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## ORIGINAL RESEARCH: CLINICAL TRIAL



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# Happiness or hopelessness in late life: A cluster RCT of the 3L-Mind-Training programme among the institutionalized older people

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**Abstract**

**Aim:** To explore the effectiveness of a new mental health promotion activities programme by including the criterion variables of happiness and depressive mood.

**Design:** A single-blinded, clustered, randomized and controlled trial.

**Method:** A list consisting of the names of elderly residents was provided by the senior social worker at a geriatric institution. The participants recruited for the study were living on one of four different floors that had separate and non-interfering spaces and having comparable disabilities. The researchers randomly assigned residents on two floors as members of the intervention group; the other residents were considered the control group. The intervention groups attended 6 weeks of the 3L-Mind-Training programme, whereas the control group only engaged in regular health promotion activities. The mini version of the Chinese Happiness Inventory was adapted to measure happiness. The Geriatric Depression Scale short-form was used to measure depression in older people. A generalized estimating equation was used to analyse the short-term and durative effects.

**Findings:** The 126 residents included in the study were 65–97 years old, and 90% of the residents relied on wheelchairs. The intervention activities give significant immediate and durative effects both on subjective well-being enhancement and depressive mood relief. When evaluating the overall intervention activity, 93.8% of the aged residents indicated that this programme was helpful and allowed them to view life events positively.

**Conclusion and impact:** A well-planned mind-training programme could help elderly people reform their viewpoint and create a more fun and happy experience of ageing.

**Trial registration:** Data were obtained from the project, initiated in 2014, which was funded by the Ministry of Science and Technology in Taiwan and was approved by the Institutional Review Board in Chung Shan Medical University (No. CS15009). The trial registration number of the study was No. ChiCTR1900021811.

**KEY WORDS**

cluster RCT, depression, elderly people, institution, mental health promotion, nursing home, subjective well-being

Chun-Yang Lee is co-first author.

<sup>\*</sup>Chun-Yang Lee not only involved in drafting the manuscript or revising it critically for important intellectual content, but also participated in the analysis and interpretation of data.

# 1 | INTRODUCTION

Globally, there is rapid ageing in the overall population. Between 2015 – 2050, the proportion of the world's population over 60 years will nearly double, from 12–22% (World Health Organization [WHO], 2017a). The rapid change in the ageing of the population will trigger many issues. The mental health of older people is important and particularly neglected (Wang, 2004). Specifically, major depressive disorder (MDD) accounted for 8.2% of global years lived with disability (YLDs) in 2010, making it the second leading cause of YLDs (Ferrari et al., 2013). Furthermore, it led to a total of over 50 million YLDs in 2015 and was ranked as the single largest contributor to non-fatal health loss globally (World Health Organization [WHO], 2017b). With the changing environment and age distribution of the population, studies on geriatric psychology are emerging in fields such as biology, clinical medicine, behaviour and social psychology (Birren, Bruce Sloane, & Cohen, 1992). This broad involvement indicates that more attention and studies are necessary to address this issue.

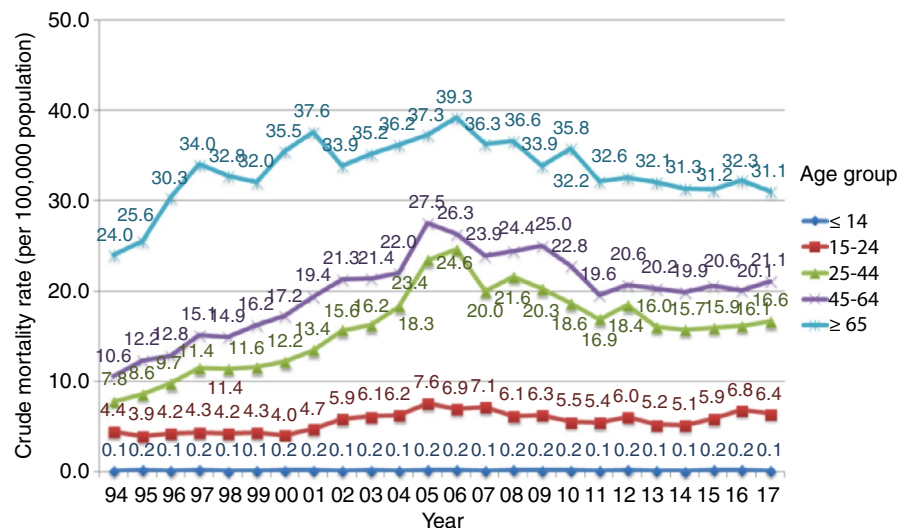
Among the various topics in geriatric mental health, depression is a common psychological issue that requires attention. Depression is the leading cause of ill health and disability worldwide (World Health Organization [WHO], 2017c); it not only leads to increased short-term or durative (for several weeks/years) emotional depression, grief, wakefulness and sadness but also decreases patients' sense of happiness, thus contributing to cognitive torpor, feelings of fatigue and insomnia. Individuals with worse symptoms are more likely to plummet to the depths of mental distress, suffering, sorrow, hopelessness, remorse, parapsychosis or suicidal thoughts (American Psychiatric Association [APA], 1994). Older adults with physical health conditions have higher rates of depression than those who are healthy (World Health Organization [WHO], 2017a). Findings from a previous study revealed that depression is the leading cause of suicide among elderly people, who have highest suicide rate among all age groups (Chong et al., 2001). In addition to the increasing suicidal risk (Sherina, Rampal, Aini, & Norhidayati, 2005), depression also impairs functioning (World Health Organization, 2015). The mortality

rate from suicide in elderly people is 2–3 times more than that of other populations, indicating that insufficient attention has been paid to the problem and appropriate treatment for mental health in elderly people (Please refer to Figure 1). The above-mentioned facts indicate that depression has an enormous impact on the quality of life in older people; hence, it is extraordinarily important to explore and improve the factors that influence depression in elderly people.

## 1.1 | Background

Because of the changes in social development and ethical concepts in the Chinese community, older people currently placed more demand than ever before on geriatric institutions. Their experiences of physical degeneration, poor financial conditions, death of a spouse and a seriously declining birth rate have caused additional burdens for long-term care institutions and a general increase in the stresses and strains of life. After entering institutions, older people face changes in their surroundings, daily life patterns, social networks and support systems and must adapt to a new environment; meanwhile, their physical health deterioration might result in another life crisis (Lee, Woo, & Mackenzie, 2002). Past studies have reported that when institutionalized residents relocated from households were compared with those relocated from other care institutions, depressive symptoms among the former were significantly increased. Other studies have also shown that institutional residents are confronted with common negative emotions, including depression, helplessness, loneliness, boredom and abandonment, similar to those of homeless people, who may also have difficulty adjusting to institutional life; additionally, institutionalized elderly residents can experience worsened physical and mental health and reduced social interaction (Emery, 2006). Consequently, compared to those living in their own communities, elderly people in nursing homes are often in bad moods and experience a sense of loss and painful feelings (Lee, 1997).

Some surveys have reported that depression is one of the most common psychological problems among older people in



**FIGURE 1** Suicide mortality rate by age group in Taiwan from 1994 to 2017. (Source from <http://tspc.tw/tspc/portaI/know/index.jsp?type=2> Taiwan Suicide Prevention Center, 2018)

institutions because of the probable mechanism that geriatric medicine is more focused on the improvement of physiological illnesses, the control of chronic non-communicable diseases and the alleviation of symptoms to the neglect of mental health in older people (Wang, 2004). Moreover, in the United States, approximately 5.7% of depressed patients are over 65 years old and are residents of institutions (Myskja & Nord, 2008). The results of the above-mentioned studies demonstrate that after entering an institution, older people require psychological adjustment to help relieve any psychological discomfort.

The key to improving the quality of life is the improvement of self-care abilities. Mental health promotion is a positive action to improve mental health and subjective well-being (Ponce, Rosas, & Lorca, 2014; Zhang & Zhang, 2015). We hope to promote social, emotional and spiritual comfort and to improve quality of life through intervention activities or programmes. The positive connotations of mental health include happiness, subjective well-being, psychological comfort, life satisfaction and quality of life (Loue, 2008; Nelson & Prilleltensky, 2010). Thus, aged individuals can expand their social support network by participating in activities. An expanded social support network improves life adaptability and satisfaction, which then promotes physical and mental health (de Guzman, Jurado, & Juson, 2015; Keykhosravi, Rezaei, & Khalouei, 2015; Li, Jiang, Li, & Zhang, 2018). Activity is not just exercise; there are a variety of purposeful and meaningful activities in life. Considering the limited physical function of aged individuals, suitable activities for therapy and pleasure must be designed. These activities can shift the individuals' attention and ways of thinking; they can also induce different behaviour patterns. Additionally, these activities can boost confidence and self-esteem, increase interactions with their surroundings, promote emotional and social skills, reduce feelings of loneliness and being lost and increase happiness and fun in life (Liu, Gou, & Zuo, 2014). The most important consideration is that the activities should be designed based on the issues and needs of the older people.

Studies on the physical and mental health of Chinese-speaking aged individuals have focussed on aged residents in residential communities (Hui, Chui, & Woo, 2009; Nomura & Hashimoto, 2006). In long-term care institutions, daily routines usually follow a set schedule; residents may be lonely and bored most of the time. If different types of activities can be arranged, the day can be more fulfilling and happier for aged residents. Thus, in this study, institutionalized aged residents were selected as our research objects, and a programme consisting of suitable mind-training activities for both healthy and disabled aged individuals was constructed to improve their mental health status.

## 2 | THE STUDY

### 2.1 | Aims

This study aims to verify the effectiveness of a mental health promotion activities programme for improving subjective well-being and reducing depressive mood.

## 2.2 | Methodology

### 2.2.1 | Trial design and study sample

This study comprised a single-blinded, clustered, randomized, controlled trial in one senior and large-scale geriatric institution in central Taiwan. Approximately 90% of the residents relied on wheelchairs. The institution was composed of many floors that allowed convenient grouping into intervention and control groups without interference between groups, which permitted clustering. Because the outcome variables were not diseases in our study, we could not determine the incidence/prevalence rate. Therefore, we were unable to apply the general formula for sample size computing. In general, the minimum sample size depends on the type of research involved. Some researchers cite a sample size of 30 as a guideline for correlational, causal-comparative, and true experimental research. Hence we used the recommendation that the minimum required sample size for each intervention/control group was at least 30 samples for the experimental study (Gay, 1992; Gay & Diehl, 1992) to determine the sample size.

We first consulted a senior social worker from the institution regarding the inclusion criteria for this study, which were (a) age 65 years and over; (b) capable of verbal expression; and (c) able to sit for an hour and cooperate with group leaders during activities. The social worker then performed an evaluation and discussed the study with other staff members in the institution. A list of residents who satisfied the inclusion conditions and lived on four different floors with non-interfering spaces and had similar disabilities were recruited by the researcher. The researchers randomly assigned residents on two floors as members of the intervention group; the other residents were considered the control group. Because only the older people and the social workers knew the schedules of the classes, blinding was not broken, and the allocation remained concealed during the course of the study. The single-blinded design meant that neither the social workers nor the participants knew who was in the intervention and control groups or the random treatment allocation procedure used by the researchers.

### 2.2.2 | Study design and procedures

After obtaining signed informed consent from the participating institution and each individual, this intervention programme was conducted for a period of 6 weeks, once a week for 40 min per session. The informed consent includes a brief introduction to the project, confidentiality, the rights of the participants, the discomfort/ inconvenience/ injury that may occur to the participants of the study, and the contact information of the research project. The number of members in an activity group was low enough to ensure the quality of our intervention and to provide sufficient practice time for each elderly resident. The residents on each floor were separated into two groups for activities. Approximately 15–17 residents participated in each activity. A total of 68 older people in the experimental group were involved in the programme for the six sessions. For the

final analyses of the effectiveness of our intervention programme, only those who participated in activities more than five times were included. There were four residents in the experimental group who missed two activities due to medical care, physical discomfort or physical therapy; these residents were not included as effective samples. Therefore, there were 64 effective participants in the experimental group (the compliance rate was 94.1%). The control group maintained their regular health promotion activities (referring to the regular physical therapy courses and activities, such as storytelling and drawing, led by social workers); a total of 62 individuals were included. Figure 2 shows the research flow chart.

Before the intervention programme, a pre-test questionnaire survey was administered. Subsequently, the older people in the intervention group participated in the 6-week mental health promotion activities programme. To investigate the short-term and durative effectiveness of this intervention programme, an immediate posttest and a 1-month posttest were given to the participants in the intervention group and the control group. The questionnaires were completed by interviewers who underwent standardized training and conducted one-on-one interviews with the participants. The study design was reviewed by an appropriate ethical committee from Chung Shan Medical University in Taiwan.

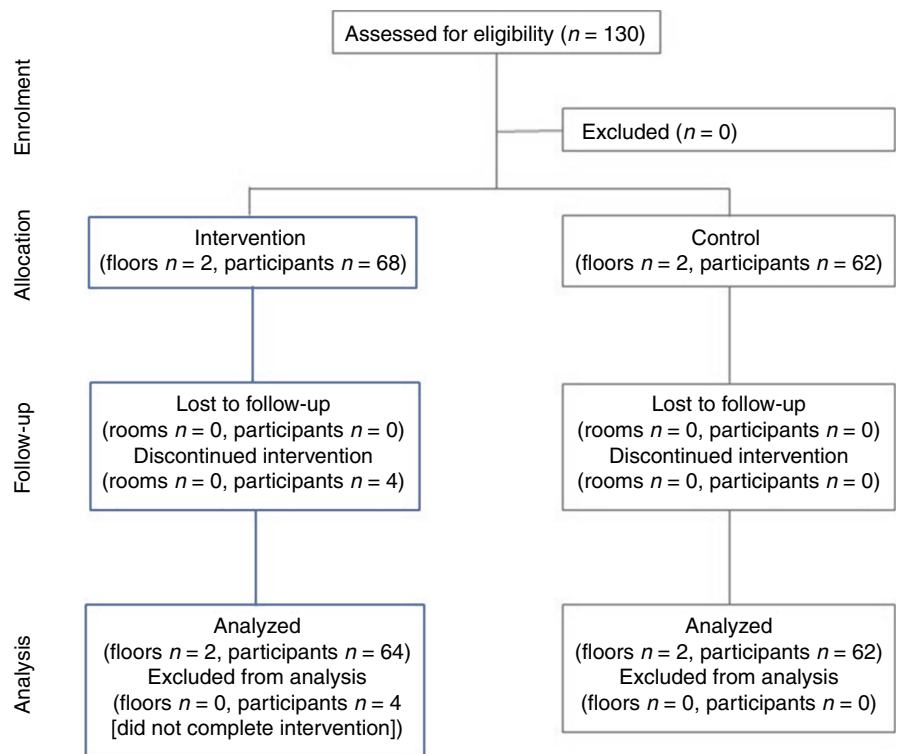
### 2.2.3 | Activity course design

The ultimate goal of this 3L-Mind-Training programme is to improve the mental health of older people. We designed our 3L-Mind-Training programme by referring to 'Question, Persuade, Refer (QPR): Suicide

Prevention Gatekeeper Training Program' (Litteken & Sale, 2018) and 'Social Learning Theory' (Bandura, 1977). Because many medical personnel, public health workers, patient healthcare practitioners, caregivers and members of the community have indicated that, for the general public, the narrow focus of the third step of QPR (Refer) was a problem, its effectiveness has been restricted and limited in psychiatric institutions. According to the perspective that 'Prevention is better than cure', we should pay more attention to empowering older people and human resources, especially in communities and geriatric institutions, to obtain skills based on the 3L-Mind-Training programme. The training programme consists of the following three modules: 1) looking (to strengthen the ability to identify mood swings); 2) listening (to use talking and listening skills and provide positive feedback); and 3) learning (aimed at changing thinking patterns, learning about thought reframing and challenging negative thinking to enable old people demonstrate and maintain an optimistic attitude). Among these three modules, the most important step is the third step: learning thought reframing skills. Everyone has times when they experience 'frustration, stress, or failure situations', however, by learning thought reframing skills and applying divergent thinking, focus shifting and multiple explanations, the negative impact and inertial thinking associated with these feelings can be minimized (Chiang, Shih, Hsu, Lin, & Lee, 2015). The objectives and teaching methods of the promotion activities in every module and the steps are shown in Table 1.

### 2.2.4 | Research instruments

Because the ultimate goal of our 3L-Mind-Training programme is to improve the mental health of older people, we choose one positive



**FIGURE 2** Research flowchart [Colour figure can be viewed at wileyonlinelibrary.com]

Module	Objective	Activities name	Teaching methods
Looking (40 min)	Recognize the fluctuation in one's own mood	Face painting The mood see-saw	Drawing Question and answer
Listening (I) (40 min)	Be able to recognize others conditions and others calls for help and provide positive feedback using chatting and listening skills	Chatting skills Listening skills	Group discussion Group discussion
Listening (II) (40 min)	Increase positive feelings by leading the older individuals to recall memories	Those years—our beautiful memories	Question and answer
Learning (I) (40 min)	Guiding thought reframing in the old through mind-training activities and assisting elderly individuals to learn reverse thinking and transform thought. In other words, build the abilities to shift attention and to think and explain diversely when facing issues; additionally, be capable of coming up with more than 1 positive thought	Brain teaser Transformation of morphology relies on the reframing of thoughts	Question and answer Work on practice questions
Learning (II) (40 min)	Allow the old participants to be capable of applying positive thinking and maintain an optimistic attitude throughout the activities	Better than nothing Mottos	Question and answer Question and answer
Learning (III) (40 min)	Allow the old to be capable of applying our methods in facing their daily life events or stress through the activities	Reversing the Yin and Yang Turn losing into winning	Whole-class discussion Whole-class discussion

**TABLE 1** Introduction of the 3L-Mind-Training programme

indicator (happiness, which is a simple concept that is generally understood among older people) and one negative indicator (depression, which is the main problem affecting older people, especially those living in geriatric institutions) to measure the effectiveness of the intervention. Below is a brief description of the sources of the scales and concepts employed in our study: (a) Subjective well-being of older people (as a positive indicator): The mini version of the Chinese Happiness Inventory (CHI-mini) edited by Lu, Kao, and Hsieh (2010) was adapted to measure happiness, which was used as the proxy measure of subjective well-being. The CHI-mini comprises four items, and the respondents rate each one on a 4-point scale. A sample item is 'In your opinion, life is... 1 = meaningless and has no purpose, 2 = meaningful and has purpose, 3 = very meaningful and has purpose and 4 = highly meaningful and full of purpose'. A higher total score indicates a greater overall sense of happiness in the respondents. The internal consistency alpha was 0.83 for the CHI-mini, which was developed and repeatedly tested for use in Chinese populations (Lu, 2005, 2008); (b) Depression in older people (as a negative indicator): The Geriatric Depression Scale short-form (GDS-S) comprises 15 questions drawn from the 30-question GDS (Sheikh & Yesavage, 1986), which is used for measuring depression (Yesavage et al., 1983). The instrument is suitable for use in people aged 65 years and older. The GDS-S scale is answered dichotomously (yes or no); higher scores indicate more severe depression. This

instrument is consistent with the one used in previous studies and in government surveillance of depressive mood in older people. It was translated into Chinese and back-translated before this study. The internal consistency of the GDS-S is high (Cronbach's alpha = 0.82). The correlation between the GDS-S and DSM-III depression diagnosis is as high as 0.84 ( $p < .001$ ). The GDS-S is positively correlated with the seven-item Beck Depression Inventory-FastScreen (BDI-FS; for medical students who were screening geriatric patients for depression;  $r = .81$ ,  $p < .001$ ; Scheinthal, Steer, Giffin, & Beck, 2001). Thus, the GDS-S displays good reliability and validity.

### 2.3 | Statistical analysis

We tested the comparability of the intervention and control groups at baseline (at the time of the pre-test questionnaire survey) using the chi-square test and independent-samples *t* test. To evaluate the effectiveness of the intervention programme (including its short-term and durative effects) and to compare it to the control condition, we used a paired-sample *t* test to examine the short-term effects of the intervention and generalized estimating equation (GEE) regression models and the Bonferroni correction to confirm the durative effects and whether they were statistically significant. Per-protocol (PP)

analysis was employed to analyse the effectiveness of the intervention. All quantitative analyses were conducted using the SPSS Version 20.0 statistical package with statistical significance set at  $p < 0.05$ .

## 2.4 | Ethical consideration

Our intervention programme was conducted after obtaining signed informed consent from the participating institution and each individual. Because of the ethical issues in the intervention studies, the control group was offered the same intervention programme after the completion of the 1-month posttest questionnaire assessment. Furthermore, to prevent the old people from knowing they were in the control group, to avoid the Hawthorne effect in the intervention group and to preclude the expectations of the leaders performing the intervention, we grouped the participants into A, B, C and D groups (the researcher responsible for the grouping did not know the conditions of the participants either). The social workers and residents of the institution were informed of the class start date without knowing their assigned group. Of course, the aged participants and the social workers can contact the research team members at any time for any detail information or ask the teacher and assistant in each class until the end of the project. Also, the participants and social workers were informed that if any injury occurs, they will be immediately transferred to the affiliated hospital of the author's affiliation for diagnosis, treatment or medical intervention.

## 3 | RESULTS

In this study, six demographic indicators were selected as the control variables based on the characteristics of the old people (Table 2).

The average weight of the intervention group was slightly significantly higher and thus was controlled in further comparisons. These results suggest the similarity and comparability of the two groups prior to the intervention.

As shown in Table 3, there was no significant difference between the two groups in the pre-test results for 'happiness'; however, the total depressive mood scores differed significantly between the intervention and control groups. Hence, the happiness/depression scores at these three waves (the baseline, immediate posttest and on 1-month posttest) among the older people in the two groups were controlled in the following GEE models. Additionally, the average 'happiness' score of the older people in the intervention group increased by 2.60 points in the immediate posttest, whereas the score for 'depressive mood' decreased by 1.94 points; there was a significant difference between the pre-test and immediate posttest scores for these two items. In contrast, there was no significant difference between the pre-test and immediate posttest scores of 'happiness' and 'depressive mood' for the control group. These results suggested that our mental health promotion activities programme had a significant positive short-term effect on 'happiness promotion' and 'depressive mood reduction'.

Further GEE analysis was performed to explore whether the short-term and durative effects of the mental health promotion programme in the intervention group persisted after controlling for weight, which differed between these two groups prior to the intervention and at the three-wave investigations. As shown in Table 4, after incorporating the group and time variables, weight was not a significant factor. The groups did not show statistically significant differences in happiness; in other words, the pre-test happiness scores of the experimental group were not significantly different from those of the control group. However, significant differences were observed for depressive mood. The time 1 and time 2 effects refer to the finding of no significant differences when the immediate

**TABLE 2** Demographic characteristics of the sample population ( $N = 126$ )

	Intervention group ( $N = 64$ )	Control group ( $N = 62$ )	$p$ -value
Gender, $N$ (%)			
Male	27 (42.2)	22 (35.5)	.440
Female	37 (57.8)	40 (64.5)	
Education, $N$ (%)			
Illiteracy/no formal qualifications	17 (26.6)	16 (25.8)	.995
Primary school	44 (68.8)	43 (69.4)	
Middle school	3 (4.7)	3 (4.8)	
Age (year) [65–97], $M$ ( $SD$ )	82.38 (7.68)	80.63 (7.78)	.207
Weight (kg) [31–85], $M$ ( $SD$ )	52.73 (10.78)	48.97 (10.13)	<b>.046*</b>
Height (cm) [135–175], $M$ ( $SD$ )	154.61 (7.43)	153.68 (8.20)	.505
MMSE [15–24], $M$ ( $SD$ )	19.36 (2.38)	19.45 (2.27)	.824

Note: A chi-square test was used to compare the gender and education of the two groups; an independent-samples  $t$  test was used to compare age, height, weight and MMSE; [ ]: the range of the variables.

Bold indicates statistically significant values ( $p < .05$ ).

\* $p < .05$ .

**TABLE 3** The comparison of pre-test and immediate posttest scores on happiness and depressive mood of the two groups and the analysis of the short-term effects of the mental health promotion activities (N = 126)

	Intervention group			Control group			Two group pre-test comparison <sup>a</sup>	p-value	Short-term effects on intervention group <sup>b</sup>	p-value	Short-term effects on control group <sup>b</sup>	p-value		
	Pre-test	Immediate posttest	Mean (SD)	Pre-test	Mean (SD)	Mean (SD)							[difference between immediate posttest and pre-test]	Mean (SD)
Happiness	6.42 (1.05)	9.02 (0.86)	2.60 (1.43)	6.16 (0.71)	6.10 (0.78)	-0.06 (0.48)	.104	<.001***	.289					
Depressive Mood	6.11 (2.13)	4.17 (1.96)	-1.94 (2.96)	7.29 (1.73)	7.47 (1.52)	0.18 (2.08)	.001**	<.001***	.504					

<sup>a</sup>When comparing the pre-test results of the two groups, a chi-square test was employed to analyse self-reported health status, whereas an independent-samples *t* test was implemented to analyse the total happiness and depressive mood scores.

<sup>b</sup>When evaluating short-term effects, a paired-sample test was used to analyse the difference between the immediate posttest and pre-test.

Bold indicates statistically significant values ( $p < .05$ ).

\*\* $p < .01$ .

\*\*\* $p < .001$ .

posttest or 1-month posttest scores for happiness and depressive mood in the control group were compared to their pre-test scores.

The interaction between 'group' and 'time 1' refers to the differences between the pre-test score and the immediate posttest score within the intervention group or within the control group. Specifically, the differences between the pre-test and immediate posttest scores were significantly higher for the intervention group than for the control group. In other words, for the intervention group, the difference between the pre-test and immediate posttest happiness scores was 2.66 points more than the difference observed in the control group. Similarly, the immediate posttest score for depressive mood was 2.12 points less than the pre-test score for the intervention group, which was significantly greater than that of the control group. These results further indicate that the mental health promotion activities programme yielded positive short-term effects.

The interaction between 'group' and 'time 2' refers to the difference between the 1-month posttest and the pre-test for the two groups. Compared to the control group, the intervention group scored 2.60 points more for happiness at the 1-month posttest than at the pre-test. Similarly, the difference between the 1-month posttest and the pre-test score for depressive mood for the intervention group was significantly larger than the difference for the control group. Hence, the mental health promotion activities programme could cause significant durative effects on both improving happiness and reducing depressive mood ( $p$ -values are all less than 0.001).

To explore the influences of the durative effects, we performed a further analysis using the Bonferroni correction. As shown in Table 5, which compares the 1-month posttest results to the immediate posttest results of the intervention group, the average happiness scores diminished marginally, whereas the average scores of depressive mood increased slightly; neither were significantly different ( $p > .05$ ). Hence, the mental health promotion activities programme maintained the upgraded happiness and reduced the depressive mood. In other words, although our research team did not perform any intervention after the 6-week programme, the effects on mental health promotion were still apparent 1 month after the programme ended (please refer to Figure 3 and Figure 4).

## 4 | DISCUSSION

In contrast to depression in younger individuals, several geriatric-specific variants of late-life depression (LLD) have been proposed (Fiske, Wetherell, & Gatz, 2009), especially for patients with late-onset LLD. Older patients are less likely to report affective symptoms but are more likely to display more somatic symptoms or loss of interest. Therefore, the diversity of programme activities and their suitability for elderly adults must be considered. Past studies have tended to focus on single-intervention activities, such as group reminiscence therapy (or intervention programmes; Chiang et al., 2010) and aerobic exercise (Hui et al., 2009). Our study was

**TABLE 4** The GEE analysis of the durative effects of the intervention on the happiness and depressive mood of elderly individuals (N = 126)

Parameter	Estimates ( $\beta$ )	p-value	Parameter	Estimates ( $\beta$ )	p-value
<y <sub>1</sub> = Happiness>			<y <sub>2</sub> = Depressive Mood>		
Intercept	6.16	<.001***	Intercept	7.29	<.001***
Group	0.26	.099	Group	-1.18	.001**
Time <sub>1</sub>	-0.07	.281	Time <sub>1</sub>	0.18	.498
Time <sub>2</sub>	-0.10	.269	Time <sub>2</sub>	0.16	.519
Group * Time Interaction			Group * Time Interaction		
Group * Time <sub>1</sub>	2.66	<.001***	Group * Time <sub>1</sub>	-2.12	<.001***
Group * Time <sub>2</sub>	2.58	<.001***	Group * Time <sub>2</sub>	-1.88	<.001***
Weight	0.002	.644	Weight	-0.001	.944

Note: 'Group' represents analysing the mean differences of pre-test values between the intervention and control groups (Group = 1: intervention group; Group = 0: control group); 'Time<sub>1</sub>' represents testing the mean difference between the immediate posttest and pre-test values in the control group (Time<sub>1</sub> = 1: posttest; Time<sub>1</sub> = 0: pre-test); 'Time<sub>2</sub>' represents testing the mean difference between the 1-month posttest and pre-test values in the control group (Time<sub>2</sub> = 1: 1-month posttest; Time<sub>2</sub> = 0: pre-test).

Bold indicates statistically significant values (p < .05).

\*\*p < .01

\*\*\*p < .001.

**TABLE 5** Comparison between any two tests of happiness and depressive mood among the intervention group using the Bonferroni correction (N = 64)

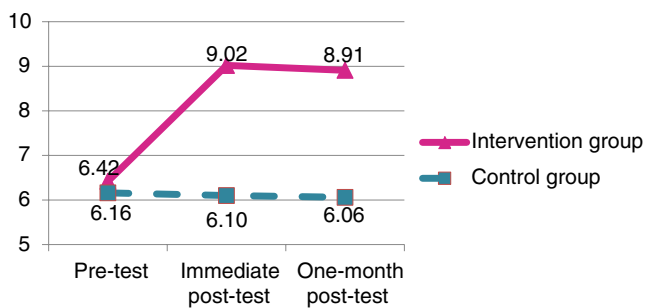
Mean difference	SE	p-value	Mean difference	SE	p-value		
<y <sub>1</sub> = Happiness>			<y <sub>2</sub> = Depressive Mood>				
Time <sub>3</sub>	2.60	0.18	<.001***	Time <sub>3</sub>	-1.94	0.37	<.001***
Time <sub>4</sub>	2.49	0.18	<.001***	Time <sub>4</sub>	-1.72	0.37	<.001***
Time <sub>5</sub>	-0.11	0.06	.953	Time <sub>5</sub>	0.22	0.08	.139

Note: 'Time<sub>3</sub>' represents testing the mean difference between the immediate posttest and pre-test values.

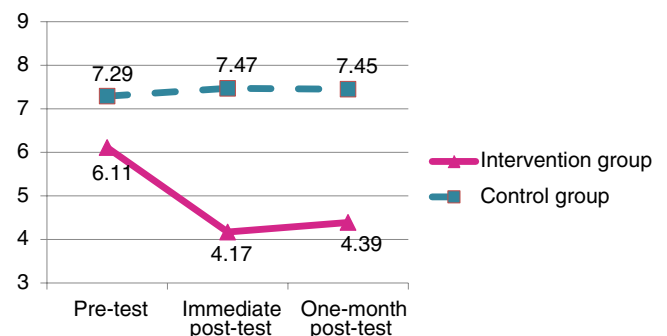
'Time<sub>4</sub>' represents testing the mean difference between the 1-month posttest and pre-test values.

'Time<sub>5</sub>' represents testing the mean difference between the 1-month posttest and immediate posttest values.

\*\*\*p < .001.



**FIGURE 3** Efficacy of the 3L-Mind-Training programme on subjective well-being improvement. (Total score measured by Chinese Happiness Inventory mini version <CHI-mini>) [Colour figure can be viewed at wileyonlinelibrary.com]



**FIGURE 4** Efficacy of the 3L-Mind-Training programme on depressive mood reduction. (Total score measured by Geriatric Depression Scale short-form <GDS-S>) [Colour figure can be viewed at wileyonlinelibrary.com]

based on the principles of mental health promotion and incorporated multiple focuses, such as physical activities, interpersonal interaction activities (introduction as a third-person and listening and expressing in pairs), reminiscence, thought reframing (brain teasers and mottos) and positive thinking. The course was provided

in organized sequences with hands-on practice. Drawing, real-life scenarios, pictures, posters and handbooks were used to help the old people establish a better understanding of the mental health promotion course. The older people gradually began to interact



and speak with one another. In addition, our thought reframing technique could be applied to redefine life events or current negative experiences. These changes further promoted happiness and reduced depressive mood.

Many of the institutionalized elderly individuals we interacted with in this study said that they felt lonely. Although they had been residing in the institution for a long time before the intervention, there were minimal interactions among the residents, even during meals. In our study, the activity programme was provided once a week for 40 min per session. There were only six sessions, making it shorter than other interventions (Nomura & Hashimoto, 2006; Thompson et al., 2015). However, significant short-term and durable effects on improving happiness and relieving depressive mood in the older participants were still produced and sustained. Because the age of the residents living in the geriatric institution ranged from 65–97 years, and the Geriatric Depression Scale (GDS) usually measures experiences in the previous week (Scheinthal et al., 2001), the 1-month posttest can be regarded as a durable effect. Furthermore, in order to include the happiness/depression scores at these three waves (the baseline, immediate posttest and 1-month posttest) meanwhile, and analyze the significant demographic characteristics among the participants at baseline and the main effects and interaction effects of group and two-time episode, we used GEE instead of repeated ANOVA or paired *t* tests to clarify the durable effects in the study. GEE is an approach for longitudinal data analyses of continuous dependent variables. GEE has been widely applied in the statistical and medical fields. The use of GEE can offer valid variance estimates for the parameter estimates (the so-called sandwich or Huberized estimator). It can deal with correlation(s) between repeated measurements through a working correlation matrix. One of the most popular serial correlation structures, especially when measurement times are not equidistant, is AR(1). The dependency decays under AR(1) when two measurement times are further away. In addition, we used the Bonferroni correction to confirm the short-term and durable effects of the intervention and determine whether they were statistically significant. As a result, the findings regarding the effectiveness of the 3L-Mind-Training programme are worthy of attention. In addition, compared to a previous study (Thompson et al., 2015) using cognitive behavioral therapy (CBT) in depressed older adults, 67% of patients had a positive response. When evaluating the overall intervention activity, 93.8% of the older residents indicated that our programme was helpful and allowed them to view life events positively. These findings indicate that the 3L-Mind-Training programme we propose is worthy of widespread use and application.

These improvements could be attributed to the use of various activities provided in small classes (15–17 people), which allowed enough time for the older people to practice and express themselves. The contents of our 3L-Mind-Training programme can be absorbed by and become useful to the old participants, which results in the promotion of mental health. Another possible reason for the continuous effects observed in the 1-month posttest could be that the institutionalized residents in our study were living on

the same floor. A previous study (Wu et al., 2017) indicated that patients who present a negative bias in pre-attentive processing are more likely to engage in negative withdrawal and reject social communication and thus might be susceptible to recurrent depression. We began the 3L-Mind-Training with the recognition that changes in a resident's own mood might allow him or her to recognize other residents' conditions and calls for help and to provide timely positive feedback by applying their talking and listening skills. The older people can apply the skills they learned in the courses to build up or strengthen their interpersonal relationships and then bring about their own and others' happiness. Therefore, our 3L-Mind-Training not only improved introspective ability but also improved interpersonal interaction and mutual assistance skills. In summary, the overall time span of the training does not need to be long, but it should include a variety of teaching or activity methods.

In addition, in our study, we employed a random grouping method to separate elderly participants with similar disabilities into intervention and control groups. The single-blinded cluster RCT result obtained was significant. The age of the 126 residents in our study ranged from 65 to 97 years (mean age = 81.5), and 90% of the residents relied on wheelchairs. After the programme, the residents continue to apply the skills learned in daily life when facing negative conditions. Notably, the ages of the participants in our study ranged widely. Hence, our programme design is applicable to institutionalized residents of any age group. Additionally, the designed activities did not preclude residents in wheelchairs from participating. Our designed programme is valuable for future reference and propagation.

Different effects should be displayed by using various indicators and measurements at multiple time points. In our study, we performed two posttests (an immediate posttest and a 1-month posttest), which were compared with the pre-test to show the immediate effect and durable effect. Additionally, many process indicators, such as the involvement and assimilation level, the amount of material learned and the contentment with the current class and expectations for the next class after each session, were used to help our research members understand the participants' level of satisfaction and the improvements necessary for future implementation.

Mental health is critical to older people. We suggest that the government develop psychological health policies aimed at mental health promotion and adopt active and effective prevention strategies instead of treatments. Furthermore, the government should invest in personnel and funding to create an environment that is elderly friendly. It should also help elderly individuals establish a happy life and find their talents, which will allow them to have a more meaningful life. The old people can then establish confidence and a sense of accomplishment and promote interpersonal relationships, further contributing to society thereby attaining self-efficacy. For institutions, we suggest that the responsible agencies pay more attention to the organization of programmes and the design of activities. Moreover, institutions could provide training activities to their staff. Thus, the opportunities for interactions and contact among older people could be increased through daily life activities.

## 4.1 | Limitations

First, the sample of this study was limited to elderly residents of a large-scale institution located in central Taiwan. The effects of the intervention on older people in communities require further investigation. Second, because we used PP analysis instead of intention-to-treat analysis (ITT) and as-treated analysis, the effectiveness of the intervention might be overestimated. We agree that ITT is an important analysis method; however, considering the particularity of the intervention we used (the 3L-Mind-Training programme consists of the following three modules and six classes), if the participants did not complete more than two-thirds of the programme, they could not realize the importance of the programme and use the skills to overcome their problems. Third, we used cluster randomization rather than randomization of the participants because 90% of the residents relied on wheelchairs and because the participants were accustomed to attending activities with familiar caregivers or residents. The institution had many floors, which allowed convenient grouping into intervention and control groups without interference between groups. Nevertheless, the results of this study are valuable due to the randomized grouping of the participants and the single-blinded design, in which neither the social workers nor the subjects knew who was in the intervention and control groups. Moreover, the rate of loss to follow-up in the intervention group was less than 6% ( $= 4/68 = 5.88\%$ ), indicating that a non-response bias could be ignored (Gluckman et al., 2005). Therefore, we suggest the implementation of this programme in other institutions. To enlarge the influence and transferability of the 3L-Mind-Training programme in practice, we conducted an annual training project to inform human resources and qualified lecturers in communities in Taichung, Taiwan, between 2014 and 2018. After recruiting nurses, social workers, retired teachers and public health personnel, 2- to 6-day training courses were conducted. If the participants completed the entire course and passed the written examination and trial teaching, they could be qualified as lecturers to administer interventions in communities or geriatric institutions. This would then allow institutionalized elderly individuals to become involved in mental health promotion activities and, even further, could turn these activities into an atmosphere, club or habit.

## 5 | CONCLUSIONS

This study explored the relationship between the 3L-Mind-Training programme and mental health in institutionalized older people and showed that the mental health promotion programmes increased happiness and reduced depressive mood even after the intervention programme ended. This study presents a highly varied intervention programme and its standard operating procedure. Most importantly, this study showed that the intervention programme not only immediately influenced mental status in older people but also had a positive effect 1 month after the intervention. We suggest future research should (a) further

examine the long-term effect with a 3- to 6-month follow-up and (b) broaden the sample size to provide more empirical, convincing support for the intervention effect. In addition, given the significant intervention effect of our proposed 3L-Mind-Training programme, we suggest that more institutions should become involved in this research project to increase attention towards the mental health of old people and train more internal and external lecturers to support elderly people's happiness and alleviate their depressive mood. It is aspired that future research can advance the application of mental health promotion programmes for older people and extend them to more institutions and institutionalized elderly individuals.

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## AUTHOR CONTRIBUTIONS

YCC: Made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; YCC, CYL: Involved in drafting the manuscript or revising it critically for important intellectual content; YCC, CYL, SCH: Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content; YCC, CYL, SCH: Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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