

# The Effect of E-Learning on Self-Efficacy and Sense of Coherence of Cancer Caregivers: Application of the Bandura and Antonovsky Social Cognitive Theory

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**ABSTRACT:** Aim: Cancer is one of the most important chronic diseases which affects caregivers. Therefore, in this study, we decided to increase the self-efficacy and sense of coherence of caregivers by using virtual learning via mobile to increase the power of managing in such situations. Methods: This study is a clinical trial performed on 60 caregivers of cancer patients. Questionnaires of demographic information, Bandura self-efficacy, and Antonovsky's sense of coherence were completed for both intervention and control groups. Then, for the intervention group, a virtual educational intervention was performed daily for 1 month using the mobile phones, and for the control group, no intervention was performed. Results: The mean score of self-efficacy in the intervention group was (18.09±93.21) before and (135.12±11.14) after the intervention, which was statistically significant (P=0.001). While in the control group, this means was (84.71±18.55) before and (84.75±17.13) after the study, but this difference was not statistically significant (P=0.2). Also, the mean score of sense of coherence in the intervention group was (73.25±7.28) before and (89.11±7.11) after the intervention, which was statistically significant (P=0.001). While in the control group, this means was (76.42±7.45) before and (76.89±7.27) after the study, but this difference was not statistically significant (P=0.31). Conclusion: Educational interventions, even virtually, can lead to improved self-efficacy and a sense of coherence in caregivers of cancer patients and can be used as one of the low-cost and effective methods in managing and controlling the disease.

**KEYWORDS:** Cancer, E-Learning, Sense of Coherence, Self-efficacy, Caregiver.

## Introduction

Despite significant advances in the field of medical sciences, cancer is still one of the most important chronic diseases of the current time and one of the main health issues in Iran and the whole world [1-3].

The prevalence of cancer is increasing and it is predicted that cancer deaths in developed countries will increase by about 45% in developed countries by 2035 [4].

So that after cardiovascular diseases all over the world, cancer is considered as the second leading cause of death and in Iran as the third leading cause of death. Currently, more than 7 million people worldwide and about 3,000 in Iran annually die from cancer [2]. Cancers include 9% of all deaths worldwide [3].

For example, gastrointestinal cancer is the most common type of cancer among men and the second most common cancer in women after breast cancer in Iran [5].

The process of cancer disease and treatment, in addition to affecting all aspects of cancer patient givers, has even involved their health care providers, who are mainly the families of these patients and are directly responsible front this patient and care of these patients. Also involved in parallel with patients, And it will have adverse effects on all their physical, psychological, social and economic dimensions, will have adverse effects and devastating consequences such as lose the faith of social support, depression and family isolation, disruption of daily family relationships and ultimately all these factors of care. Insufficient care of the patient and even abandonment of the patient will lead to the fact that according to the results of research by Abbasi et al., 70% of caregivers of cancer patients are involved in these problems and have many problems in the care and treatment of these patients [1,3,6].

Therefore, health is a basic human need [7].

All of the above problems, directly and indirectly, affect the sense of coherence and self-efficacy in cancer caregivers, which are two very important factors in adapting to cancer [8].

Self-efficacy is a psychological concept based on the research of Albert Bandura and cognitive-social theory [2]. Self-efficacy is an important internal factor for coping and controlling the conditions created during chronic diseases [8-12]. Cancer shows that taking any action to increase the sense of self-efficacy, increase the effectiveness of treatment and reduce symptoms, will lead to longer survival and reduce the recurrence of the disease in them [3,8].

The sense of coherence is a personal resource and the inner core of the structure of Antonovsky's theory [9]. According to Antonovsky, the sense of coherence is a bridge between health and disease, which there will be the ability to control situations in times of illness and stress [13]. A sense of inner coherence or harmony is a pervasive and enduring sense of confidence in a person that makes the inner and outer environment of the individual predictable and resolves matters as expected and in a reasonable manner [14,15]. And in fact, it is a way to deal with stressors that facilitate success in such situations [15-17] and ultimately lead to recovery and a sense of well-being [3,13] and enable successful adaptation and management of critical situations [18] and made promotes health-related behaviors and improves performance [19] and ultimately as an essential factor leads to improving the quality of life and reducing the complications of cancer and disease [8,19].

This feeling is an inner experience that grows gradually and during youth to reach a relatively stable quality. Antonovsky believes that the coherence questionnaire assesses the ability to manage stress through three basic concepts: comprehensibility of events, manageability of events, and meaningfulness of events from the individual's point of view, that all three of which have a psycho-social aspect [9,14,19].

According to the results of research by Sheikh Abumasoudi et al, in the field of chronic diseases similar to a stroke, showed that in all chronic diseases due to the chronicity of the disease and the continuation of treatment at home and the need for caregivers in the care process and the ability to control the situation and due to the insufficient provision of information in the hospital environment before discharge, many experts in this field have

introduced the use of new advances in information technology as a good opportunity to provide the necessary training in this field [20].

Virtual education is a new method that is very flexible and does not have many of the limitations of traditional education, such as time and place, same education for all people with different characteristics, hospitalization costs, etc. Its various types include the use of the Internet and virtual networks, electronic journals, virtual newsletters, etc. Research has shown that e-learning can reduce hospitalization time, acute complications, and disease progression [2,20].

Since in cancer patients, the most important people caring for these patients are their families, and on the other hand, following the chronic course of this disease, their families have been involved with these conditions for a long time [3], and many of the complications mentioned above. On the other hand, due to the importance of self-efficacy and sense of coherence and its positive effects in controlling chronic diseases and increasing the individual's understanding of his ability to better care for cancer patients and due to the limitations of research conducted in this Background: In this study, we aimed to investigate the effect of virtual education on self-efficacy and sense of coherence in health care providers in cancer patients.

## Method

In this study, 60 cancer caregivers from the oncology ward (Figure 1), who met the inclusion criteria, were entered into the study by easy non-probability sampling and then randomly, using a card written on (A) and (B), were randomly divided into control and intervention groups. Inclusion criteria included: definitive diagnosis of cancer for the patient that the caregiver takes care of him/his, no other disease, age 20 to 60 years, literacy, having a mobile phone, constant care of the patient. Conscious consent was obtained from all of them at the beginning of the study, and before that, comprehensive information on the reasons for conducting the research, benefits, results, and confidentiality of the information and how to conduct the research was provided to them. Demographic information, as well as information about the disease of the affected person in their family, was recorded as basic information in special forms. At the beginning of the study, a standard questionnaire of sense of coherence and

self-efficacy was completed for both intervention and control groups.

For e-learning and virtual training in the intervention group, after installing the "Soroush" application on the phone of the intervention group caregivers, for a month and daily (except Fridays) at 10:00 AM, all the necessary training related to caring for cancer patients in various fields of medicine, nutrition, mental needs, etc. (Table 1) and all the necessary training concerning control, creating and strengthening a sense of coherence and self-efficacy were provided regularly and coherently and In the control group, no changes were made in the routine conditions of caregivers. Finally, one month later, the standard questionnaire of sense of coherence and self-efficacy was completed and compared by both control and intervention groups.

The results were analyzed using descriptive (frequency, mean, standard deviation) and inferential (repeated analysis of variance) tests. In inferential statistics, an independent t-test, before and after of intervention was used.

The instruments used in this study include 1-Demographic information questionnaire and information related to the disease of a person with cancer, 2-Standard questionnaire of Antonovsky coherence (SOC-13) includes 13 questions prepared by Antonovsky. The scoring of the questionnaire is 7-point Likert and from 1 to 7. Antonovsky defines a sense of coherence as a personal orientation to life. So

that the higher the person's score indicates more health and sense of coherence and the lower the score indicates more vulnerability to events [14,15]. This questionnaire was translated, approved, and used by Mohammadzadeh et al. In 2009 and its reliability was obtained using Cronbach's alpha of 0.66 which shows a very high correlation with the total score 3-Bandura's standard self-efficacy questionnaire [21], which was made by Bandura and consists of 25 items that are used to measure self-efficacy [8,11,12].

This questionnaire was translated by Masmooi and his colleagues in 2019 and previous studies and confirmed and used and its reliability was obtained using Cronbach's alpha 0.94, which is a sign of the very good reliability of the questionnaire [22]. The questionnaire is scored as a 7-point Likert scale, which is given from 1 to 7 for the impossible, very difficult, difficult, slightly difficult, simple, very simple, and impossible options, respectively. In this questionnaire, the higher the person's score indicates higher self-efficacy and the lower indicates lower self-efficacy and greater vulnerability [8,11,12].

We obtained the ethical approval of the Saveh University of Medical Sciences (IR.SAVEHUMS.REC.1397.016) and because this is a clinical trial, its IRCT code is IRCT20180828040891N2, that examined the effect of e-learning on self-efficacy and sense of coherence of cancer caregivers in the Shahid Modarres Hospital in Saveh city.

**Table 1. Summary of training for cancer patient caregivers to control and manage common and specific symptoms and issues of the patient separately daily.**

Content of meetings	Week
Saturday: Stress and anxiety	The first week
Sunday: Depression, confusion, fatigue	
Monday: Sleep problems	
Tuesday: Decreased appetite, weight changes	
Wednesday: Changes in blood cell count, blood in the stool, blood in the urine	
Thursday: Constipation, diarrhea	second week
Saturday: Movement disorders, physical activity, and mobility	
Sunday: Falling, leg cramps	
Monday: Lack of body fluids, fever	
Tuesday: Tongue burning, mouth sores, bleeding from the mouth	
Wednesday: Nausea and vomiting, swallowing problems, hiccups	Third week
Thursday: Nutrition in a cancer patient, complete intravenous nutrition	
Saturday: Itching, softening of the skin	
Sunday: Wounds and scars, pressure sores on the skin	
Monday: Skin discoloration, Dry skin	
Tuesday: body appearance, hair loss	forth week
Wednesday: Pain, shortness of breath, sexual function, sweating, swelling	
Thursday: Oxygen delivery, ostomy, tracheostomy, urostomy, and colostomy	
Saturday: Necessary training in the process of chemotherapy	
Sunday: Necessary care during chemotherapy, its side effects, and control	
Monday: Necessary training on the radiotherapy process	
Tuesday: Necessary care during chemotherapy, its side effects, and control	
Wednesday: Psychological care for the last days of life	
Thursday: Educational tips on creating and strengthening a sense of coherence and self-efficacy and strategies to increase caregivers' confidence	

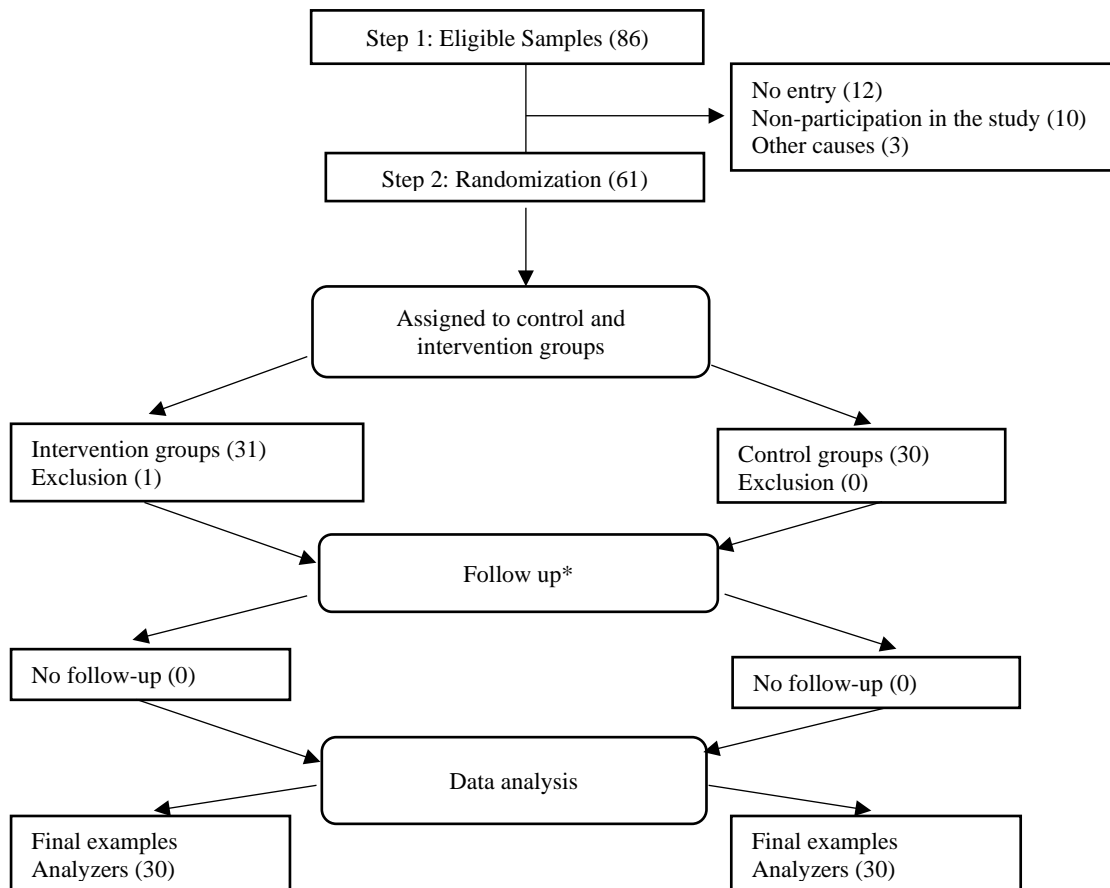


Figure 1. Consort chart of study participants.

\*The purpose of the follow-up in this study was to follow the caregivers of cancer patients who all participated in the study and none of them were excluded from the study.

## Results

Findings from the above study showed that most of the caregivers of cancer patients in the control (63.3%) and intervention group (56.6%) were women. Also, most of the cancer caregivers in the control (90%) and intervention group (93.3%) had a diploma and sub-diploma education and the majority of them were in the control (53.3%) and the intervention group (73.3%) were housewives. Also, most of the caregivers were married in the control (90%) and intervention group (83.3%), and their income level, both in the control (63.3%) and in the intervention group (60%) were at the normal level. The majority of caregivers of cancer patients in the control (56.6%) and intervention group (73.3%) were the spouses of the cancer patient who cared for him. The majority of patients in the control group (36.6%) and caregivers had gastric, intestinal, and breast cancer, and in the intervention group, the majority (40%) had lung cancer. The mean age of cancer caregivers in the control group was

(42.17±13.12) years and in the intervention group was (45.13±14.03) years. The results showed that demographic variables in the two groups were homogeneous and there was no statistically significant difference between the two groups ( $P>0.05$ ) (Table 2).

The results of the t-test also showed that the mean of self-efficacy in the control group before and after the study was (84.71±18.55) and (84.75±17.13), respectively, which was not statistically significant ( $P=0.2$ ) and in the intervention group before and after the intervention was (93.21±18.09) and (135.12±11.14), respectively, which were statistically significant ( $P=0.001$ ) (Table 3).

Using an independent t-test, there was no statistically significant difference in the mean self-efficacy score between the control and intervention groups before the intervention ( $P=0.53$ ). But there was a statistically significant difference between the overall self-efficacy of the control and intervention group after the intervention ( $P=0.001$ ) (Table 3).

Also, the mean score of sense of coherence in the control group before and after the study was (76.42±7.45) and (76.89±7.27), respectively, which was not statistically significant (P=0.31) and in the intervention group before and after the intervention respectively (73.25±7.28) and (89.11±7.11) which were statistically significant (P=0.001) (Table 3).

Using an independent t-test, there was no statistically significant difference in the mean sense of coherence between the control and intervention groups before the intervention (P=0.6). However, there was a statistically significant difference between the overall sense of coherence of the control and intervention group after the intervention (P=0.01) (Table3).

**Table 2. Demographic characteristics of control and intervention groups.**

index	Group	index level	frequency index (n)	frequency percentage	P
Gender	control	Female	19	63.3	0.12
		Male	11	36.6	
	intervention	Female	17	56.6	
		Male	13	43.4	
Education	control	Diploma and sub-diploma	27	90	0.51
		Post-diploma and bachelor's degree	3	10	
		Masters and PhD	-	0	
	intervention	Diploma and sub-diploma	28	93.3	
		Post-diploma and bachelor's degree	2	6.6	
		Masters and PhD	-	0	
Job	control	Employed	6	20	0.43
		housewife	16	53.3	
		Unemployed	8	26.6	
	intervention	Employed	8	26.6	
		housewife	22	73.3	
		Unemployed	-	0	
Marital status	control	Married	27	90	0.21
		Single	3	10	
	intervention	Married	25	83.3	
		Single	5	16.6	
Income	control	Less than usual	9	30	0.56
		As usual	19	63.3	
		More than usual	2	6.6	
	intervention	Less than usual	11	36.6	
		As usual	18	60	
		More than usual	1	3.33	
The relationship with the caregiver and the patient	control	Spouse	17	56.6	0.53
		Child	9	30	
		sister or brother	3	10	
		Other	1	3.33	
	intervention	Spouse	22	73.3	
		Child	7	23.3	
		sister or brother	-	0	
		Other	1	3.33	
Type of cancer patient	control	Gastric and intestines	11	36.6	0.44
		Lung	8	26.6	
		Breast	11	36.6	
		Other	-	0	
	intervention	Stomach and intestines	6	20	
		Lung	12	40	
		Breast	9	30	
		Other	3	10	
Age (year)	control	Standard deviation ± mean	42.17±13.12		0.35
	intervention	Standard deviation ± mean	45.13±14.03		

**Table 3. Mean self-efficacy and sense of coherence in the control and intervention groups before and after the intervention.**

Variable	Group	Before intervention Standard deviation $\pm$ Mean	After intervention Standard deviation $\pm$ Mean	P
self-efficacy	control	84.71 $\pm$ 18.55	84.75 $\pm$ 17.13	0.2
	intervention	93.21 $\pm$ 18.09	135.12 $\pm$ 11.14	0.001
P	-	0.53	0.001	-
sense of coherence	control	76.42 $\pm$ 7.45	76.89 $\pm$ 7.27	0.31
	intervention	73.25 $\pm$ 7.28	89.11 $\pm$ 7.11	0.001
P	-	0.6	0.01	-

## Discussion

Considering that no research has been done on the review and promotion of self-efficacy and sense of coherence together in cancer caregivers, the present study aims to investigate the effect of virtual learning using e-learning on two factors of self-efficacy and coherence in cancer patient caregivers. The results of the above study showed that there was a statistically significant difference between the self-efficacy score before and after the study. There was also a statistically significant difference between the score of sense of coherence before and after the study. Numerous studies have shown that improving self-efficacy and sense of coherence leads to improved quality of life and care and reduces many symptoms and complications in people.

In other studies conducted by Liu et al., in 2017, the results were consistent with the results of the above study and showed that bilateral and individual educational interventions had beneficial and valuable effects on the self-efficacy of individuals, so that the level of self-efficacy in their study before and after interventions were (23.5 $\pm$ 3.1) and (34.7 5. 5.7), respectively. However, the above study examined self-efficacy in patients with lung cancer, while in our study, self-efficacy in caregivers of cancer patients was examined. But the common denominator of both studies is that by performing a series of measures, including educational measures, the level of self-efficacy, quality of life, etc. can be improved [8]. Such a result is not too far from expectation because according to the theory Bandura, self-efficacy increases a person's beliefs and motivation and the amount of effort, perseverance, and endurance of pressures, etc. to create the desired results [23].

In another study conducted by Hoffman et al., in 2009, the results were consistent with the above study and showed that fatigue due to chemotherapy in cancer patients is a confounding factor that can easily affect a

person's self-efficacy and reduce its rate and, conversely, self-efficacy promotion methods can improve many symptoms in cancer patients, including fatigue. In Hoffman's study, research has been done on the self-efficacy of cancer patients, while in our study, research has been done on cancer caregivers who can be a spouse, sibling, or any other person [11].

As mentioned above, so far no research has been done on the self-efficacy measures of cancer caregivers and all available research has been done on cancer patients themselves, not their caregivers. But research is available on other disorders, such as asthma, and the self-efficacy of their caregivers. An example of these studies is the study of Fuladvandi et al., in 2016 that they examined the self-efficacy of caregivers of children with asthma and using the family-centered empowerment model were able to increase the self-efficacy of caregivers of children with asthma and the skills and management of their caregivers. The results of the present study were consistent with the results of our study, but in the above study, although self-efficacy was examined in inpatient caregivers, the study differed like the disease (asthma) and other details [24].

In a study by Mystakidou et al., in 2012 and another study by Hendrix et al., in 2016, the results showed that educational measures on caregivers of cancer patients can reduce symptoms such as anxiety, stress, and depression, etc., and the self-efficacy of caregivers increase.

The above two studies are very similar to our study compared to other studies because they have examined the self-efficacy of cancer caregivers, but with the difference that in these studies, in addition to examining the self-efficacy of caregivers, symptoms such as anxiety, stress, and depression has also been examined [25,26].

A study by Tang et al., in 2008 and Lilius et al., in 2009 examined the importance and role of a sense of coherence in cancer caregivers and its relationship to stress, anxiety, and depression.

The results of their studies were in line with our study and showed that stress, anxiety, and depression are important factors in reducing a person's sense of coherence, and strategies to increase the sense of coherence can reduce or moderate the above symptoms and disorders. Although the mentioned studies have examined the sense of coherence in the caregivers of cancer patients, in these studies, symptoms such as depression, stress, etc. have been studied and there are differences in the method of work and the variables studied with our study [27,28].

In another study conducted by Pasek et al., in 2017, the results were consistent with our study and showed that the level of coherence in caregivers of cancer patients is low and is directly related to the level of social support. It is similar to our study in that it examines the sense of coherence in caregivers of cancer patients, but differs from our study in that it examines its relationship to perceived social support and does not involve educational intervention [29].

In another study conducted by Tang et al., in 2013, the results showed that strategies to improve the sense of coherence of cancer caregivers lead to improved self-confidence, lightening the burden of caring for patients, and reducing depression in cancer patients. In the study of Saveh, although the positive effects of promoting a sense of coherence have been confirmed and in this respect are consistent with our study, but educational intervention and self-efficacy study has not been done in it [30].

In this regard, Antonovsky believes that people with a stronger sense of coherence are more flexible, and given that these people are more aware of their feelings and emotions and internal factors, especially in critical situations such as having a chronic cancer patient in the family and caring for it (like the study above) therefore can manage stressful situations better than other people and overcome problems better [31].

Since the results of the present study showed the positive and valuable effects of promoting self-efficacy and sense of coherence, these educational interventions and strategies to increase self-efficacy and sense of coherence of caregivers and even patients with chronic diseases can increase self-confidence and use such cases.

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## Conflict of interests

None to declare.

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