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Exploring the Effects of Horticultural Therapy Combined with AIGC on Depression in Community-Dwelling Elderly

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Abstract. The aim of this paper was to investigate the impact of horticultural therapy combined with AIGC on the mental health of community-dwelling olderly with depression. A controlled study was designed in the paper, in which recruited olderly were divided into a AIGC- horticultural therapy Test group and a Sample group, and changes in their depression levels before and after the treatment were assessed using the Hamill Depression Scale (HAMD) and the Self-assessment of Mental Health Scale (SCL-90). The HAMD assessments of the participants before and after the AIGC- horticultural therapy were analysed using independent t-tests. Independent t-test showed that before the experiment, there was no significant difference in HAMD scores between the two groups (t= 0.197, p=0. 505), and after the experiment, the Test group's HAMD scores were significantly lower than the Sample group's (t= 4.285, p<0.001**), which was a more significant difference than the Sample group. Correlation analysis showed that the number of AIGC-horticultural therapy in the Test group was significantly correlated with HAMD scores. Mental health self-assessment scale showed a significant difference in the improvement of mental health of participants in the Test group before and after the experiment, especially in depression, anxiety, hostility and psychoticism (**ρ<0.01). The results of the experiment indicate that AIGC- horticultural therapy has a significant improvement effect on the mental health of older adults and a significant moderating effect against depression-related symptoms. These findings have implications for community health care and mental health professionals for older adults.

Keywords. Horticultural therapy, Art therapy, Older adults, Depression, AIGC

1. Introduction

Mental health issues in older people are becoming increasingly prominent in the community, with depression being one of the most common and serious mental health disorders. Major depressive disorder (MDD) is one of the most common mental health disorders in older adults, with a global average of 7.5% (WHO, 2017), accounting for 4.3% of the global disease burden, and a prevalence of 14% in people aged 65 years and older. [1] Depression has a negative impact on the quality of life and well-being of the elderly, and it brings potential physical burden and cognitive deficits to the elderly, so effective treatments are needed to alleviate the symptoms of their depression. A. apageorgiou et al. [2] found that depressive symptoms were associated with the quality

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of life and health status of the elderly through a cross-sectional study of the elderly. In recent years, horticultural therapy as a creative expression and psychological intervention, has gradually attracted attention. The rise of AIGC (Artificial Intelligence Generated Content) has also created the conditions for innovation in horticultural therapy. Horticultural therapy combined with AIGC provides an avenue for emotional catharsis and self-expression through creative horticultural design and participation in the artistic process, which can improve the quality of spiritual life of the elderly. However, the current research on horticultural therapy combined with AIGC for depression in the elderly is still relatively limited. Therefore, this study aimed to explore the effect of horticultural therapy combined with AIGC on the mental health of the elderly with depression. We hypothesized that by horticultural therapy combined with AIGC, older adults could reduce depressive symptoms and improve their mental health.

The study was conducted by enrolling a group of older adults in a AIGC-horticultural therapy program and assessing changes in their depression levels before and after therapy with a standard depression scale. The results of this study are expected to provide valuable information and empirical basis for community mental health care, and promote the application and promotion of horticultural therapy combined with AIGC in the field of mental health of the elderly.

2. Related work

In a study by Celso Silva et al. [3], they proposed that prior to the COVID-19 pandemic, 5.7% of people aged 60 years and older had depression. The epidemic has led to a significant increase in the prevalence of major depressive disorder, with an estimated 28.1% increase in cases worldwide. Seonjae Been et al. [4] predicted depression in the elderly after the COVID-19 pandemic based on the ICF model, and the results showed that subjective health status has a direct and negative impact on depression, and those who think their subjective health status is poor are more likely to suffer from depression. Therefore, it is very necessary to carry out continuous mental health monitoring of the elderly group at the community level, especially the elderly with poor subjective health status should be paid attention to. In fact, psychotherapists may take into account the specific characteristics of older people with different types of depression, and by observing some of the behavioral characteristics of daily living and related variables, they can provide guidance on certain areas of some specific cases of depression in order to provide more in-depth mental health interventions for older people. Sergio P.B. et al. [5] found that there was a lack of uniformity in the distinction between subtypes of depression, ranging from 2 to 7 types, among which the three most common types were non-depressive, depressive and psychotic, or presumed psychotic. By classifying the symptoms of depression among Spanish adults, three distinct types were found among the subjects: psychosomatic (11.12%), melancholic (14.21%) and unhappy (74.67%). Susana Sousa et al. [6] described depressive states to identify associated factors and potential predictors of depression in community-dwelling elderly people who may have major depressive disorder. The results found that social isolation in the elderly may trigger the loneliness of major depression, which can be alleviated by supplementing nutrition and participating in social activities.

The improvement effect of horticultural therapy on mental health has been verified by many experts in recent years. Flower arrangement as one of the horticultural therapy,

because of its diverse color combinations and pleasant flower aroma, can make people feel the natural plant power, is very popular in horticultural therapy. Yuka Morita et al. [7] conducted horticultural therapy with the Flower arrangement Project (FAP), measured the effects of FAP tasks on the frontal lobe activity of healthy participants using near-infrared spectroscopy, and quantized salivary amylase levels as an indicator of stress levels during FAP, suggesting that FAP treatment may be more effective in the rehabilitation of stress-sensitive patients. Juan Du et al. [8] used EEG to measure emotional indicators before and after the experiment, and found that flower arrangement would make the elderly feel physically and mentally relaxed, and had a positive impact on the participants' neuroemotional state. Jinyu Hu et al. [9] proposed that landscape pattern has an important spatio-temporal influence on habitat quality. It can be seen that the application and promotion of horticultural therapy combined with AIGC in the field of mental health of the elderly has some scientific basis.

3. Experiment design

3.1. Sample settings

In this study, we will use a convenient sampling method to recruit community older adults to participate in the AIGC- horticultural therapy program who meet the following criteria: age 65 years and older, diagnosed with depression or self-reported depressive symptoms. Participants will voluntarily participate in this study based on their interest and sign an informed consent form. The participants were selected from four nursing homes in Honggutan District, Nanchang City, Jiangxi Province, China. A total of 20 volunteers aged 75.63±5.81 years (mean±SD) who were diagnosed with depression or self-reported depressive symptoms were enrolled in the study. All the elderly participants in the experiment signed informed consent forms, and the experiment was approved by the local ethics committee of Nanchang University in China.

The AIGC- horticultural therapy program will take place in the art room set up at the Community Mental Health Center. The art room will provide bulk wholesale flowers, art materials, tools and a comfortable environment to support participants' creative and emotional expression. Participants will interact with floral materials and art tools, take photos of their works and use AIGC for secondary creation to generate artworks. Through these design creations, they express their emotions and inner experiences. Therapy sessions will take place at fixed times and dates each week. The art therapist will be responsible for guiding and supporting participants in the artistic expression and emotional exploration during the therapy process.

3.2. Depression assessment tools

To assess the severity and change of depressive symptoms in participants, we will use a classic Depression assessment tool, the Hamilton Depression Rating Scale (HAM-D). The scale consists of 17 items that assess the frequency and severity of depressive symptoms. Each project was scored based on the participants' responses on a scale from 0 to 52, with higher scores indicating more severe depressive symptoms. Overall evaluation: (7 points or less, normal; 8-17 points, may have depression; Score 18-24 for mild to moderate depression and more than 24 points for severe depression.

3.3. Mental health self-rating scale

To understand participants' perception of their own mental health status, we will use the Mental Health Self-Rating Scale (Sympotom Check-List 90, SCL-90). The scale has 90 items in nine subscales, namely, somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, terror, paranoia, and psychosis. Each item in SCL-90 is graded on a five-point scale. Participants will choose response options that reflect their mental health based on their subjective experience.

3.4. Experiment process

A pre - and post-control experiment was used. Prior to the initiation of horticultural therapy combined with AIGC, participants will undergo a baseline assessment, including HAMD assessment, and then record each participant's assessment score on a scale greater than 18 points, of which 2 elderly people did not meet the standard score and 2 elderly people were unable to participate in the program on time for physiological reasons. Finally, 16 elderly people were selected as participants. At the start of the therapy, participants will be randomly divided into two groups, an Test group of eight and a Sample group of eight. The Test group received the AIGC-horticultural therapy once a week for 1 hour for 6 weeks. The Sample group only received routine psychological counseling. After the therapy ended, participants in both groups were assessed again with HAMD and changes in their assessment scores and symptoms of depression were recorded. As shown in Table 1, the characteristic of the two groups of participants showed no significant differences in age, sex, education level and HAMD scores.

Table 1. Characteristic of the two groups of participants

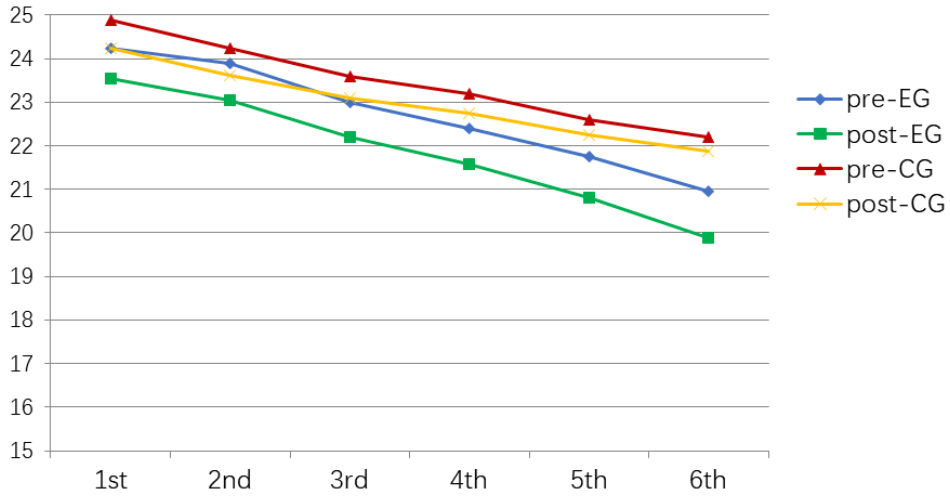
Characteristic	Test group (n=8)	Sample group (n=8)	t/X^2	P
Age	76.75 ± 5.09	74.50 ± 6.59	0.219	0.374
Gender (n,%)			0.254	0.614
Male	4(50.0)	3 (38.0)		
Female	4(50.0)	5 (62.0)		
Education Degree (n,%)			0.311	0.856
Junior high school and below	2 (25.0)	3(38.0)		
Senior high school	5 (63.0)	4(50.0)		
University and above	1 (12.0)	1(12.0)		
HAMD	24.25 ± 1.04	24.88 ± 1.13	0.197	0.505

*ρ<0.05, **ρ<0.01, ***ρ<0.001

4. Analysis and results

This study will adhere to ethical principles and protect the privacy and confidentiality of participants. All participants will obtain appropriate informed consent prior to participation, and their personal identities will be treated confidentially. This study has been approved by the Ethics Review Committee and will follow the requirements of the Research Ethics Guidelines. We will use statistical software packages to conduct data analysis, including descriptive statistical analysis, independent T-sample

examination and correlation analysis, to explore the effect of AIGC- horticultural therapy on depressive symptoms. Figure 1 shows the statistical changes in depression assessment scores of the two groups before and after 6 experiments.



*pre- Test group (pre-EG), post- Test group (post-EG), pre- Sample group(pre-CG), post- Sample group(post-CG).

Figure 1. Depression scores for two groups before and after the six-week experiment.

In the process of data analysis, we found that both the Test group and the Sample group had the effect of reducing the depression score before and after the experiment. The weekly treatment program had a certain upward trend before the start of the experiment, but the whole showed a downward trend. However, the improvement degree of the two groups is different. As can be seen from Figure 1, the Test group has a more obvious downward trend and the effect is stable; the Sample group has the same effect as the Test group in the early stage, but the effect decreases and the improvement effect tends to slow down in the later stage.

In order to more accurately evaluate the experimental effect of the two groups, SPSS statistical software was used to conduct descriptive statistical analysis on the collected data, including calculating the mean, standard deviation and frequency distribution, using independent t test and variance analysis to analyze the differences between the two groups before and after the experiment, and calculating the Pearson correlation coefficient between the number of AIGC- horticultural therapy and HAMD scores in the Test group. To assess the correlation between the two.

As shown in Table 2, 3, and 4, the independent sample T-test and repeated measurement ANOVA of HAMD scores of participants in the two groups before and after the experiment, as well as the T-test analysis of mental health self-rating scale, were respectively analyzed.

Table 2. HAMD scores independent sample T - test of of two groups

Item	Test group (n=8)		Sample group (n=8)		P t	
	pre-	post-	pre-	post-	EG pre/post	CG pre/post
HAMD scores	24.25 ± 1.04	19.88 ± 2.70	24.88 ± 1.13	21.88 ± 3.14	p=0.001*** t = 4.285	p=0.023** t = 2.546

Table 3. Repeated measure ANOVA of HAMD scores

Item	HAMD scores pre/post (SD)	F	P
Test group (n=8)	1.035/2.696	17.157	0.001***
Sample group (n=8)	1.126/3.137	5.552	0.034**

*SD=Standard deviation

Table 4. T-test analysis of mental health self-rating scale in two groups

Factor score	Test group - horticultural therapy combined with AIGC n=8	Sample group. – Regular counseling n=8
Total points	141.70±1.46	142.02±32.12
Total equipartition	1.57±0.16*	1.59±0.48
Somatization	1.34±0.15*	1.63±0.16
Obsessive-Compulsive	1.77±0.14*	1.86±0.22*
Interpersonal Sensitivity	1.74±0.20*	1.81±0.20*
Depression	1.79±0.13**	1.79±0.26*
Anxiety	1.45±0.15**	1.67±0.20*
Hostility	1.63±0.18**	1.65±0.12*
Phobic	1.43±0.18*	1.56±0.25
Paranoid Ideation	1.56±0.14*	1.66±0.23
Psychoticism	1.54±0.19**	1.58±0.13*

*ρ<0.05, **ρ<0.01, ***ρ<0.001

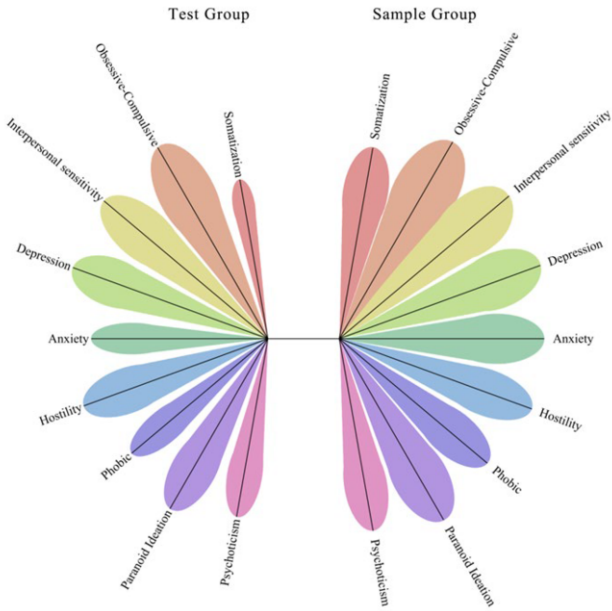


Figure 2. Legend of the rootless tree of the mental health self-rating scale for two groups. [10]

Table 5. Correlation analysis between the frequency of AIGC- horticultural therapy and HAMD score in the Test group

Variable	1	2	3	4	5	6
1st	/					
2nd	0.939***	/				
3rd	0.859***	0.973***	/			
4th	0.72**	0.914***	0.951***	/		
5th	0.703*	0.892***	0.955***	0.976***	/	
6th	0.615	0.828**	0.911***	0.948***	0.987***	/
Mean value	23.63	22.99	22.44	21.65	20.90	19.88
SD	0.92	1.11	1.53	1.63	2.20	2.70

*ρ<0.05, **ρ<0.01, ***ρ<0.001

As can be seen from Table 2 above, the HAMD score of the Test group was significantly lower than that of the Sample group after the experiment (t=4.285, p<0.001**). Table 3 shows that during the experiment period, HAMD scores of the Test group showed a steady downward trend with significant differences (F=17.157， p=0.001***), while the differences in the Sample group were less significant than those in the Test group (F=5.552, p=0.034**). According to Table 4, comparing the scores and total scores of each dimension of the mental health self-rating scale between the Test group and the Sample group before and after the experiment, it can be found that the Test group has significant differences in the improvement of the nine items of the mental health self-rating scale, especially in depression, anxiety, hostility and psychoticism (**ρ<0.01). In the Sample group, there was no significant difference (ρ>0.05) in the somatization, phobia and paranoid ideation, which also resulted in no significant difference in the total score and total mean score. By observing FIG. 2, we can find that the Test group's leaf size is smaller than that of the Sample group, indicating that AIGC- horticultural therapy has more obvious improvement on mental health self-evaluation. As can be seen from Table 5, there was a significant negative correlation between the frequency of AIGC- horticultural therapy and HAMD score in the Test group (r>0.7, p<0.001***), indicating that the more frequency of therapy, the more obvious the effect of improving HAMD score.

5. Discussion

This study revealed the effect of AIGC- horticultural therapy based on HAMD score and mental health self-assessment results on mental health in the elderly. A controlled experiment was conducted to compare the intervention effects of AIGC- horticultural therapy and routine psychological counseling on depression assessment and mental health self-assessment, and to evaluate the specific effects on depressive symptoms and mental health. The results of the study showed that after AIGC- horticultural therapy, participants' depression symptoms were significantly improved, and there was a

significant difference in the mental health self-rating scale. However, the depression symptoms were slightly improved after routine psychological counseling, and the difference effect was slightly significant. By comparing the t-test results of mental health self-rating scale, it was found that the Test group had significant effects on depression, anxiety, hostility and psychoticism. Further analysis also found that the number of AIGC- horticultural therapy was significantly negatively correlated with HAMD score. These findings are consistent with previous research on the positive effects of horticultural therapy on the mental health of older adults. On the one hand, Ya Wei Zhang et al. [11] used a meta-analysis to screen 13 studies, supporting a significant positive effect of horticultural therapy on depressive symptom outcomes in older adults. On the other hand, in terms of scale detection and data collection, Kheng Siang Ted Ng et al. [12] conducted a controlled experiment using ELISA and scale detection, which proved that horticultural therapy may be promising in enhancing the mental health of the elderly and reducing the risk of depression. Using blood pressure and EEG measurements, Ahmad Hassan et al. found that horticultural therapy significantly reduced blood pressure and overall anxiety levels in older adults. At the same time, the innovation of this study is to use horticultural therapy combined with AIGC as a controlled experiment to explore the influence of AIGC- flower arrangement on depression in the elderly. Through these data analysis methods, we will be able to assess more comprehensively the impact of AIGC- horticultural therapy on depression and its relationship with mental health status. These analysis results will provide us with strong evidence on the efficacy and mechanism of art of horticultural therapy, so that AIGC- horticultural therapy can be used as an effective horticultural therapy intervention to reduce the symptoms of depression in the elderly and improve their mental health, and help promote the application of AIGC- flower arrangement in the mental health of the elderly. It also provides guidance for further research and practice.

However, there are some limitations to this study. Due to the cross-sectional design of the study, it was not possible to determine the lasting effects and long-term impact of AIGC- horticultural therapy in the future, while the sample size of the study was too small and limited to older adults with depression in a specific region, and the sample may have been geographically and culturally limited. Future studies could adopt a longitudinal design and expand the sample to include older adults from different regions and cultural backgrounds in order to assess the lasting effects of the treatment and thus obtain more comprehensive conclusions. Additionally, the AIGC-horticultural therapy protocol in this study was implemented according to a specific treatment process and technique; therefore, our results may be limited by the specific treatment protocol and are not applicable to other forms or types of horticultural treatments. Future research could explore different types of horticultural therapy modalities and compare their effectiveness in older adults' mental health. Second, the use of self-assessment-style scales to assess depressive symptoms and mental health status has the potential for subjectivity and memory bias. Future research could incorporate objective clinical assessment tools and physiological indicators for a more comprehensive assessment.

In the future, AIGC- horticultural therapy has a large potential benefit in older adults' mental health and could be an effective intervention to reduce depressive symptoms. Our findings provide support for the use of AIGC- horticultural therapy in older adults' mental health care, but further research is needed to explore the mechanisms and long-term effects in depth so that we can better develop and

implement art therapy intervention programmes for older adults' mental health for better guidance and practice.

6. Conclusion

This study explored the use of AIGC- horticultural therapy in the mental health of older adults, and through the evaluation of AIGC- horticultural therapy, it was found that this form of therapy has a positive impact on reducing depressive symptoms and enhancing mental health in older adults, providing an effective intervention in the mental health care of older adults. The results of the study will not only validate that AIGC-horticultural therapy is more effective than conventional counselling, but also provide relevant recommendations for professionals working in mental health and community-based mental health care agencies for older adults. Future research should also consider further exploring the mechanisms and long-term effects of AIGC- horticultural therapy to better meet the mental health needs of older adults and to promote wider application and dissemination. AIGC- horticultural therapy is expected to be a useful addition to mental health care for older adults, providing them with a better quality of life and psychological well-being.

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