

# The Effect of Meditation-based Strategy on Sleep Quality and Perceived Stress in Older Adults Living in the Community

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## Abstract

**Objectives:** The study assessed the comparative effectiveness of two non-pharmacological interventions, Mantram repetition, a meditation-based strategy, and sleep techniques, to improve sleep in the healthy older adults. The study also evaluated the feasibility of delivering a 5-week, 60-90-minute, weekly Mantram repetition training program to a sample of healthy older adults living in the community.

**Methods:** Qualified subjects were healthy older adults aged 50 and above. A convenient sample of 44 subjects consented to participate. One subject left the study due to illness and eight subjects with missing post tests were removed from the analysis. A total of 35 subjects (sleep technique group n=19, Mantram group n=16) remained for the analysis. The study used a quasi-experimental pre-test and post-test non-equivalent comparison group approach. A blocked design by gender was used and blocks were randomly assigned to either the Mantram repetition group or sleep technique group. Sleep quality was measured with the Pittsburgh Sleep Quality Index (PSQI). The level of perceived stress was measured with the Perceived Stress Scale (PSS). The self-reported questionnaires (PSQI and PSS) were completed before and after the 5-week training. Analysis of Covariance and change scores were performed to determine the impact of Mantram repetition on sleep quality and perceived stress.

**Results:** The Mantram repetition group and the sleep technique group significantly differed in perceived stress, sleep latency, and subjective sleep quality scores post training. The Mantram repetition group exhibited a beneficial change in perceived stress level, sleep quality (global), frequency of sleep-aid use, sleep latency, and subjective sleep quality.

**Conclusion:** The study results suggest that Mantram repetition could benefit older adults seeking ways to improve sleep and decrease stress. The findings demonstrate the feasibility and acceptability of the five-week Mantram repetition training program to older adults living in the community.

**Keywords:** Mantram repetition; Meditation-based; Stress; Sleep quality; Sleep-aid; Older adults

## Introduction

Poor sleep, a common complaint and an important problem in older adults, has gained attention as a health risk factor due to increasing evidence of its association with chronic diseases. Poor sleep has been shown to be a health risk factor that is linked to increased mortality and morbidity in major illnesses, higher level of stress (perceived and physiological response) frequent use of health services, reduced functional capabilities, and diminished quality of life [1-3]. Persons with poor sleep frequently report physical distress, mental distress, activity limitations, depressive symptoms, anxiety, and pain than those without frequent sleep disturbance. Short sleep duration has been associated with the pathogenesis of obesity, diabetes, and hypertension, all of which are potent factors for atherosclerosis [4-8]. Sleep-promoting pharmacological agents are commonly utilized to treat sleep. Even though studies show that improvements in sleep with sedative use are statistically significant, the degree of effectiveness is small while the increased risk of adverse events is statistically significant, especially in older adults [9]. Efforts to discover an effective treatment to improve sleep have increased; however, pharmacological intervention is still currently the popular approach. There is a need to investigate non pharmacological options for improving sleep in the older population. Mantram repetition, a meditation-based approach that has shown many benefits to patients with physical and psychological ailments, is a promising option.

## Purpose

The study assessed the comparative effectiveness of two non-pharmacological interventions (Mantram and sleep technique) to improve sleep in the older population and to evaluate the feasibility of providing a 5-week Mantram repetition program consisting of 60-90-minute weekly training classes to a sample of healthy older adults living in the community. The objective was to examine the extent to which Mantram Repetition can improve sleep quality and decrease stress in older adults. The long-term goals are: (1) to utilize findings to conduct a

longitudinal study examining changes in sleep two months and four months after the end of the training, and (2) ultimately to provide evidence on the efficacy and safety of non-pharmacological interventions such as Mantram repetition to help improve sleep quality and reduce stress in older adults leading to a decreased use of sedatives, improved functional capabilities, improved health, and increased quality of life.

The conceptual framework for this study, the mind and body interaction, presents a cause and effect relationship between the mind and the body [10]. Meditation techniques can trigger a relaxation response that helps in initiation of sleep [11]. Mantram repetition is a meditation-based strategy that uses words of power that can penetrate the inner self. These words are repeated silently and continually to focus attention, slow down thinking for mental clarity, interrupt the stress response, tap inner resources, transform consciousness, and trigger a mental change in the person. Mantram repetition, unlike meditation and spiritual-based treatment options, does not need a quiet place and a period of quiet time to practice. Mantram repetition may be a useful option for healthy older adults. Mantram repetition is a strategy that is easy to learn, portable, and readily accessible. It can be utilized during any activity at any time of the day without a need to change action or environment [12].

### Pharmacological treatment for poor sleep

Pharmacological treatment for sleep remains the popular option [13]. A wide variety of pharmacological agents for sleep, both over-the-counter such as antihistamine and melatonin, and prescription, are available. Hypnotics are effective interventions but not without risks. There is potential for dependence or abuse, withdrawal syndrome, dose escalation, and rebound insomnia [14]. In addition, sedative use is a major risk factor for falls in older adults living in the community [11]. Glass, Lanctot, Herrmann, Sproule and Busto performed a meta-analysis using 24 studies investigating the risk and benefits of sedative in older adults. Compared to patients on placebo, those on sedatives had more reports of adverse events including memory loss, confusion, disorientation, dizziness, loss of balance, falls, residual morning sedation, and fatigue. Over-The-Counter (OTC) sleep aids used for sleep include diphenhydramine, herbs, and diet supplements that is claimed to have hypnotic effects. Majority of OTC sleep aids are composed of a combination of different herbs that may need further investigation of their side effects in older adults. Diphenhydramine can cause serious side effects in older adults. Possible side effects include sleepiness, decreased reaction time, dizziness, dry mouth, constipation, blurred vision, urinary retention, cognitive impairment, and confusion [15]. Some studies on herbs such as valerian, kava, passionflower, zizyphi spinosi semen, and glycyrrhizae radix show hypnotic effect on subjects; however, their efficacy requires further investigation [16]. There are mixed findings in randomized trials investigating the tranquilizing effect of melatonin [17-20]. There is evidence in the literature that melatonin may possibly increase seizure frequency [21], disturb sleep-wake pattern [22], and result in optic neuropathy if taken with sertraline and a high-protein diet [23]. There is no sufficient data available that demonstrates its long-term safety for it to be

recommended to older adults. There were very few studies found that examined possible side effects of herbs currently being used for sleep in older adults. In addition, poly pharmacy is an important concern in older adults. Macgregor et al. (1989) have warned of the possible hepatotoxic effect of herbal remedies. Sleep aids, most especially in combination with other medications, may lead to possible adverse effects.

The literature demonstrates that non-pharmacological approaches to poor sleep can be very effective Tai chi, a form of meditation that involves slow body movements and deep breaths, has been found to significantly improve sleep quality, sleep-onset latency, sleep duration, and sleep efficiency in older adults [1,24]. Exercise has shown to significantly improved in sleep quality on the global Pittsburgh Sleep Quality Index (PSQI), sleep latency, sleep duration, daytime dysfunction, and sleep efficiency [25]. Lai and Good used a randomized controlled trial with a two-group repeated measures design to investigate effect of soft music to sleep quality. The difference in sleep quality score between the music group and the control group was clinically significant with a 35% improvement overall in the music group. Meditation-based approach to poor sleep has demonstrated benefits as well. Carlson, Specia, Patel, and Goodey found a decrease in reported poor sleep quality in cancer patients after completing the Mindfulness-Based Stress Reduction program (MBSR). Ong, Shapiro, and Manber combined mindfulness meditation with Cognitive Behavioral therapy to strengthen the effect of sleep. A significant reduction in the symptoms of insomnia, pre-sleep arousal, sleep effort, and dysfunctional sleep-related cognitions were found. Evidence has supported efficacy of non-pharmacological interventions such as exercise, Tai chi, and music therapy, but there may be adherence difficulty for older adults. The interventions require sustained and prolonged attention and concentration, considerable time commitment, and change in environment and physical activity.

### Mantram repetition

A Mantram is a Sanskrit word that means, "To cross the mind". Mantrams are powerful words or phrases that contain divine syllables or sound that have been passed on for generations [12]. Mantram repetition is a meditation-based approach, used for management of stress, anxiety, and pain that involves repetition of a word or a phrase with spiritual association that is chosen by the participants that fits their current beliefs or philosophy or something that they desire to experience [26,27]. In contrast to the demands of exercise and traditional relaxation techniques, Mantram repetition does not need a change in environment and activity or a period of quiet time to practice. It can be practiced anytime, anywhere, and during any activity. Its accessibility and portability will make it more "user-friendly" to older adults.

It was examined how a Mantram repetition training program is helpful or not helpful to veterans and Veteran Affairs (VA) staff using a qualitative design. They found that Mantram repetition was useful in controlling emotions, stress, unwanted thoughts, and attaining good sleep. Due to use of convenient sampling, generalization to other population would be difficult. However,

the findings demonstrate the benefits that Mantram repetition could offer to veterans suffering from Post-Traumatic Stress Disorder (PTSD). In the PTSD study by Bormann et al. a quantitative experimental design was used to examine the effect of Mantram repetition to symptoms of combat-related PTSD in veterans aged 40 to 76 years (average age of 56). They found that the Mantram repetition group showed improvement in PTSD symptom severity including sleep disturbance related to hyper arousal and re-experiencing trauma as well as a significant improvement on self-reported PTSD severity. Clinician-assessed scores also showed improvement. Other important findings included diminished psychological distress and increased quality of life. A more recent study also found significant improvements in psychological distress and spiritual well-being in randomized trials with 223 veterans aged 22 to 88 years of age with medical or psychiatric diagnosis [28].

## Methods

### Research design

The study used a quasi-experimental pretest-posttest non-equivalent comparison group approach. Mantram repetition training was a weekly, 60 to 90-minute, 5-week class held at the local community and senior centers. The classes were taught by the primary investigator, a trained Mantram instructor. An instructor guide developed from the VA San Diego Health Care System was followed. To minimize investigator bias, information was presented via pre-recorded instructional material consisting of power points with audio. Class activities and discussions were conducted after the presentation. Materials that were provided for the intervention group include a Mantram training manual, the book *"Strength in the Storm"* by Sri Eknath Easwaran, and for both groups, a sleep diary for tracking experiences and progress. The sleep technique class involved five weekly, face-to-face sessions with pre-recorded power point presentation on sleep hygiene, diet and exercise, discussions and learning activities. Sleep experiences were recorded by the subjects in the sleep diary. Assignments and experiences were discussed during subsequent face-to-face sessions.

### Sample and setting

The target population was healthy older adult in the community aged 50 and above who were English literate. Individuals with a diagnosis of dementia were excluded because Mantram repetition requires the ability to focus. Those with diagnosis of obstructive sleep Apnea were also excluded. A sample of 44 subjects originally consented to participate with 38 females and 6 males. One subject left the study due to illness and eight who did not submit the post-tests were removed from the analysis. A total of 35 subjects (sleep technique group n=19, Mantram group n=16) were used in the analysis. The subjects were assigned to blocks based on gender, and then the groups were randomly assigned to either the sleep technique group or the Mantram group. Training sites were community and senior centers in North Orange County and Southwest Los Angeles.

## Instruments

### Sleep quality and pittsburgh sleep quality index

This research study used Pittsburgh Sleep Quality Index (PSQI) with permission from the holder of the copyright. PSQI is a self-administered questionnaire that consists of 4 open-ended questions and 14 questions to be answered using event-frequency and scales, differentiating "poor" from "good" sleep. It measures seven areas: subjective sleep quality, sleep duration, sleep latency (the time it takes to fall asleep), habitual sleep efficiency (the ratio of total sleep time to time in bed), frequency of prescribed or over-the-counter sleep-promoting medication use, sleep disturbances, and daytime dysfunction over the last month [29]. PSQI is comprised of different response categories that include usual bed time, wake time, number of actual hours slept, and number of minutes in bed before sleep onset, and Likert-type responses. The PSQI raw scores from the 18 questions measuring the seven sleep indicators (subjective sleep quality, sleep duration, sleep latency, habitual sleep efficiency, frequency of prescribed or over-the-counter sleep-promoting medication use, sleep disturbances, and daytime dysfunction) are combined and rescored from 0 to 3. The seven sub scores are totaled, producing the global score that can range from 0 to 21. A global score of 5 or more indicates poor sleep quality. The PSQI scoring instruction was provided by the University of Pittsburgh, Department of Psychiatry and accessed via the department's website [28,29]. PSQI has been used in numerous studies with older populations living in the community and people with disorders including depression, type-2-diabetes, and cardiovascular disease, which have supported its validity [30]. According to a psychometric study of the PSQI, it has a global reliability coefficient (Cronbach's alpha) of 0.83 [30]. In this study, a Cronbach's alpha was computed using Statistical Package for the Social Sciences software. The alpha coefficient for PSQI in the study was 0.73 indicating an acceptable internal consistency.

### Perceived stress and perceived stress scale

Perceived stress is a person's appraisal of how much stress he or she is under at a given point in time or over a given time period. This study used Perceived Stress Scale (PSS), a measurement tool comprised of 10 items with responses varying from 0 to 4 for each item and ranging from never, almost never, sometimes, fairly often and very often. The response is based on the degree to which an occurrence is appraised as stressful. PSS-10 scores were obtained by reversing the scores on the four positive items [17,26,31] and then calculating the sum across all 10 items. The range of score is from 0 to 40. A higher score indicates a higher stress level [32]. Perceived Stress Scale questionnaire (10-item scale) was utilized because it has been widely used in older adult studies. It has a Cronbach's alpha of 0.78 to 0.91 with good factor structure and predictive validity [33-38].

## Data Analysis

### Sample description

The range of age in the sample was from 57 to 83 years of age. The mean age was 71 years of age. Thirty-seven per cent of the subjects were Caucasian; forty-six per cent were Asian/Pacific Islander; and the remainder were Latino, Black, or Hispanic. Sixty per cent of the subjects had attained a bachelor's degree or higher; 20% had a technical degree; and 20% reported a High School degree as the highest education attained. Sixty per cent of the subjects were married while the other 40% were widowed, single, divorced, or separated. The sample was comprised of 14.3% male and 85.7% female subjects. **Table 1** displays the number of male and female subjects in the sleep technique group and the Mantram group. Seventy-one percent of the subjects had insomnia (n=25), of which 15 of the 25 subjects took sleep aids. Seven of the subjects taking sleep aids were in the sleep technique group, and eight were in the Mantram group. Eighty-six percent of the 35 subjects were on routine medication for chronic illness. Hypertension was the most commonly reported chronic disease in the sample (51%), followed by dyslipidaemia (26%). Only 8.6% of the subjects had diabetes mellitus and 5.7% had chronic obstructive pulmonary disease. Comparisons between the intervention and control group showed no significant differences in gender ( $\chi^2=0.480$ ,  $df=1$ ,  $p=0.489$ ), age ( $t=0.177$ ,  $df=33$ ,  $p=0.860$ ), ethnicity ( $\chi^2=0.742$ ,  $df=2$ ,  $p=0.74$ ), education ( $\chi^2=0.768$ ,  $df=3$ ,  $p=0.901$ ), marital status ( $\chi^2=1.228$ ,  $df=2$ ,  $p=0.655$ ), and use of sleep aid ( $\chi^2=0.614$ ,  $df=1$ ,  $p=0.494$ ). **Table 1** presents the sample's demographics.

**Table 1:** Demographics (N=35).

Ethnicity	Asian/Pacific Islander	16	45.7
	Caucasian/White	13	37.1
	Hispanic/Latino/Black-American/Other	6	17.1
Education	High School	7	20
	Vocational/ Technical School (2-year)	7	20

The two groups were similar in the number of subjects with reported insomnia (**Table 2**). The sleep technique group had 14 subjects with insomnia, while the Mantram group had 11. Both intervention groups had five members with no reported insomnia. Responses from the demographics and PSS questionnaires were entered in Excel spread sheet and uploaded to SPSS. Responses from the PSQI were entered in a PSQI database provided by the University of Pittsburgh, Department of Psychiatry. The database automatically combined and rescored the raw scores into sub scores for the seven sleep

quality indicators. The total score was also provided. The output was entered into SPSS for data analysis.

**Table 2:** Distribution of subjects with reported insomnia in each intervention group.

Groups	Decision	F	%
Sleep Technique	NO	5	26.3
	YES	14	73.7
	<b>Total</b>	<b>19</b>	<b>100</b>
Mantram	NO	5	31.3
	YES	11	68.8
	<b>Total</b>	<b>16</b>	<b>100</b>

## Results

A one-way analysis of covariance controlling for pre-test scores was conducted across all study variables: global sleep quality (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, the frequency of use of sleep-promoting medication, and daytime dysfunction) and perceived stress to compare the effect of Mantram repetition training and sleep technique training on the subjects' sleep quality and perceived stress (**Table 2**). The subjects' scores on the pre-intervention administration were controlled in the analysis. Preliminary analysis was conducted to check for any violation of assumptions. Results revealed a significant difference between the Mantram group and the sleep technique group with a large effect size in perceived stress ( $F(1, 32)=7.06$ ,  $p=0.012$ , partial eta squared=0.18) and subjective sleep quality ( $F(1, 32)=6.73$ ,  $p=0.01$ , partial eta squared=0.17; **Table 2**). There was also a significant difference between the groups in sleep latency ( $F(1, 32)=4.7$ ,  $p=0.04$ , partial eta squared=0.13) with a medium effect size. The difference in global sleep quality score between the Mantram group and the sleep technique group had a medium effect size, however, it did not reach statistical significance ( $F(1, 32)=3.2$ ,  $p=0.08$ , partial eta squared=0.091). Similarly, there was a medium effect size found in daytime dysfunction, but the difference between the two groups did not reach statistical significance ( $F(1, 32)=3.5$ ,  $p=0.07$ , partial eta squared=0.099). The difference between the two groups in sleep duration, habitual sleep efficiency, sleep disturbances, and frequency of use of sleep-promoting medication did not reach statistical significance.

Analysis of change scores in the two intervention groups was performed to examine if there was a greater positive in the group that received Mantram repetition training as compared to the group that received sleep technique education. Change scores were computed from the pre-test and post-test in sleep quality (subjective sleep quality, sleep disturbances, sleep latency, sleep duration, habitual sleep efficiency, daytime dysfunction, the frequency of use of prescribed or over-the-

counter sleep-promoting medication) and perceived stress. The change scores were analyzed using two-way analysis of covariance controlling for gender and age, with the intervention group membership as the independent variable. Results with a positive value indicated a change in a beneficial direction (**Table 3**).

**Table 3:** Differences in Post-test Scores between Groups Controlling for Pre-test Scores

DV	M (SD)		F(1, 32)	Sig	Partial $\eta^2$
	Sleep Tech	Mantram			
Perceived Stress	12.58 (7.26)	11.87 (6.09)	7.062	0.012 <sup>*</sup>	181a
Sleep Quality (global)	8.95 (3.29)	8.69 (4.59)	3.2	0.083	0.091 <sup>b</sup>
Subjective Sleep Quality	1.42 (0.61)	1.25 (0.77)	6.728	0.014 <sup>*</sup>	0.174 <sup>a</sup>
Sleep Latency	1.47 (1.12)	1.25 (0.86)	4.692	0.038 <sup>*</sup>	0.128 <sup>b</sup>
Sleep Duration	1.37 (0.83)	1.25 (0.86)	0.339	0.564	0.01
Habitual Sleep Efficiency	1.16 (1.07)	1.31 (1.35)	0.138	0.712	0.004
Sleep Disturbances	1.53 (0.61)	1.56 (0.63)	0.351	0.558	0.011
Frequency in use of Sleep aid	0.68 (1.11)	0.94 (1.12)	0.231	0.634	0.007
Daytime Dysfunction	0.89 (0.99)	1.19 (.89)	3.506	0.07	0.099 <sup>b</sup>

a: Large effect size  
b: Medium effect size

The Mantram group showed a significant change in a beneficial direction in perceived stress ( $M=5.6$ ,  $SE=1.5$ ; **Table 3**). The sleep technique group did not demonstrate any change in perceived stress ( $M=-0.002$ ,  $SE=1.8$ ). There was a significant

difference in the mean change scores between the two intervention groups (Mantram repetition and sleep technique) with a large effect size ( $F(1, 30)=5.6$ ,  $p=0.025$ , partial eta squared=0.16; (**Tables 4 and 5**).

**Table 4:** Change scores mean (Pre-test minus post-test).

DV	Group	M	SE	95% CI
Perceived Stress Level	Sleep Technique	-0.002	1.788	(-3.654, 3.650)
	Mantram	5.596 <sup>*</sup>	1.544	(2.442, 8.751)
Sleep Quality (global)	Sleep Technique	-0.782	0.985	(-2.79, 1.23)
	Mantram	1.73	0.851	(-.007, 3.47)
Frequency in use of sleep aid	Sleep Technique	-0.037	0.206	(-.456, 0.383)
	Mantram	0.444 <sup>*</sup>	0.178	(.081, 0.806)
Sleep duration	Sleep Technique	-0.244	0.34	(-.939, 0.450)
	Mantram	0.184	0.294	(-.415, 0.784)
Sleep efficiency	Sleep Technique	-0.139	0.347	(-.848, 0.570)
	Mantram	0.17	0.3	(-.442, 0.783)
Daytime Dysfunction	Sleep Technique	0.006	0.288	(-.583, 0.595)
	Mantram	-0.518	0.249	(-1.026, -0.009)
Sleep Disturbance	Sleep Technique	0.282	0.198	(-.123, 0.687)
	Mantram	0.277	0.171	(-.072, 0.627)
Sleep Latency	Sleep Technique	-0.364	0.329	(-1.036, 0.307)
	Mantram	0.564	0.284	(-.015, 1.144)
Subjective Sleep Quality	Sleep Technique	-0.364	0.231	(-.836, 0.108)

	Mantram	0.391	0.2	(-.017, 0.798)
*Significant Change Scores				

**Table 5:** Difference in mean change scores between Mantram and sleep technique groups.

DV	Type III SS	MS	F (1, 30)	Sig.	Partial $\eta^2$
Perceived Stress	126.933	126.933	5.566	0.025*	0.157 <sup>a</sup>
Sleep Quality (global)	25.568	25.568	3.697	0.064	0.110 <sup>b</sup>
Sleep Duration	0.745	0.745	0.903	0.35	0.029
Sleep Disturbance	0.000082	0.000082	0	0.986	0
Sleep Latency	3.494	3.494	4.537	0.041*	0.131 <sup>b</sup>
Daytime Dysfunction	1.111	1.111	1.874	0.181	0.059
Sleep Efficiency	0.388	0.388	0.452	0.506	0.015
Subjective Sleep Quality	2.307	2.307	6.054	0.020*	0.168 <sup>a</sup>
Frequency in use of sleep aid	0.935	0.935	3.103	0.088	0.094 <sup>b</sup>
a:large effect size					
b:medium effect size					

The global sleep quality score revealed a change in a beneficial direction in the Mantram group ( $M=1.7$ ,  $SE=0.85$ ), but not in the sleep technique group ( $M=0.78$ ,  $SE=0.98$ ). There was a medium effect size in the difference between the two groups in the global sleep quality change scores, however, it did not reach statistical significance ( $F(1, 30)=3.7$ ,  $p=0.06$ , partial eta squared =0.11). A significant decrease in the frequency of sleep aid use was found in the Mantram group. ( $M=0.44$ ,  $SE=0.18$ ). There was no positive change in the frequency of sleep aid use in the sleep technique group ( $M=-0.04$ ,  $SE=0.21$ ). The mean difference between the Mantram group and sleep technique group did not reach statistical significance but had a medium effect size ( $F(1, 30) = 3.10$ ,  $p=0.088$ , partial eta squared=0.094). A direction of improvement in sleep latency was found in the Mantram group ( $M=0.39$ ,  $SE=0.2$ ), but not in the sleep technique group ( $M=-0.36$ ,  $SE=0.33$ ). There was a significant difference between Mantram repetition and sleep techniques groups in sleep latency ( $F(1, 30)=4.54$ ,  $p=0.04$ , partial eta squared=0.13) with a medium effect size. Subjective sleep quality score showed a positive change after Mantram repetition training. No change in the subjective sleep quality score was found in the sleep technique group ( $M=-0.36$ ,  $SE=0.23$ ). A significant difference between the two groups with a large effect size was found in the

subjective sleep quality change scores ( $F(1, 30)=6.05$ ,  $p=0.02$ , partial eta squared=0.17). There was a small movement towards a beneficial direction in sleep duration ( $M=0.18$ ,  $SE=0.29$ ) and sleep efficiency ( $M=0.17$ ,  $SE=0.3$ ) in the Mantram group but not in the sleep technique group. Both Mantram ( $M=0.28$ ,  $SE=0.17$ ) and sleep technique groups ( $M=0.28$ ,  $SE=0.2$ ) showed improvement in sleep disturbance. No beneficial change in the daytime dysfunction score was seen in both the Mantram group and the sleep technique group.

## Discussion

The results showed that the Mantram group and the sleep technique group significantly differed in their perceived stress, sleep latency, and subjective sleep scores post training. Findings of the study suggested improvement in perceived stress, subjective sleep quality, and sleep latency in the Mantram group when pre-test scores were controlled. The result supported the findings on the efficacy of frequent Mantram repetition on reducing stress and improving sleep in studies conducted with veterans, caregivers of veterans with dementia, and Veteran Affairs employees [12,27,31,39,40]. The findings in the change score analysis also support observations of the benefit of Mantram repetition on sleep and perceived stress (Table 6).

**Table 6:** List of recommended Mantrams\*

Mantrams (pronunciation)	Description
Om mani padme hum (Ohm mah-nee pahd-may hume)	An invocation to the jewel (Self), in the lotus of the heart
Namo Butsaya (Nah-mo Boot-see-yah)	I bow to the Buddha
My God and My All	St. Francis of Assisi's phrase
Maranatha (Mah-rah-nah-tha)	Lord of the Heart (Aramaic)
Kyrie Eleison (Kir-ee-ay Ee-lay-ee-sone)	Lord have mercy
Christe Eleison (Kreest-ay Ee-lay-ee-sone)	Christ have mercy
Jesus, Jesus	Son of God
Hail Mary or Ave Maria	Mother of Jesus
Lord Jesus Christ, Son of God, have mercy on me	Jesus Prayer
Rama (Rah-mah)	Eternal joy within (Gandhi's mantram)
Om Namah Shivaya (Ohm Nah-mah Shee-vah-yah)	Invocation to beauty and fearlessness
Om Prema (Ohm Pray-Mah)	A call for universal love
Om Shanti (Ohm Shawn-tee)	Invocation to eternal peace
Shalom (Shah-lome)	Peace, completeness

So Hum (So Hum)	I am that Self within
Barukh Atah Adonoi (Bah-rookh Atah Ah-doh-nigh)	Blessed art Thou, King of the Universe
Ribono Shel Olam (Ree-boh-no Shel O-lahm)	Master of the Universe
Bismillah ir-Rahman ir-Rahim (Beese-mah-lah ir-Rah-mun ir-Rah-heem)	In the name of Allah, the merciful, the compassionate
O Wakan Tanka (Wah-Kahn Tahn-Kah)	Great Spirit
*used in research studies	

In the change score analysis, the Mantram group demonstrated a beneficial change in perceived stress level, sleep quality (global), frequency of sleep-aid use, sleep latency, and subjective sleep quality. Both the sleep technique and Mantram repetition training exhibited a positive effect on sleep disturbance. Mantram repetition can pause the mind and refocus attention to the present and to a state of calm with relaxation as a goal [26,41-46]. It can raise the awareness of negative and maladaptive responses to undesired experiences and everyday nuisance and provide an opportunity to choose an adaptive or a positive response. For example, one subject shared that upon awakening and seeing two o'clock AM on the clock, worry about inability to fall back to sleep and irritability were the usual reactions. Mantram can bring awareness to the reaction, remove attention from the clock, and focus on other options such as a relaxing activity.

## Conclusion

The findings demonstrate the feasibility and acceptability of the five-week Mantram repetition training program to older adults living in the community. The study was instructive in identifying areas of modification for future studies. The study results suggest that Mantram repetition could benefit older adults seeking ways to improve sleep and decrease stress. The results are preliminary and will need a larger study to confirm the findings. Nevertheless, the findings are promising and support the acceptability and feasibility of a non-Pharmacological, mind-body intervention.

## Limitations

Interpretation of the findings of this study should be made within the confines of the study limitations. An important limitation in the data analysis was the Pittsburgh Sleep Quality Index (PSQI) method of scoring. It may have decreased the sensitivity of the tool as questions were combined and rescored to 0-3. For example, sleep disturbance had a raw score of 0-27. The score was reduced to 0-3 when rescored. The self-reported measures may be prone to inaccuracy of information provided by the subjects. Recall difficulty may have affected the quality of the responses and decreased the magnitude of the true effect. The risk of under-reporting or over-reporting of historical information is also a possibility. The use of a sleep diary in this study had likely improved the accuracy of the post-test. The findings cannot be generalized to other healthy older adults due

to the small convenience sample. In addition, there were more women who volunteered to participate in the study.

## Future Research Recommendations

Qualitative data from the sleep diary should be examined in future studies to recognize other important factors that negatively affect sleep in healthy older adults and to understand the usefulness of Mantram repetition in managing those factors. Future study should include sleep quality and perceived stress measurements at 3 months and 6 months, post training, to determine longitudinal efficacy of Mantram repetition. To increase the number of subjects, recruitment areas should be expanded geographically. In addition, quota sampling may be utilized as an option to ensure recruitment of male subjects. To increase sensitivity of the PSQI tool in analyzing each element of sleep quality, a possible approach is to examine the score of each item in the tool independent of the global sleep quality scoring guideline. For example, sleep disturbance will not be rescored; instead, the raw score of 27 will be used in the analysis. Distribution of the sleep diary to subjects well in advance of the first week of training and pre-test may improve accuracy of the responses.

## Implications for Practice

The clinical application of Mantram repetition is in health promotion with efforts to improve sleep and management of stress and support healthier habits and life style. Mantram repetition training can be integrated in the practice of physicians, nurse practitioners, nurses, psychologists, and social workers. Health care providers can teach Mantram repetition to older adults with simple sleep complaints or as part of a treatment plan for those with more complex sleep disturbances. The use of Mantram repetition can lead to a decrease in the use of sleep aids and the attainment of better sleep without the side effects of pharmacological remedies. In addition, it can be part of a treatment strategy for those with depression and anxiety. It can be taught to those with chronic illnesses who experience pain, fear, frustration, anger, and disruptions in their daily lives. It can be prescribed to manage stress and worry related to challenges caused by biological, emotional, financial, and lifestyle changes experienced by the older adults. Better sleep and stress management will improve functional capabilities, decrease the need for health services, and ultimately improve the overall quality of life in older adults.

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