficient of the BDI was found to be 0.91.

### Caregiver Burden of Dementia Patient Caregiver Scale

The CBDPCS consists of four sub-dimensions: physical, social, economic and psychological. Physical subscale items are 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 7<sup>th</sup>; social subscale items are 8<sup>th</sup>, 16<sup>th</sup>, 17<sup>th</sup>, 18<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup> and 22<sup>nd</sup>; economic subscale items are 14<sup>th</sup>, 23<sup>rd</sup> and 24<sup>th</sup>; psychological subscale items are 1<sup>st</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup> and 21<sup>st</sup>. The CBDPCS consists of 24 items on a five-point Likert type scale with one representing the response "never", two representing the response "rarely", three representing the response "occasionally", four representing the response "mostly" and five representing the response "always". The total score of the scale ranges between 24 (the lowest) and 120 (the highest) points. A high score indicates that caregiver burden is high [13].

### Procedure

The Sociodemographic Characteristics Questionnaire, the CBDPCS and the BDI were applied to the experimental and control groups to gather pre-test data during the first home visit. After the pre-test was provided to the experimental group, the training program prepared according to the PLST model was implemented twice at two-week intervals. The training program lasted approximately 45 – 60 min on average. To enhance the efficiency of this training program, the training booklet was distributed to the caregivers subsequent to the second training. The post-test was performed two months after the second training. A telephone interview was used for patient consultations to arrange interviews both with the caregivers and patients at caregivers' homes. At the end of each visit, the day and time were planned for the next visit. Two months following the second interview, the post-test data of the experimental group and control groups were collected (Fig. 1). Upon obtaining the final data of the control group, education was given and a training booklet was distributed.

In the study, the training booklet prepared according to the PLST model was used as a nursing intervention material. PLST models are used to reduce the behavioral symptoms in dementia patients, to improve caregivers' skills and knowledge about life quality and care of individuals with dementia, to identify and reduce stress sources in addition to making effective observations and identify the patient, and to organize the appropriate environment for dementia individuals [10]. The literature review for this booklet prepared for caregivers of dementia patients is based on the Alzheimer's Association of Turkey and evidence-based practice [10, 14–17]. The booklet was evaluated by three experts and includes information on the definition

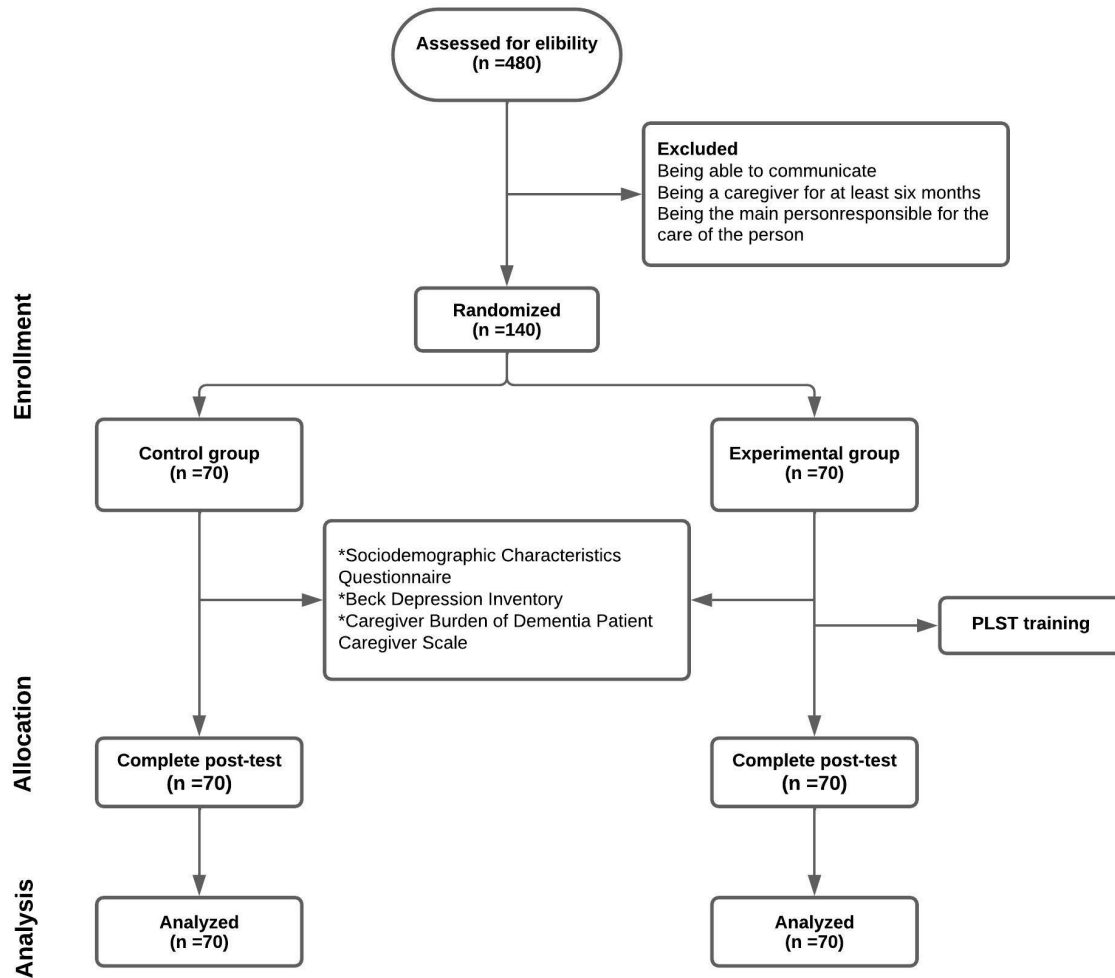


Figure 1. Study CONSORT flow diagram.

of dementia, its indications, stages of the disease, risk factors, treatment, ways of protection, common behavioral changes, problems faced by caregivers and their solutions, environmental regulations and safety precautions to reduce the burden of the caregiver.

The comparison of the characteristic variables of caregivers in the experimental and control groups included in this study are shown in the Table 1. Our findings suggested that there was no statistically significant difference between the control variables of caregivers and demented patients in both the experimental and control groups ( $p > 0.05$ ) (Table 1).

### Data Analysis

The statistical analysis of the data was performed using the IBM SPSS (Statistical Package for Social Science) 18.0 statistics program. The data were found to show a normal distribution in the examination performed with the Kolmogorov-Smirnow test before the analysis. Percentage, chi-square, in independent and dependent sample t-tests were used to evaluate data.

## Results

Table 3 shows the comparison between the pre-test and post-test BDI and CBDPCS mean scores of caregivers in the experimental group. The mean BDI score was  $15.61 \pm 10.97$  in the pre-test and  $11.08 \pm 8.82$  in the post-test ( $t=6.738$ ,  $p=0.001$ ). The total mean CBDPCS scores in the pre-test and post-test were  $67.02 \pm 16.23$  and  $59.27 \pm 15.25$ , respectively ( $t=5.974$ ,  $p=0.001$ ). After receiving the intended education, the mean BDI and CBDPCS scores were seen to decrease and the difference between the two scores was defined as statistically significant (Table 3).

Table 4 demonstrates the comparison of the pre-test and post-test total BDI and CBDPCS scores of caregivers. The mean BDI score in the pre-test was determined to be  $15.35 \pm 12.06$ , while the mean post-test score was  $20.05 \pm 12.82$ . The difference between the two scores was found to be statistically significant ( $t=-6.680$ ,  $p=0.001$ ). The caregivers had the mean CBDPCS score of  $65.61 \pm 18.38$  in the pre-test, and the mean score of  $71.48 \pm 17.70$  in the post-test. The mean post-test scores of caregivers in the control group were found to increase

**Table 3.** Beck Depression Inventory of caregivers in the experimental group and comparison of the pre-test and post-test mean scores of the Caregiver Burden of Dementia Patient Caregiver Scale (n=70).

Scales	Pre-test		Post-test		t	p
	Min-Max	Mean±SD	Min-Max	Mean±SD		
Beck Depression Inventory	0-45	15.61±10.97	0-37	11.08±8.82	6.738	0.001
Caregiver Burden of Dementia Patient Caregiver Scale	38-97	67.02±16.23	32-90	59.27±15.25	5.972	0.001
Physical subscale	8-20	14.64±2.77	7-20	13.82±2.91	3.141	0.002
Social subscale	7-31	19.94±7.11	7-28	17.18±6.50	5.683	0.001
Psychological subscale	11-41	26.25±8.19	10-39	23.25±7.73	4.312	0.001
Economic subscale	3-13	6.18±2.90	2-11	5.00±2.59	4.691	0.001

**Table 4.** Beck Depression Inventory of caregivers in the control group and comparison of the pre-test and post-test mean score of the Caregiver Burden of Dementia Patient Caregiver Scale (n=70).

Scales	Pre-test		Post-test		t	p
	Min-Max	Mean±SD	Min-Max	Mean±SD		
Beck Depression Inventory	0-48	15.35±12.06	1-54	20.05±12.82	-6.680	0.001
Caregiver Burden of Dementia Patient Caregiver Scale	27-105	65.61±18.38	31-115	71.48±17.70	-3.995	0.001
Physical subscale	6-20	14.65±3.50	8-20	15.11±2.85	-1.470	0.146
Social subscale	7-35	19.65±8.00	8-35	21.12±7.24	-2.156	0.035
Psychological subscale	10-45	24.87±9.14	10-50	28.24±8.87	-4.691	0.000
Economic subscale	3-15	6.30±3.20	2-13	6.35±3.30	-0.302	0.763

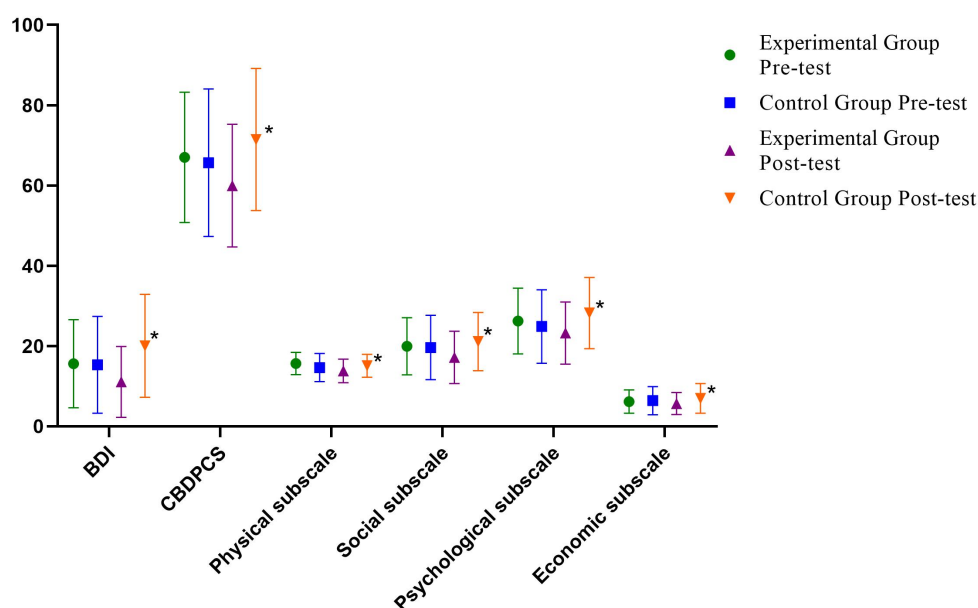
and the difference between the two scores was statistically significant ( $t=-3.995$ ,  $p=0.001$ ) (Table 4).

Figure 2 indicates the results of the intergroup comparison of the pre-test mean scores in the experimental and control groups; there was no statistically significant difference between the mean total scores of the BDI and the CBDPCS ( $t=0.132$ ,  $p=0.361$ ;  $t=0.482$ ,  $p=0.637$ ). The results of the intergroup comparison of the post-test mean scores of the experimental and control groups revealed that there was

a statistically significant difference between the mean total scores of the BDI and the CBDPCS ( $t=4.820$ ,  $p=0.001$ ;  $t=-4.118$ ,  $p=0.001$ ) (Fig. 2).

## Discussion

Caregivers are faced with several difficulties in terms of providing efficient patient care due to various issues and challenges. Behavioral problems in dementia patients in-



**Figure 2.** Beck Depression Inventory of caregivers in the experimental and control groups and comparison of the pre-test and post-test mean score of the Caregiver Burden of Dementia Patient Caregiver Scale.

Notes: \* – significant difference ( $p<0.05$ ) between the post-test results in the experimental and control groups; BDI – Beck Depression Inventory; CBDPCS – Caregiver Burden of Dementia Patient Caregiver Scale.



crease the respective caregiver burden and depression levels while, at the same time, tending to reduce the quality of their lives [6, 14, 18]. This is exactly why many studies intend to identify the means to reduce the level of depression and the burden of care given to caregivers of demented patients.

In this study, the mean BDI and CBDPCS scores of dementia patient caregivers in the experimental group were found to decrease after receiving education. Furthermore, the difference between the pre-test and post-test mean scores was statistically significant. Söylemez *et al.* determined that training dementia patient caregivers according to the PLST model improved the level of burden, depression and life quality over time [19]. Moreover, Buckwalter *et al.* implemented the PLST model and identified that caregivers reported lower levels of depression. In addition, this randomized controlled study has revealed that caregivers receiving intensive education are bound to experience lower levels of depression as compared to those in the control group who received less education [20]. Finally, Gerdner *et al.* also implemented the PLTS model and found that the burden of caregivers in dementia tended to decrease [21]. In the study by Asiret *et al.*, it was determined that at the end of the training given according to the PLST, the behavioral problems of patients with Alzheimer's disease and the burden of caregivers decreased, while the satisfaction of caregivers increased [22].

In the control group of our study, the mean BDI and CBDPCS scores of dementia patient caregivers increased, as confirmed by Garanda *et al.* who investigated the effect of the training provided by the PLST to characterize the mood of dementia patient caregivers. Consequently, the authors reported that the study group exhibited significantly less stress as compared to the control group [23]. The psychoeducation program given by Sousa *et al.* according to the Living Together with Dementia approach had a positive and statistically significant effect on the burden of dementia patient caregivers [24].

These results underline that education provided to caregivers according to the PLST model is effective in reducing their mean scores related to depression level and total and subscale scores, verifying our initial hypotheses that training provided to dementia patient caregivers reduces the level of their burden and depression levels [18–22]. In the study by Stolley *et al.* it was reported that the training given to the caregivers of dementia patients according to the PLTS model had a positive effect on the care burden and satisfaction level [25].

## Conclusions

In the experimental group, according to the PLST, the depression levels of the caregivers and the mean scores of the CBDPCS subscales decreased after the training model. In the control group, the level of depression and the CBDPCS subscale scores increased.

The use of the PLST is recommended as it reduces the physical, social, economic and psychological care burden of dementia patient caregivers and is an easy and inexpensive method to apply.

In accordance with these results, education plans to be prepared according to the PLST model in an attempt to reduce stress and depression levels of dementia patient caregivers can be efficiently applied to improve the respective caregiver outcomes. The number of people suffering from dementia is expected to increase in the upcoming decades and there is a need to strengthen informal caregiving to meet the care recipient needs, as well as the caregiver needs. This study will be a good reference for creating an appropriate environment and daily activities for patients with dementia and their caregivers.

## Ethical Statement & Informed Consent

Ethical approval for this study was obtained from the University Scientific Research and Publication Ethics Committee (Decision No: 2015/5-2). In addition, official permission to carry out this research study was obtained from Turgut Özal Medical Center Dementia Polyclinic of the Neurology Department. Volunteer caregivers meeting the inclusion criteria were informed about the objectives of the study. In addition, they were informed that the participation was voluntary, and they could leave anytime they wanted. The caregivers participating in the survey were reassured that their personal information would not be disclosed to others and their affidavits as a confidentiality statement was signed. After the post-test, training and the booklet was given to the control group.

## Conflict of Interest

The authors report no actual or potential conflicts of interest.

## Financial Disclosure

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