Effects of Laughter Therapy on Depression and Sleep among Patients at Long-term Care Hospitals

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Purpose: The purpose of the study was to investigate the effects of laughter therapy on depression and sleep among patients at two long-term care (LTC) hospitals. **Methods:** Forty-two residents from two LTC hospitals participated in this study. Twenty-one residents at one LTC hospital received the laugher therapy treatment and 21 at the other LTC hospital received no treatment as a comparison group. The laugher therapy protocol consisted of singing funny songs, laughing for diversion, stretching, playing with hands and dance routines, laughing exercises, healthy clapping, and laughing aloud. The participants engaged in the protocol 40 minutes twice a week (Monday/Thursday) for a total of eight sessions held in the patients' lounge. **Results:** Findings showed that depression and sleep improved in the treatment group compared to the comparison group (t=-7.12, *p*<.001; Z=-4.16, *p*<.001). **Conclusion:** To improve depression and sleep among patients at LTC hospitals, offering laughter therapy strengthening physical activities might be beneficial to patients.

Key Words: Laughter, Depression, Sleep, Long-term care

INTRODUCTION

The number of older adults in the need of long term care (LTC) has led to the increase number of LTC hospitals which increased from 819 in 2010 to 1,342 in 2015[1]. Almost 80% of patients at LTC hospitals remain in treatment for more than two years. Patients at LTC hospitals report having problems with self-control, loneliness, social isolation, and anxiety leading to depression [2]. For instance, almost 50% of patients at LTC hospitals exhibit more than three symptoms of depression [1]. Often depression occurs among older adults with physical disease. It is difficult to recognize symptoms of depression; thus, early detection and intervention in older adults is important [3].

Depression is related to the delay of sleep latency, sleep deficiency, and reduced sleep quality. Older adults with sleep problems exhibit more depressive symptoms than those without sleep problems.[4]. Patients at LTC hospitals already have a compromised physical status, thus leading to a low level of physical activities and, thus a delay in sleep latency. Participating in health promotion programs including physical activities decreases depressive symptoms and improves sleep quality [5]. Almost 36~61% of older adults in hospitals complained of sleep problems [6]. Older adults in LTC hospitals report that the quality of their sleep is compromised compared to the home-dwelling older adults [7]. At times, the low quality of sleep among older adults is misunderstood as a normal aging process rather than sleep problems [3].

At LTC hospitals, medications are used to improve depression and the quality of sleep among older adults. However, the side effects of drowsiness during the day, reduced cognition, a high risk of falls, and medication toler-

ance suggest that other interventions should be considered [8]. For example, non-pharmacological interventions including aromatherapy, music intervention, art therapy, laughter therapy may be introduced. The advantages of laughter therapy are that it is cost-effective, does not require high technology, and is not limited to a specific time and place [9]. While laughing, endorphins and serotonin, which control anxiety and depression, are secreted [10,11]. Especially, laughing aloud with whole body movements improves blood circulation. There is evidence to support that emotional relaxation and the quality of sleep will be improved [12].

Previous studies of laughter therapy investigate the effects of the therapy on vital signs, anxiety, depression, sleep and quality of life [12-15]. These reported studies were limited to community-dwelling older adults [12-15]. Previous studies reported consistent positive effects on depression, but not on sleep [16]. Previous studies showing the lack of a consistent effect on sleep suggested that interventions improving sleep require more active movements to enhance the upper and lower extremities and torso movements and increased physical activity time. In this study, the research design took into account the recommendations from the reviewed studies. That is, there was an effort to utilize physical movement including stretching, dance routines, and activities to express the pleasure and laugh is reinforced. Specifically, the purpose of this study was to investigate the effects of laughter therapy on depression and quality of sleep among older adults living in LTC hospitals. The hypotheses in this study are as follows:

1. Hypotheses

- Patients at LTC hospitals who participate in the laughter therapy(the treatment group) will report lower depression scores than those who do not receive it(the comparison group).
- Patients at LTC hospitals who participate in the treatment group will report better sleep quality than the comparison group.

METHODS

1. Study Design

A nonequivalent design was utilized in this study. The purpose of the study was to identify the effects of laughter therapy on reported depression and quality of sleep among older adults living in a LTC hospital.

2. Setting and Samples

A non-probability convenience sample was used. A total of 42 individuals from two different LTC hospitals were used. Specifically, the treatment group was from Hangeul Hospital located in Daegu city and the comparison group was drawn from Suseong hospital located in Daegu city in Korea. The power calculation based on Cohen's effect size formula [17], t-test, using power .80, effect size .50, and α =.05, group=2, showed a total of 34 participants (17 for each group). The rationale for setting the effect size as .50 was that differences in means and standard deviations between the treatment and comparison groups were high in the previous study [18]. Considering a 20% dropout rate, a total of 42 participants (21 in the treatment group and 21 in the comparison group) were recruited for the study. During the study, five participants withdrew (2 for personal reasons in the treatment group;
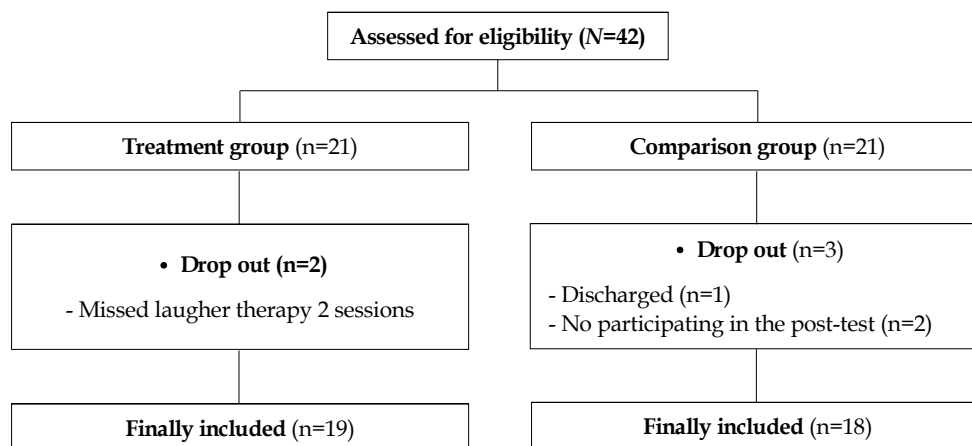

Figure 1. Flowchart of participants included for data analysis.

one discharge and two with no measurement data in the comparison group). Finally, 37 participants were included in the analysis (Figure 1).

The participants that met the following inclusion criteria were included in the study. Those who are aged 65 and older; staying at a LTC hospital; able to communicate (scoring >18 on the Mini-Mental State Examination for Koreans [MMSE-K])[19]; exhibiting light depression (scoring > 5 on the Geriatric Depression Scale Short Form— Korea [GDSSF-K])[20]; and having sleep problems (scoring > 5 on the Pittsburgh Sleep Quality Index—Korea [PSQI-K])[21] were recruited.

3. Development of the Intervention (Treatment Group)

The initial design of the protocol was developed based on Han's laughter therapy [22]. In the initial protocol seven activities were included: 1) singing funny songs, 2) laughing for diversion, 3) stretching, 4) playing with hands and dance routines, 5) laughing exercise, 6) healthy clapping, and 7) laughing aloud. The initial design consisted of therapy for 60 minutes per session. The protocol was reviewed by six health professionals familiar with laughter therapy to improve the validity of the protocol. Included among the six health professionals were one nursing faculty, three nurses from nursing homes, and two instructors skilled in laughter therapy. The recommended modifications were: 1) simplifying fast movements and increasing the physical movements in the 'laughing for diversion' area and 2) adding exercises of the upper and lower extremities to the 'laughing exercise' area. The rationale for simplifying the fast movements was the residents' physical health status. Additionally, the exercises for upper and lower extremities were added because increased physical activities are supposed to improve sleep.

The second revision of the protocol was based on the findings of the pilot study. Ten patients participated in the pilot study. Based on the results of the pilot study, the therapy protocol was modified as follows: 1) stretching, healthy clapping, and laughing out loud were repeated without any change every session and were easy to follow; 2) the length of each therapy session was reduced from 60 minutes to 40 minutes because a length of 60 minutes made it difficult for residents to participate; and 3) lecture time without any activity was added as break time in the middle of each session to prevent fatigue. Finally, the final form of laughter therapy simplified the fast movements and added exercises of upper and lower extremities.

The structure of the final laughter therapy is presented in Table 1. The laughter therapy included introduction, main, and closing stages. The introduction stage was intended to increase the sense of closeness and motivation to participate and lasted for five minutes. A sense of closeness was fostered with light hugs/handshakes and compliments. The main stage of the laughter therapy lasted for 25 minutes and included singing funny songs, laughing for diversion, stretching, playing with hands and dance routines, lecture, laughing exercises, healthy clapping, and laughing aloud. "Singing funny songs" consisted of singing songs such as Namheangyeolcha (a south-bound train), spring of hometown, and wind of winter. "Laughing for diversion" consisted of laughing while complimenting the positive qualities of other participants, thankful laughing, mirror laughing and you are the best laughing. The lecture topic was related to laughing and consisted of the effects of laughing, effective laughing methods, thankful laughing, emotional expression, laughing practice, and habits. The closing stage was for relaxation and the maintenance of a positive mood for 10 minutes and included positive meditation, expression of thoughts and feelings, and saying goodbye.

Each session occurred at 2 pm for 40 minutes twice a week (Monday/Thursday) with a total of eight sessions in the lounge of the LTC hospital provided by four research assistants (1 laugher therapist, 1 nurse, 1 social worker, and 1 nurse aid). The laughter therapist is certified by the International Association of Laughter Therapy Inc.

4. Measurements

The demographic data collected included age, gender, education, medical diagnosis, medication types, and duration of hospitalization. The levels of cognition, activities of daily living, depression, and sleep quality were measured.

1) Cognition
Cognition level was measured using the MMSE-K [19]. The MMSE-K was modified from Folstein and colleague's MMSE [23]. The MMSE-K includes six areas: time and place orientation, memory registration, attention and calculation, memory recall, language, and understanding/comprehension. Possible scores on the MMSE-K range from 0 to 30 and are classified into three groups by score: normal ($\geq$24), inadequate (20~23), and poor ($\leq$19). The Cronbach's α for the original MMSE was .99, and the Cronbach's α for the MMSE-K in this study was .80.

2) Activities of daily living
Activities of daily living were measured using the Kore-

Table 1. Contents of Laughter Therapy

Session	Contents	Time (mins)
Introduction	Light hugs/handshakes, laughing, complementing	5
Session 1~8		
Main stage Session 1	Singing funny songs: '*namheangyeolcha*', laughing for diversion: '*laughing while complementing the positive qualities of other participants*'	5
	Stretching, playing with hands & dance routines	5
	Lecture: '*the effects of laughing*'	5
	Laughing exercises	5
	Healthy clapping, laughing out loud	5
Main stage Session 2	Singing funny songs: '*namheangyeolcha*', laughing for diversion: '*laughing while complementing the positive qualities of other participants*'	5
	Stretching, playing with hands & dance routines	5
	Lecture: '*effective laughing methods*'	5
	Laughing exercises,	5
	Healthy clapping, laughing out loud	5
Main stage Session 3	Singing funny songs: '*the spring of home town*', laughing for diversion: '*thankful laughing*'	5
	Stretching, playing with hands & dance routines	5
	Lecture: '*becomes happy with laughing*'	5
	Laughing exercises,	5
	Healthy clapping, laughing out loud	5
Main stage Session 4	Singing funny songs: '*the spring of home town*', laughing for diversion: '*thankful laughing*'	5
	Stretching, playing with hands & dance routines	5
	Lecture: '*force a laugh becomes real laughing*'	5
	Laughing exercises	5
	Healthy clapping, laughing out loud	5
Main stage Session 5	Singing funny songs: '*wind of winter*', laughing for diversion: '*mirror laughing*'	5
	Stretching, playing with hands & dance routines	5
	Lecture: '*emotional expression*'	5
	Laughing exercises	5
	Healthy clapping, laughing out loud	5
Main stage Session 6	Singing funny songs: '*wind of winter*', laughing for diversion: '*mirror laughing*'	5
	Stretching, playing with hands & dance routines	5
	Lecture: '*complementing a positive things*'	5
	Laughing exercises	5
	Healthy clapping, laughing out loud	5
Main stage Session 7	Singing funny songs: '*namheangyeolcha*', '*the spring of home town*' laughing for diversion: '*you are the best laughing*'	5
	Stretching, playing with hands & dance routines	5
	Lecture: '*even when happy or boring*'	5
	Laughing exercises	5
	Healthy clapping, laughing out loud	5
Main stage Session 8	Singing funny songs: '*wind of winter*'. '*the spring of home town*', laughing for diversion: '*you are the best laughing*'	5
	Stretching, playing with hands & dance routines	5
	Lecture: '*laughing is practice and habit*'	5
	Laughing exercises	5
	Healthy clapping, laughing out loud	5
Closing stage Session 1~8	Positive meditation	5
	Expression of thoughts and feelings, saying good-bye	5

an Activities of Daily Living (K-ADL) [24]. The K-ADL consists of seven items and ranges from 1 (without any difficulty) to 3 (unable to do). Lower scores indicated higher ADL. The Cronbach's α for the original K-ADL was .93, and the Cronbach's α for this study was .86.

3) Depression

Depression was measured using the GDSSF-K [20]. The original GDSSF was developed by Yesavage and Sheikh [25] and was translated into Korean (GDSSF-K) by Kee [20]. The GDSSF-K includes 15 items. Possible scores on the GDSSF-K range from 0 to 15 and are classified into three groups by score: normal (≤ 4), mild (5~9), and severe (≥ 10). Higher scores indicate higher levels of depression. The Cronbach's α for the original GDSSF-K was .88, and the Cronbach's α for the GDSSF-K in the current study was .75.

4) Sleep

Sleep was measured using the PSQI-K [21]. The original PSQI was developed by Buysse and colleagues [20] and was translated into Korean (PSQI-K) by Choi and colleagues [21]. The PSQI-K is composed of 18 questions and assesses seven categories: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction. The PSQI-K ranges from 0 to 21, and scoring more than five indicates sleep problems. Higher scores indicate lower sleep quality. The Cronbach's α of the original PSQI was .83, and the Cronbach's α of the PSQI-K in the current study was .73.

5. Data collection

The participants were recruited at two LTC hospitals in Daegu city, Korea. The first LTC hospital was allocated to the treatment group and the second LTC hospital was allocated to the comparison group based on each LTC hospitals' choice. The two LTC hospitals with similar sizes of 150 beds, were built within two years, and did not provide any other programs related to depression and sleep. Under the cooperation with the LTC directors, primary investigator (PI) was able to contact the patients and explained about study purpose, contents and procedures, and benefits and risks of this study participation. A written consent was obtained from each participant if they agreed to participate in this study.

After the written consent was obtained, demographic data, cognition, ADL, depression, and sleep were measured by the PI prior to the laughter therapy in the treat-ment and comparison groups. Cognition was the MMSE-K scores obtained from the electronic medical record data. Depression and sleep were measured by the PI immediately following the eighth session of laughter therapy. The residents in the comparison group received standard care without laughter therapy and a CD of laughter therapy was provided after the study is completed.

6. Ethical Considerations

This study was reviewed and approved by Keimyung University Institutional Review Board (No. 40525-201505-HR-38-02). Data collection began after obtaining the approval. Participants were informed that they could withdraw anytime during the study participation without any consequences. All data and consent forms were stored in a locked file cabinet in the PI's office.

7. Data Analysis

The data analysis was performed using the SPSS Statistics 22.0 program. Descriptive statistics were used to describe participants' demographic characteristics. To test the homogeneity of participants' characteristics, cognition, ADL, depression, and sleep between the two groups, t-test, x^2 test, and Mann-Whitey U test were used. Kolmogrov-Smirnov was used to check the normal distribution of depression and sleep level. To compare the effects of laugher therapy on depression between the two groups paired t-test, independent t-test was used. To compare the effects of laugher therapy on sleep between the two groups, Wilcoxon matched pairs signed ranks test, and Mann-Whitney U test were used because the sleep level did not follow the normal distribution.

RESULTS

1. Participant Characteristics

The findings of the participant characteristics are presented in Table 2. In the treatment group, 57.9% of them were male and 63.2% were under the age of 80. Those participants who had less than an elementary school education were 57.9%, had a cerebrocardiovascular disease were 47.4%. 26.3% of them were taking sleeping pills and 26.3% were taking antidepressants. 57.9% of them had been at the LTC hospital for less than 1 year. Cognition and ADL levels were 26.47±2.86 and 12.00±3.63, respectively. In the comparison group, 55.6% of the participants were female and 55.6% were under age 80. Those participants who had

Table 2. Characteristics of Participants at the Long-term Care Hospitals (N=37)

Characteristics	Categories	Treatment group (n=19) n (%)/M±SD	Comparison group (n=18) n (%)/M±SD	x^2 or t or Z	p
Gender	Male	11 (57.9)	8 (44.4)	0.67	.313
	Female	8 (42.1)	10 (55.6)		
Age (year)	65~79	12 (63.2)	10 (55.6)	0.22	.446
	≥80	7 (36.8)	8 (44.4)		
Education	≤Elementary school	11 (57.9)	13 (72.2)	0.83	.286
	≥Middle school	8 (42.1)	5 (27.8)		
Medical diagnosis	CVD	9 (47.4)	8 (44.4)	0.25	.882
	MCI	4 (21.0)	3 (16.7)		
	Others [†]	6 (31.6)	7 (38.9)		
Sleeping pills [†]	Yes	5 (26.3)	6 (33.3)	0.22	.457
	No	14 (73.7)	12 (66.7)		
Antidepressants	Yes	5 (26.3)	5 (27.8)	0.01	.605
	No	14 (73.7)	13 (72.2)		
Hospitalization	≤1 year	11 (57.9)	11 (61.1)	0.04	.554
	>1 year	8 (42.1)	7 (38.9)		
Cognition		26.47±2.86	25.94±2.62	-0.59	.562
ADL		12.00±3.63	10.83±2.68	-1.35	.179
Depression		8.37±1.54	8.17±1.98	-0.35	.730
Sleep		8.98±3.08	9.22±3.39	-0.28 [§]	.783

CVD=cerebrocardiovascular disease; MCI=mild cognitive impairment; ADL=activity of daily living; [†] Parkinson's disease, cancer, arthritis, fracture, diabetes mellitus, Sjogren's syndrome; [†] Lunapam, Stilnox; [§] Mann-Whitney U test.

less than an elementary school education were 72.2% and had cerebrocardiovascular disease were 44.4%. 33.3% of them were taking sleeping pills and 27.8% were taking antidepressants. 61.1% of them had been at the LTC hospital for less than 1 year. Cognition and ADL levels were 25.94±2.62 and 10.89±2.68, respectively. There were no significant differences in the participants' characteristics, cognition, ADL, depression, and sleep between the two groups prior to therapy. In both groups, prescribed medications were not changed throughout the study period.

2. Depression

Changes in depression in both groups are presented in Table 3. In the treatment group, the depression level was 8.37 prior to the laughter therapy and decreased to 5.32, indicating light depression, when the therapy ended. The depression decreased significantly at posttest compared to the baseline in the treatment group (t=8.96, p<.001). In the comparison group, the depression level was 8.17 and decreased to 7.94, indicating light depression. The depression did not decrease significantly at posttest compared to the baseline in the comparison group (t=0.81, p=.429). There was a significant difference in depression between the two groups (t=-7.12, p<.001).

3. Sleep

The changes in sleep in both groups are also presented in Table 3. In the treatment group, sleep level was 8.68 prior to the therapy and decreased to 6.53 after the therapy. Sleep decreased significantly at posttest compared to the baseline in the treatment group (z=-3.62, p<.001). In the comparison group, sleep level was 9.22 and decreased to 8.83. There was a significant difference in sleep between the two groups (z=-4.16, p<.001). Sleep had not decreased significantly at posttest compared to the baseline in the comparison group (z=-0.88, p=.378). There was a significant difference in sleep between the two groups (z=-4.16, p<.001).

DISCUSSION

This study investigated the effects of laughter therapy

Table 3. Difference in Depression and Sleep between the Two Groups (*N*=37)

Variables	Groups	Pretest M±SD	Posttest M±SD	Difference M±SD	Paired t or Z	p	t or Z	p
Depression	Treatment (n=19)	8.37±1.54	5.32±1.20	-3.05±1.31	8.96	<.001	7.12	<.001
	Comparison (n=18)	8.17±1.98	7.94±2.49	-0.22±1.17	0.81	.429		
Sleep	Treatment (n=19)	8.68±3.38	6.53±2.34	-2.42±1.22	-3.62[†]	<.001	4.16[‡]	<.001
	Comparison (n=18)	9.22±3.39	8.83±3.13	-0.39±0.92	-0.88[†]	.378		

[†] Wilcoxon matched pairs signed ranks test; [‡] Mann-Whitney U test.

on depression and sleep quality for residents at LTC hospitals, and the results showed that depression and sleep quality were improved. Previous studies involving laughter therapy were performed among older adults living in the community and showed similar effects on depression [12,14]. Laughing affects the secretion of physiological stress hormones and of serotonin and endorphins and also reduces depression [10,11]. Laughing increases the ability to control negative situations such as stress and to convert negative emotions such as depression into positive emotions.

However, some previous studies showed no significant effect from laughter therapy on depression [13,26]. In those studies, the therapy was provided only once a week, and the they suggested the importance of providing the therapy more than once a week to improve depression. Therefore, this study provided the therapy twice a week for a total of eight sessions. The pilot study was originally offered for 60 minutes, and the older adults complained that 60 minutes of operation time is strenuous to older adults and suggested 40 minutes as appropriate for the laughter therapy in this study. In further studies involving laughter therapy, the residents' physical status and attention should be taken into consideration.

In this study, participants were screened using GDSSF-K and evaluated as having or not having mild depression. Prior to the therapy, the residents showed mild-moderate levels of depression, but the level decreased to a mild level when the therapy was completed. Therefore, the laughter therapy could be considered an important therapy to improve depression in LTC hospitals.

This study showed positive effects of laughter therapy on sleep for patients at LTC hospitals whereas previous studies did not show consistent results. While some studies on laughter therapy showed positive effects on sleep for home-dwelling patients or vulnerable populations, other studies showed no significant effect on sleep in patients with dialysis or hospitalized patients [16,27]. Lee and colleagues [16,27] assumed that the lack of a significant effect from laughter therapy on sleep was because the

therapy was more focused on laughing. Because sleep has a significant correlation with physical activity, adding exercises of upper and lower extremities to the therapy appeared to improve sleep in this study. In the sub-categories of sleep, subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency and daytime dysfunction were significantly improved with laughter therapy, but sleep disturbance and medication use were not. Sleep disturbance is a serious problem in LTC hospitals [28]. The amount of medication used to improve sleep in the treatment group was lower than in the comparison group, though the difference was not significant. For better sleep with less taking sleeping medications, the contents of laughter therapy need to be reviewed and modified for patients at LTC hospitals.

It is meaningful that the results of this study supported the value of laughter therapy on depression and sleep. The therapy included more intense physical activities to increase the effect of laughter therapy on sleep. Laughter therapy is originally defined as "expressing the pleasure to laughing using the physical body, make physical, psychological and social relationship with others healthy and help improving quality of life"[29]. Physical activity is often defined as "the movement of the body by the skeletal muscle following energy consumption"[5]. Thus, the laughter therapy is similar with physical activity in terms of using physical body, but it is distinguished from the physical activity in terms of using physical body to express the pleasure to laugh. Based on the findings, laughter therapy strengthening physical activities must be provided more than two times a week to improve depression and sleep among patients in LTC hospitals.

The limitations of this study were as follows. First, this study was conducted at two LTC hospitals. Therefore, it requires careful generalization of the study results. Further, the two groups of participants were drawn from separate hospitals and there may be differences in the two groups that may account for the findings. The PSQI-K to measure sleep used in this study was based on the participants' memory and self-reporting during the past month; hence, the in-

strument must be changed to consider the short-term memory of older adults and to increase the validity and reliability of the study findings. In the past, laughter therapy was mostly provided to reduce depression among older adults. However, in this study, the laughter therapy enhanced physical activities (from exercise with upper and lower extremities) in the "laughing exercise" area; therefore, the laughter therapy improved sleep as well as depression. Therefore, for the older adults with depression and sleep problems at LTC hospitals, laughter therapy reinforcing physical activities can be considered to decrease depression and sleep problems.

CONCLUSION

This study showed that laughter therapy with more intense physical activities reduced depression and improved sleep among the participants in the LTC hospitals. To improve depression and sleep quality in older adults, laughter therapy strengthening physical activities might be beneficial if it can be offered more than two times a week. The findings of this study suggest that laughter therapy must enhance more physical activities to improve depression and sleep.

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