Original Research Article

Improving Depressive Mood Status and Activities of Daily Living for Older People of Long-Term Care Facilities

ABSTRACT

Aims: To examine the effectiveness of transcutaneous electrical acupoint stimulations (TEAS) and cognition action exercise program (CAEP) in managing depressive mood status and enhancing activities of daily living (ADL) performance.

Study design: This was a multiple-factor, 36-week, cluster-randomized controlled trial.

Place and Duration of study: Subjects were recruited from long-term care facilities located in Taiwan, between 2013-2014.

Methodology: Subjects were randomly assigned to receive TEAS, CAEP, physical exercise (PE), social visits, or care as usual based on the long-term care facility where they lived.

Results: The PE activity and the CAEI produced a significant reduction in depression score at week 36. Subjects in the TEAS group also showed a small increase in depression score, they displayed mild depressive mood status. Subjects' ADL performance improved significantly during the 24 weeks but had declined slightly when measured at 36 weeks.

Conclusion: This study provides staff caregivers with a safe, noninvasive, theory-based caring model to prevent the development of depressive mood in older residents and to maintain their self-care performance.

Key words: elder, depression, activities of daily living, transcutaneous electrical acupoint stimulations, traditional Chinese medicine, cognition action

1. **INTRODUCTION**

Depressive mood is a one of the most common psychological problems found in elderly people living in long-term care facilities [1]. According to the Center for Disease Control and Prevention in the United States of America [2], the prevalence of depression for 2011–2012 were 24%, 25%, and 49% in adult day-service centers, residential care communities, and nursing homes, respectively. In Taiwan, the prevalence rate for depression in people aged older than 65 years living in long-term care facilities was reaching 81.8% [3], which is much higher than that (21.4–24.2%) of the community-dwelling elderly individuals [4]. However, the high prevalence of depressive mood in elderly residents has been frequently overlooked by staff caregivers such as nurses and nursing assistants. Depression in elderly people can lead to inactivity followed by a decline in self-care ability. Therefore, to improve self-care ability in elderly residents of long-term care facilities, interventions aiming at preventing depressive mood in elderly people are clearly needed.

The evidence base for treatment of depressive mood in elderly residents in long-term care facilities is currently expanding. There is only a limiting number of studies conducted to examine the effectiveness of the non-pharmacological therapies, such as the complementary therapy or psychotherapy [5, 6], for the Taiwanese long-term care facilities. The purpose of this study therefore was to examine the effectiveness of the non-pharmacological therapies for the Taiwanese long-term care facilities. The non-pharmacological therapies include the transcutaneous electrical acupoint stimulations (TEAS) and the cognition action with exercise program (CAEP) in managing depressive mood and in enhancing performance in activities of daily living (ADL). TEAS was selected as a complementary therapy to manage depressive mood in elderly residents in long-term care facilities. CAEP was used as a psychological therapy, either alone or in combination with appropriate medications, to treat elderly people with depression [7].

The principle of TEAS is derived from the idea that stimulation of acupoints enhances, generates, and smoothens the flow of chi and helps to maintain the balance of yin and yang [8]. It has been employed as an alternative to acupressure. According to the traditional Chinese medicine (TCM), depressive symptoms are related to disharmony between physical qi and the spiritual energies of the body. Yin qi and yang qi are the primordial feminine and masculine energies, respectively. Yin and yang produce the “five elements” of human beings: wood, fire, earth, metal, and water. There are supporting and controlling relationships between the five elements. When the five elements are balanced, human beings experience health and prosperity; however, human will experience some form of disease if the elements are unbalanced [9].

According to the five-element school of TCM, three distinct forms of depression, worry, fear, and anger result from the imbalance in three internal organs spleen /stomach, kidney, and liver, respectively. The three elements, the earth, water, and wood influenced the balance of the spleen /stomach, kidney, and liver, respectively. For many diseases or forms of physical discomfort, TCM recommends an integrated treatment approach.[6] In view of this, TEAS was employed in this study to stimulate the channels

governing the flow of chi [10]. As chi increases, the balance and harmony between yin and yang is benefited.

Dechamps et al. [11] employed the cognition action intervention to manage behavioral disturbance and prevent functional decline and the worsening of depressive mood in elderly residents of long-term care facilities. The intervention was based on Bandura's social cognitive theory (SCT). According to SCT [12], the human mind is an active force that is capable of constructing reality, selectively encoding information, performing behavior on the basis of values and expectations, and imposing structure on its own actions. Through feedbacks and reciprocities, the perception of reality is formed through the interaction of the environment and the individual's cognition. Furthermore, cognition alters over time due to the individual's physical/mental maturation and experiences. Therefore, if the processes underlying the construction of reality are understood, human behaviors can be appreciated, predicted, and changed.

In this study, CAEP was used to improve the five fundamental human capabilities of elderly people by using a nonjudgmental approach to cognition action intervention and five-element gymnastics (FEG). FEG integrated several traditional Chinese exercises such as qigong, xang gong, and martial arts with gymnastics [13]. The intervention focused on the modeling effects of the instructor rather than the type of exercise involved [5, 11, 14]. In other words, CAEP relied more on expert guidance than a particular type of exercise.

2.MATERIAL AND METHODS

This study was a multiple-factor, 36-week, cluster-randomized controlled trial. Subjects were randomly assigned to one of the groups based on the long-term care facility in which they lived. All interventions were implemented for 36 weeks. The research design is presented in Table 1.

Table 1. Research design and data collection period

Groups	Baseline	Intervention	12 weeks post-intervention	24 weeks post-intervention	36 weeks post-intervention
Ex1	O1	TEAS	O2	O3	O4
Ex2	O1	cognition-action exercise program	O2	O3	O4
Com1	O1	Social Visits	O2	O3	O4
Control	O1	Care as usual	O2	O3	O4
Com2	O1	Exercise	O2	O3	O4

Note. O is observations. O1 is observation 1st time. O2 is observation 2nd time. O3 is observation 3rd time. O4 is observation 4th time. Ex1 is experimental group 1. Com 1 is comparison group 1. Ex 2 is experimental group 2. Com 2 is comparison group 2. TEAS is transcutaneou electrical acupoint stimulation.

2.1 Sample

The selection criteria used to determine subjects' eligibility were: 1) aged older than 65, 2) able to speak Mandarin or Taiwanese with or without a hearing device, and 3) bed bound for less than six months.

2.2 Interventions

Subjects in Experimental Group 1 underwent TEAS performed by a trained research assistant for 15 minutes twice per week. TEAS is an alternative to acupressure or acupuncture and designed to use the low-frequency electrical stimulator acupoints and meridian lines on the surface of elderly people's skin. To enhance the generation and smoothing of the flow of chi and maintain the balance of yin and yang, three pairs of acupoints were used to improve depressive mood (Table 2). The acupuncture points used in the TEAS intervention include: neiguan vs. shennen, yanglingquan vs. zusanli, and taichong vs. yongquan.

Table 2. Three pairs of acupoints for the transcutaneou electrical acupoint stimulation

Acupoints	Code	Positions
Neiguan	PC6	1.Pericardium Meridian 2. at the inner side of the wrist, perpendicular along the middle finger of the hand and 3 fingers (placed horizontally) below the upper horizontal line of the wrist. 3.On the palmar side of the forearm, 2 cun above the crease of the wrist.
Shennen	HT7	1.Heart Meridian 2. At the ulnar end of the transverse crease of the wrist, in the depression on the radial side of the tendon of muscle flexor carpi ulnaris.
Yanglingquan	GB-34	1.Gall Bladder Meridian 2. below the lateral aspect of the knee, in the tender depression approximately 1 cun ahead of and below the head of the fibula. A cun is the distance between the 2nd and 3rd knuckles or the distance at the widest part of the thumb.
Zusanli	ST-36	1.3 cun below ST 35, one finger breadth from the anterior crest of the tibia, in tibialis anterior.
Taichong	LR-3	1. On the instep of the foot. in the depression of the posterior end of the lst interosseous metatarsal space
Yongquan	K1	1.Kidney Meridian 2. On the sole, in the depression when the foot is in plantar flexion, approximately at the junction of the anterior third and posterior 2/3 of the sole.

Subjects in Experimental Group 2 participated in the CAEP, which involved FEG. The CAEP was implemented by an exercise instructor for 30 minutes twice per week. The CAEP guideline is presented in Table 3.

Table 3. The Cognition-Action Exercise Program (CAEP) guideline

Type of Information	Improving capabilities	Interactions
Verbal	Symbolizing capability	1. No value judgment the elders' ability. 2. Talking with elders about importance /readiness for attending exercise program
	Self-regulating capability	1. Using mastery-based movements: Helping elders to find familiarly and meaningful activities, than, working with elders. 2. Providing positive encouragement to improve self-confidence.
	Self-regulating capability	1. Providing collaborative exchanges, verbal persuasion (telling him/her, he/she can do it.), positive encouragement to improve or maintain elders' motivation in attending exercise program 2. Offering positive feedback if elders exercise 3. Litter change but repetition in exercises
	Forethought capability	1. providing advices individually to reinforce elders' exercise behaviors 2. Discussion with elders about feeling and movement perceptions in normal conversation.
	Self-reflective capability	1. Rolling with resistance by reassuring voice tone in a clam environment 2. Don't do any exercise if the elder does not want to do, than, stay with the elder and take about activities of anything else 3. Telling him/her how he/she looks good. 4. Talking about the progresses 5. Asking about why they are frustrated and discussing how he/she can manage the situation. 6. Showing respect of elder
Verbal and non-verbal	Vicarious capability	1. Observing another elders' success in maintaining exercises. 2. Discussing another elders' success in maintaining exercises.

Subjects in Comparison group 1 received social visits (SV) for 15 minutes twice per week. During the SVs, subjects were asked to talk about their life experiences and/or events that had occurred in the preceding few days. In contrast, subjects in Comparison group 2 engaged physical exercise (PE) for 30 minutes twice per week. The PE activities including FEG were conducted by a trained exercise instructor, who did not implement any interventions related to CA activities. Subjects in the control group received

care as usual.

2.3 Instruments

The Geriatric Depression Scale – Short Form (GDS-SF) was used to measure depressive mood status and general well-being of the elderly. The GDS-SF has been widely used to measure depressive mood status in elderly residents of long-term care facilities in Taiwan [15,16]. The GDS-SF is a 15-item self-report instrument with the score range from 0 to 15. All item scores are summed to produce a total score. Scores of 0–4, 5–8, 9–11, and 12–15 indicate no depression, mild depression, moderate depression, and severe depression, respectively. Almeida and Almeida [17] assessed the GDS-SF and found good reliability and high rates of specificity (65.2%) and sensitivity (95.7%) in the detection of clinical depression.

The Refined ADL Assessment Scale (RADLAS) was used to measured ADL performance. The RADLAS was designed for elderly patients with Alzheimer's disease and related disorders [18]. The *RADLAS* can be used to assess small increments in basic ADL performance and it is highly sensitive to ADL performance changes. The following five ADLs was assessed in the RADLAS: feeding, washing, grooming, dressing, and toileting. Each ADL is broken down into 2 to 3 tasks, and each task is broken down into the sequence of steps needed to complete the activity. The internal consistency of each subtask in the RADLAS ranged from 0.89 to 0.96. The RADLAS was rated through observations of each step in ADL performance across a continuum from unassisted (6), verbal prompt (5), nonverbal prompt (4), physical guidance (3), full assistance attempted (2), full assistance not attempted (1), and N/A (0) [19]. A sum of the total scores represents the level of ADL performance. The score ranges of the RADLAS for feeding, washing, grooming, dressing, and toileting activities are from 0 to 126, 0 to 204, 0 to 174, 0 to 150, and 0 to 126, respectively; therefore, levels of ADL performance ranged from 0 to 780. The higher the total score, the greater the independence of the subject in ADL performance.

2.4 Data analysis

The statistical software package, SPSS 21.0 for Windows, was used to analyze data. An alpha of 0.05 was set as the significance level. A one-way analysis of variance (ANOVA) and chi-square (χ^2) were used to examine differences in demographic information between groups. The repeated measures analysis was performed to determine the effectiveness of the interventions.

3. RESULTS

3.1 Demographic information

Two hundred fifteen subjects were recruited from ten long-term care facilities in southern Taiwan. They were randomly assigned to receive TEAS (n = 45), CAEP (n = 42), SV (n = 56), PE (n = 31), or usual care (n = 41). The average age of the subjects was 80.42 (SD = 7.35) years old. The average duration of residence in one of the long-term care facilities was 3.65 (SD = 2.61) months. The majority of subjects were male (n = 111) and married (n = 125). The demographic information and baseline data group comparisons are presented in Table 4.

Table 4. Demographic information and group comparisons

Variables	TEAS Mean(SD)/N	CAEP Mean(SD)/N	SV Mean(SD)/N	PE Mean(SD)/N	Control Mean(SD)/N	X^2/one-way ANOVA
Age (years)	78.85 8.51)	80.97 (6.41)	81.65 (7.30)	80.65 (8.54)	80.39 (8.26)	0.719
MMSE	23.11 (8.06)	20.10 (5.51)	21.36 (6.11)	19.45 (5.95)	22.00(6.11)	2.074
GDS-SF	5.58 (4.53)	6.07 (3.37)	6.09 (3.90)	5.19 (2.07)	6.98 (3.65)	1.207
ADL	703.47 (107.24)	615.62 (210.08)	603.84 (178.31)	528.52 (233.02)	581.46 (159.72)	4.972**
Gender						10.232*
Female	15	16	30	18	25	
Male	30	26	26	13	16	
Marital status						72.259**
Single	18	5	9	0	1	
Married	12	26	21	30	36	
Widow	15	11	26	1	4	
Reasons for admission						37.250**
Living alone	23	4	8	4	6	
Poor health	6	22	28	16	17	
Family members unable to care	16	16	20	11	18	
Financial status						32.534**
Pension	25	4	15	4	6	
Supported by adult children	20	38	41	27	35	
Education						6.726
No educated	23	17	33	17	23	
<=6 years	13	10	13	7	11	
> 6 years	9	15	10	7	7	

3.2 Assessing the effectiveness of the interventions in preventing depressive mood

Figure 1 shows the changes in depressive mood status for the five groups during the four data collection periods. Analysis based on the repeated measures design revealed significant differences in depressive mood status scores between the five groups ($F = 931.327$, $p < .01$). Examination of differences in depressive mood status scores showed statistically significant differences between times 1 and 2 ($F = 3.032$, $p = .019$) and times 3 and 4 ($F = 6.749$, $p < .01$).

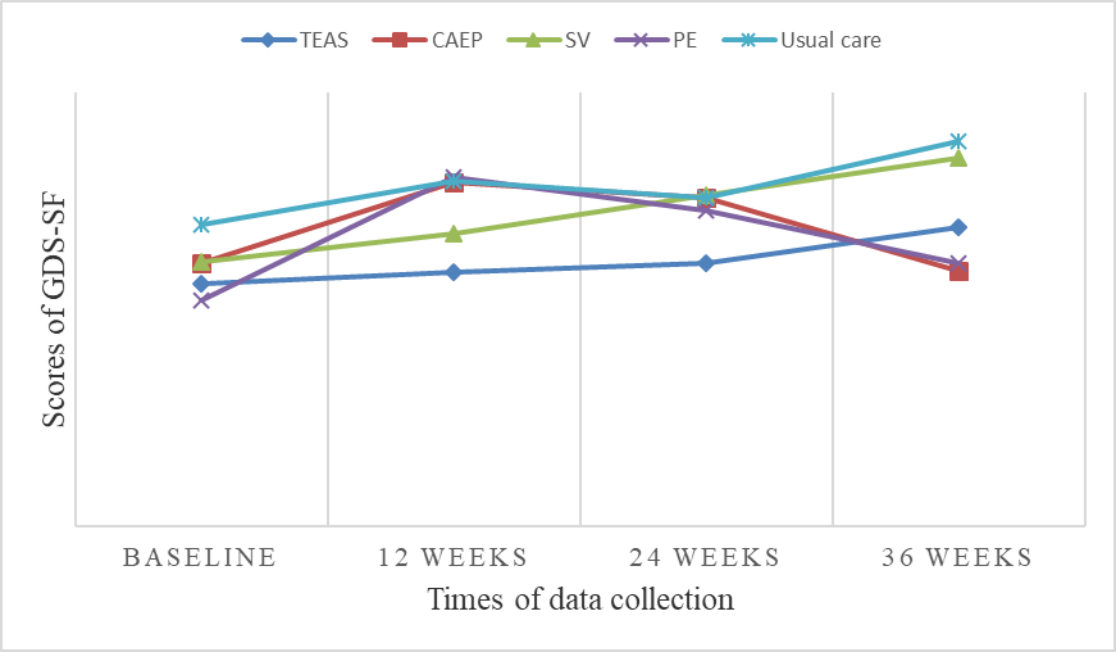

Figure 1. Depressive mood status score at the beginning to the end of the study

Note. TEAS is transcutaneous electrical acupoint stimulation. CAEP is cognition action exercise program. SV is social visits. PE is physical exercise. GDS-SF is the geriatric depression scale – short form.

In the TEAS group, the scores of four tests of depressive mood status differed significantly ($F = 103.329$, $p < .01$). In the CAEP group, the scores of four tests of depressive mood status differed significantly ($F = 209.572$, $p < .01$). The score of time 2 was significantly higher than that of time 1 ($F = 11.44$, $p = .002$).

In the SV group, the scores of four tests of depressive mood status differed significantly ($F = 427.587$, $p < .01$). The score for time 2 was significantly lower than that of time 3 ($F = 4.511$, $p = .040$); however, the score for time 4 was significantly higher than that of time 3 ($F = 10.341$, $p = .003$). In the PE group, the scores of four tests of depressive mood status differed significantly ($F = 317.935$, $p < .01$). The score for time 2 was significantly higher than that of time 1 ($F = 28.802$, $p < .01$); however, the score for time 4 was significantly lower than that of time 3 ($F = 5.079$, $p = .032$). In the usual care group, the scores of four tests of depressive mood status differed significantly ($F = 427.587$, $p < .01$). The score for time 3 was significantly lower than that of time 2 ($F = 4.511$, $p = .040$); however, the score for time 4 was significantly higher than that of time 3 ($F = 10.341$, $p = .003$). Overall, the subjects in SV and usual care groups, GDS-SF scores increased and almost reached those of moderate depressive mood status.

3.3 Testing the effectiveness of the interventions in enhancing ADL

Figure 2 shows the changes in levels of ADL performance between the five groups. Analysis based on the repeated measures design revealed significant differences in the RADLAS scores between groups ($F = 2481.05$, $p < .01$).

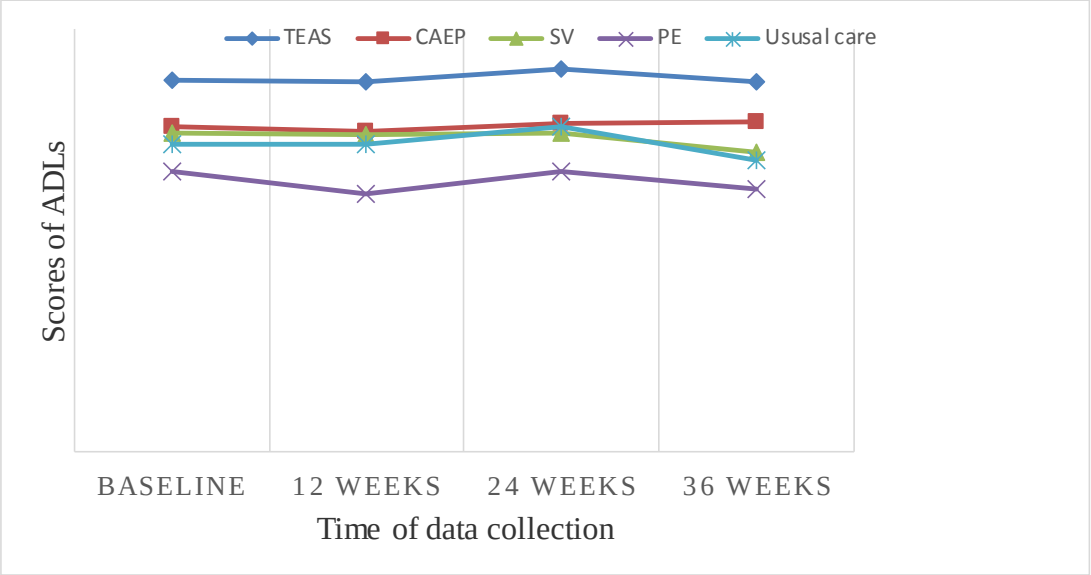

Figure 2. The level of activities of daily living score at the beginning to the end of the study

Note. TEAS is transcutaneous electrical acupoint stimulation. CAEP is cognition action exercise program. SV is social visits. PE is physical exercise. ADLs are activities of daily living.

In the TEAS group, the scores for four ADL performance tests differed significantly ($F = 1631.488$, $p < .01$). The score of time 3 was significantly higher than that of time 2 ($F = 4.887$, $p = .032$). In the CAEP group, the scores of four ADL performance tests differed significantly ($F = 479.20$, $p < .01$).

In the SV group, the scores of four ADL performance tests differed significantly ($F = 551.987$, $p < .01$). The score for time 4 was significantly lower than that of time 3 ($F = 6.281$, $p = .015$). In the PE group, the scores for four ADL performance tests differed significantly ($F = 205.714$, $p < .01$). In the usual care group, the scores for four ADL performance tests differed significantly ($F = 445.989$, $p < .01$). The score for time 3 was significantly higher than that that of time 2 ($F = 4.983$, $p = .031$); however, the score for time 4 was significantly lower than that of time 3 ($F = 9.569$, $p = .004$).

4. Discussion

The present study showed that, although subjects in the TEAS group showed a small increase in GDS-SF scores, they displayed mild depressive mood status, ADL performance improved significantly during the 24 weeks subsequent to the TEAS intervention but had declined slightly when measured at 36 weeks. These findings were inconsistent with previous studies [1, 19]; this may be due to differences in sample sizes, the acupuncture points stimulated, and intervention periods.

For instance, Chang and colleagues [16] conducted a pilot study to assess the effectiveness of TEAS on improving depressive mood status in several Taiwanese nursing home residents. Nine subjects received TEAS for 15 minutes 5 times per week for 4 weeks and showed a significant improvement in

depressive mood status. Yang and colleagues [19] examined the effectiveness of TEAS in increasing muscle strength in 62 stroke patients. TEAS was applied to 4 acupuncture points (ST36, LV3, GB34, and BL60) in subjects' affected lower extremities for 60 minutes 5 days per week for 3 weeks. Results showed that subjects' ankle dorsiflexor strength increased, and their antagonist contraction ratio decreased. Subjects also tended to walk 2–4 days sooner relative to subjects treated with physiotherapy and occupational therapy.

This study also observed that the GDS-SF scores at week 36 of the subjects in PE and CAEP groups were significantly reduced, although thus effects was small. Also, no decline of ADL performance was found for the subjects in PE and CAEP groups. Most previous studies reported that the CAEP and PE trials had yielded positive results in the prevention of depressive mood and improvement of ADL performance in elderly residents of long-term care facilities [11, 20, 21]. For example, Chang and colleagues [21] designed an exercise program to maintain performance of ADL such as feeding, dressing, grooming, washing, and toileting. Twenty-six elderly people with dementia were recruited to participate in the study. The exercise program consisted of stretching and walking five times per week and leg-weight bearing for 20 to 30 minutes at least three times per week. Results showed that scores for the ADL performance were significantly higher than those observed at baseline and 4 months subsequent to intervention. Similarly, Maki and colleagues [4] designed a municipality-led walking program to prevent cognitive decline and improve motor function and functional ability. The walking program encouraged elderly people to walk regularly and gradually increase the number of steps taken per day. The walking program was implemented for 90 minutes once per week for 3 consecutive months. One hundred fifty community-dwelling elderly individuals participated in the walking program. It was found that the subjects who participated in the walking program showed no significant improvement in cognitive function, but their motor function improved. However, all of the subjects in the study showed increased depression and reduced the ADL performance at 12 weeks subsequent to the intervention relative to baseline measurements. This observation mainly resulted from the arrival of the Chinese New Year, which is a very important and special day in Chinese culture. Traditionally, the Chinese new year celebration begins with a family reunion along with a new year's eve dinner. Due to the influence of this culture custom, the subjects intended to return home to reunite with their families, which led to the anxiety and depression of the subjects and somewhat weakened elderly individuals' self-care ability [4, 22].

5.CONCLUSION

Depressive mood is highly prevalent in long-term care facilities, particularly nursing homes, and contributes to disability in this frail and vulnerable population. Elderly individuals with depressive mood are more likely to be inactive and experience a decline in the ability to perform ADL. This study employed three non-pharmacological techniques including TEAS, a CAEP, and PE, to improve depressive mood of elderly in several long-term care facilities. It was found that CAEP and PE notably reduced depression mood. On the contrary, TEAS had no significant effect to reduce depression and to improve ADL

performance.

CONSENT AND ETHICAL APPROVAL

This research was approved by the Ethical Board (. Before any intervention took place, the researchers informed the participants about the purpose, benefits of the study, and the written, informed consent of the participants was obtained.

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