

Application of horticulture therapy as a health intervention for elderly people in nursing homes: a scoping review[†]



Review

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Abstract: **Objective:** To review the scope of interventional studies on horticultural therapy (HT) applied to elderly people in nursing institutions to support the efficient implementation of HT among this target group.

Methods: In accordance with the scoping review framework proposed by the Joanna Briggs Institute (JBI), the PubMed, JSTOR, Web of Science, CNKI, and Wanfang databases were searched. Data from the retrieved literature were summarized and analyzed.

Results: In all, 18 studies were included in this review. The target population groups of interventions included self-supporting elderly people, cognitively impaired elderly people, elderly people with negative emotions, and elderly people with frailty living in nursing institutions. HT interventions, including planting, craft activities, derivative activities, and outdoor viewing activities, are implemented indoors, outdoors, or in mixed settings. The most common duration of the intervention was 8 weeks, the most common frequency was once per week, and the most common session duration was 60 min.

Conclusions: The measurements used in HT interventions included assessments of physical, psycho-mental, and social health; quality of life; and activity effects. Future studies should include partially dependent groups and completely dependent groups of elderly individuals, interventions that last at least 6 months, scientifically designed activity intensity and safety-guarantee plans, and outcome-evaluation indicators such as compliance and intervention benefits.

Keywords: elderly people • horticultural therapy • intervention • nursing home • scoping review

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1. Introduction

The global population is ageing rapidly. It has been estimated that the number of individuals aged ≥60 years will reach 2.1 billion by 2050,¹ accounting for approximately 22% of the world's population. Furthermore, the proportion of elderly individuals aged ≥65 years in China has reached 14.2%.² Due to changes

in the Chinese family structure, increasing pressure on children to support elderly people,³ and national policies, the number of elderly people who choose to live in nursing homes is increasing. As age increases, physical condition declines.⁴ Additionally, after they move to a nursing home, elderly people are reluctant

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to go out for physical activities due to changes in their living environment and activity patterns; therefore, the health of elderly people is greatly affected in nursing homes.⁵ However, studies have shown that reductions in physical activity and increases in sedentary behavior lead to increased risks of physical function decline and frailty.⁶ These outcomes have a considerable impact on elderly individuals as well as society as a whole. By contrast, enhancing physical activity among older adults could improve general physical function. Physical activity refers to bodily movement of skeletal muscles in any manner that results in energy expenditure.⁷ Maintaining regular physical activity can enhance skeletal muscle, effectively improve physical function, reduce sedentary behavior, delay the onset of frailty, and promote health.⁸

At present, conventional activities in nursing homes cannot meet the needs of elderly people. Horticultural therapy (HT), as a kind of treatment and activity that can change unhealthy living habits, is gradually being accepted by elderly people in nursing homes. HT involves the use of plants and horticultural activities to achieve specific treatment goals. HT helps to improve individuals' physical and mental health by facilitating social, educational, psychological, and physical adjustments for individuals who need to improve their physical and mental states.⁹ Horticulture has gradually become a popular leisure activity for older adults and is highly suitable for being used as a therapy. However, to date, there is no summary of research on HT in nursing homes for elderly adults.

Scoping reviews aim to explore the sources and types of evidence available, to systematically classify studies and to summarize the literature to identify knowledge gaps and clarify concepts.¹⁰ To our knowledge, no scoping review has examined the effect and influence of HT on older adults. Therefore, based on the above issues and the limitations of existing research, our study aims to provide an overview of the potential benefits of HT on older adults' physical, psycho-mental, and social health to support the efficient implementation of HT among this target group in the future. This scoping review addressed the following questions: (1) Who undergoes HT interventions? (2) What kind of

interventions does HT include? and (3) What are the evaluation tools for HT?

2. Methods

2.1. Design

We followed the following 5 stages of a scoping review¹¹: identify relevant studies; select studies based on pre-defined criteria; extract data; and analyze, summarise, and report results.

2.2. Search strategy

There is a standard protocol for conducting scoping reviews. To formulate the search strategy, the population, concept, context (PCC) method were defined as employed.¹² The population comprised older people who lived in nursing homes and whose ages were >60 years; the concept was the effectiveness of HTs among older individuals and the related assessment tools; and the context was nursing homes.

Two researchers independently searched the PubMed, Web of Science, and JSTOR databases. A combination of subject terms and free words was used for the search. The details of the search strategy used for PubMed are shown in Table 1.

We searched the databases from inception to May 2023. The inclusion criteria were as follows: published in English or Chinese; explored the effectiveness of horticultural intervention and used some assessment tools; conducted in a nursing home; the full text of the study was available; the population was individuals ≥60 years old; and the participants had a Mini-Mental State Examination (MMSE) score >27 points. The exclusion criteria were as follows: visual, auditory, and verbal expression impairments; withdrawal from the study; protocols; guidelines; articles for which the full text was not available; and duplicate studies.

2.3. Study selection

Study selection was performed by 2 independent researchers. The 2 steps of this process were as

#1 (Care Facility[MeSH Terms]) OR (Skilled Nursing Facility[MeSH Terms]) OR (Institutional Care[MeSH Terms]) OR (Homes for the Aged[MeSH Terms]) OR (Nursing Home[MeSH Terms]) OR (Old age home[MeSH Terms]) OR (Nursing Care[MeSH Terms]) OR (elderly care facility[MeSH Terms]) OR (long-term care facility[MeSH Terms]) OR (Nursing Care Management[MeSH Terms]) OR (Residential Facility[MeSH Terms])

#2 (Elderly[MeSH Terms]) OR (Older people[MeSH Terms]) OR (aged[MeSH Terms]) OR (Older adults[MeSH Terms])

#3 (horticulture therapy[MeSH Terms]) OR (horticultural therapy[MeSH Terms]) OR (gardening therapy[MeSH Terms]) OR (garden therapy[MeSH Terms]) OR (therapeutic horticulture[MeSH Terms]) OR (Horticulture Therapy[MeSH Terms])

#1 AND #2 AND #3

Table 1. Search strategies.

follows: (1) title and abstract screening and (2) full-text screening.

2.4. Data extraction

One reviewer independently extracted information from the eligible articles for data synthesis. A second reviewer checked the accuracy of the extracted data. The following data were extracted: author, publication date, country, intervention process, type of HT, duration and frequency, study results, and assessment tools. The data were then summarized and analyzed.

3. Results

A total of 797 records were initially retrieved from the databases. After exclusion of duplicates and application of the screening criteria, 18 publications were eligible for

inclusion in this scoping review. The literature screening process is shown in Figure 1.

3.1. Characteristics of the studies and interventions

This scoping review included 18 studies. Among the included studies, there were 14 quantitative studies, including 4 randomized controlled trials (RCTs),^{13–16} 8 quasi-experimental studies,^{17–25} and 1 non-experimental study.²⁶ Additionally, there were 2 qualitative studies^{27,28} and 2 mixed methods studies.^{29,30}

The sample size of the intervention subjects varied according to the type of study and ranged from 10 to 290 patients. There were 9 RCTs and quasi-experimental with a sample size of <40 persons,^{14,16,18–24} 5 studies^{13,15,17,19,25} with a sample size ranging from 41 to 99 persons, and only 1 study¹³ with a sample size >100

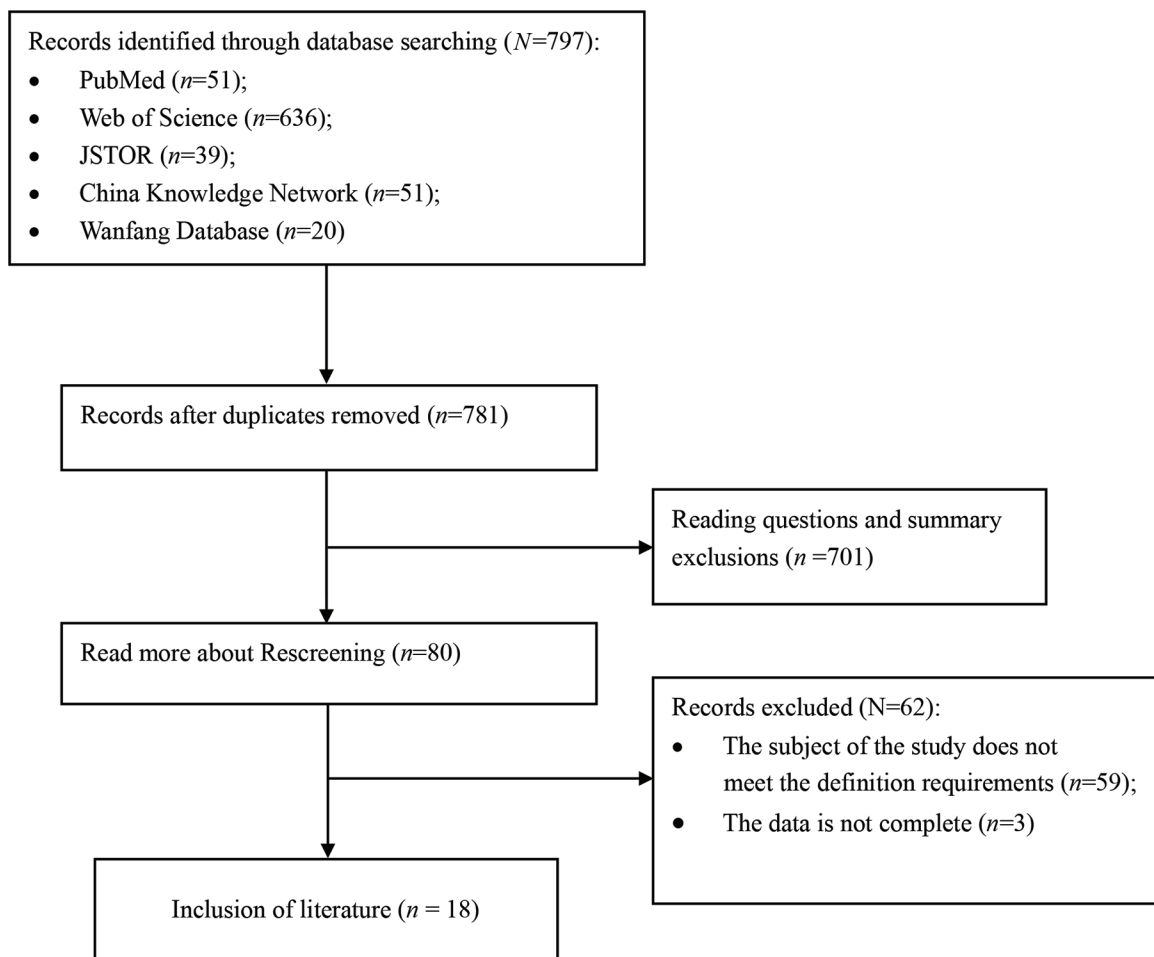


Figure 1. Flow chart of the literature screening.

persons. The qualitative studies and mixed methods studies had sample sizes ranging from 8 to 24 subjects. Additionally, 9 studies were conducted in China, 3 were conducted in Japan, 1 was conducted in the United States, 1 was conducted in Italy, 1 was conducted in Sweden, 1 was conducted in Australia, 1 was conducted in France, and 1 was conducted in Korea. The basic information of the included studies, including authors' names, location, publication year, study design, relevant information about the participants, interventions, main findings, and outcome measures, is shown in Table 2.

3.2. Participants

The research population included younger elderly people and middle-aged and older elderly people in nursing homes. From the perspective of daily activities ability, 4 articles^{13,22,26,29} included self-supporting elderly individuals, and 4 articles^{17,19,20,26} included elderly individuals who had the ability to cooperate in completing interventions. From the perspective of health status, 7 trials^{14,18,21,23–25,28} included older adults suffering from cognitive dysfunction (Alzheimer's disease), 1 study¹⁶ included older adults with depressive symptoms, and 2 studies^{15,27} included nursing home residents with frailty or prefrailty. The implementation of HT interventions requires that elderly people have a certain level of activity,^{13,20–22,25,26,29,30} a normal mental state,^{13,17,19,29,30} and the ability to communicate.^{13,15,19,24,25,27,29} Studies have excluded individuals with serious cognitive impairment and behavioral problems,²¹ and older people with heart, brain, and lung diseases were excluded.²²

3.3. Design of interventions

3.3.1. Activity content

There are 4 types of horticultural activities³¹: plant cultivation,^{13,14,16,17,19,22–25} handcraft making,^{14,18,22,23,29} derivative activities^{14,24,25,29} (sharing plants, processed foods, thoughts and so on), and outdoor viewing activities.^{21,26,28} The interventions were carried out in different places; 11 studies^{13,14,16–19,22,24,25,27,29} were carried out indoors, 5 studies were carried out outdoors for gardening activities,^{20,21,23,26,28} and 2 studies^{15,30} involved mixed indoor and outdoor activities.

3.3.2. Activity period, frequency, and duration

Two studies^{16,18} reported that the HT duration was ≤5 days, 3 studies^{22–24} reported an HT duration of 6 weeks, 6 studies^{13,15,17,25,27,30} reported an HT duration of 8 weeks, 2 studies^{14,29} reported an HT duration

of 10 weeks, 3 studies^{19,20,28} reported an HT duration of 3 months, and 1 study²¹ reported an HT duration of 6 months.

As HT is usually carried out by groups, it is difficult to implement with more than two kinds of activities. Therefore, the frequency of activities in 12 studies^{13–19,22,24,27,29,30} was once per week, and the frequency of studies involving plant cultivation or outdoor viewing activities as a single intervention was increased to 2 times a week^{20,23} and 4 times a week.²¹

The duration of activity is related to the frequency and number of intervention measures, and interventions with high frequency and intervention measures are relatively monotonous, as their duration is usually shorter than that of other interventions. Three studies^{19,23,24} reported a single activity duration of 30–40 min, and 2 studies^{16,27} reported a single activity duration of ≤20 min. By contrast, for interventions with low frequency and many measures, the duration was longer; 8 studies^{14,15,17,19,20,22,27,29} reported durations ranging from 60 min to 90 min, and 1 study¹⁹ reported durations ranging from 90 min to 120 min. Considering the effect of interventions, more attention should be devoted to the total activity time per week. Six studies^{14,15,17,22,23,27} reported a total activity time of 60 min/week, 1 paper²⁹ reported a total activity time of 70–90 min/week, 2 studies^{13,20} reported a total activity time of 90–120 min/week, and 3 studies^{18,19,24} reported a total activity time of ≤40 min/week.

3.3.3. Effect evaluation

- (1) Physical health: The articles that examined physical health used the Barthel Index (BI),¹⁴ Senior Fitness Test (SFT),²⁰ activities of daily living (ADL),^{17,21,24} Vitality Index (VI),²⁴ and modified Barthel Index (MBI)²⁵ to evaluate changes in comprehensive physical function. The effect on minor changes in physical function was confirmed by hand function ability and the Timed Up and Go (TUG) test.²⁰ The health improvement of elderly people with chronic disease and cognitive impairment was evaluated using disease-related indicators (i.e., physiological indicators such as blood pressure,¹⁶ metabolic profiling techniques,²⁰ electroencephalograms [EEGs],¹⁶ and cognitive indicators such as the MMSE^{14,20,21,23,24,28}).
- (2) Psycho-mental health: The evaluation of specific psycho-mental states focused on the effect of the intervention on negative mental states such as loneliness,^{13,29} depression,^{13,15,18,24,28,29} and agitation.^{16,23} One study examined happiness¹⁵ to verify the positive effect of some interventions on mental

Author	Years	Location	Study design	Participant		Intervention		Main findings		Outcome measures
				Age (year)	Sample size (observation group/control group)	Measure	Duration and frequency			
Chu et al. ¹³	2019	China	RCT	≥65	75/75	Intervention group performed planting and handicraft activities, and the rest were the same as the control group	1–1.5 h per time/8 week	A reduction in depressive symptoms and improvement of the level of mental health	(21)(22)	
Yao and Chen ¹⁷	2017	China (Taiwan)	Quasi-experimental study	≥65	44/41	Intervention group performed indoor planting activities, and the rest were the same as the control group	1 h per week/8 weeks	Significant improvement in the activities of daily life, the sense of happiness, and interpersonal intimacy	(19)(25)(26)(27)	
Mochizuki-Kawai et al. ¹⁸	2021	Japan	Quasi-experimental study	90.3 ± 6.8	8/8	Intervention group performed bedside structured floral arrangement program, and the rest were the same as the control group	4 min/5 days	HT had a greater effect on QOL, and the depressive symptoms have reduced greatly	(3)(4)(5)	
Yang et al. ¹⁴	2021	China	RCT	≥60	8/8	The intervention group performed outdoor planting, handicraft activities, and derivative activities, and the rest were the same as the control group	1 h per week/10 weeks	A reduction of the apathy in dementia elderly and improvement in cognitive function	(6)(7)(8)	
Jueng and Chen ¹⁹	2022	China	Quasi-experimental study	60–85	37/49	Intervention group conducted indoor desktop gardening, and other measures were the same as the control group	40 min per week/12 weeks	Significant benefits on SOC level of older LTCF residents	(9)	
Park et al. ²⁰	2020	Korea	Quasi-experimental study	≥65	20/20	Intervention groups were cultivated with low-intensity to moderate-intensity gardening activities, and the others were the same as the control group	1 h per time/twice per week/12 weeks	The ability of cognitive and BDNF levels in the gardening group was significantly improved	(10)(11)(12)(13)	
Chen and Ji ²³	2015	China	Mixed methods research	60–85	5/5	The intervention group performed indoor planting, handicraft, and cooking activities, and the rest were the same as the control group	1.5 h per week/10 weeks	Significant improvement in the sense of achievement, happiness, and reduced loneliness	(14)(15)	
Lai et al. ¹⁵	2018	China (Hong Kong)	RCT	≥70	46/50	The intervention group performed indoor and outdoor planting activities, and the rest were the same as the control group	1 h per week/8 weeks	HT enhanced the sense of happiness greatly	(2)(15)(16)(17)(18)(24)	

(Continued)

Table 2. Continued

Author	Years	Location	Study design	Participant		Intervention		Main findings		Outcome measures
				Age (year)	Sample size (observation group/control group)	Measure	Duration and frequency			
Lo et al. ²⁷	2019	China (Hong Kong)	Qualitative research	≥70	22	Intervention group conducted horticultural courses, and the rest were the same as the control group	1 h per week/8 weeks	A significant improvement was observed in well-being and quality of life	—	—
Bourdon and Belmin ²¹	2021	France	Quasi-experimental study	81.0 ± 3.5	3/3/3	Group A were encouraged to invite enriched garden, group B were reminded to visit to invite conventional sensory garden, and ensure the elderly visited 4 times/week	10–20 min per time/4 times per week/24 weeks	Significant benefits on the level of cognition	(6)(19)(20)	
Bassi et al. ²²	2018	Italy	Quasi-experimental study	≥65	6/7	The first group took part in plant cultivation and handicraft activities, then took part in routine nursing home activities; the second group took part in routine activities and then took part in gardening activities	1 h per week/6 weeks	HT had improved the quality of life, reduced stress, promoted happy mood, and enhanced mental health	(6)	
Luk et al. ²³	2011	USA	Quasi-experimental study	≥65	7/7	The intervention group performed outdoor planting and handicraft activities, and the rest were the same as the control group	30 min per time/twice per week/6 weeks	A reduction in the agitation in the elderly with dementia had been noticed	(6)(23)	
Dahlkvist et al. ²⁶	2016	Sweden	Mixed methods research	84.8	290	Encouraged to wander around in gardens and green spaces	Not mentioned	A significant improvement was observed in healthy self-perceived ability and level of health	(27)(28)	
Edwards et al. ²⁸	2013	Australia	Qualitative research	79–90	12	The intervention group visited the therapeutic garden, and the others were the same as the control group	12 weeks, duration and frequency were not mentioned	Significant benefits in the quality of life and HT could reduce stress to a certain extent	(4)(6)(29)	
Hassan et al. ¹⁶	2018	China	Randomised controlled cross-over study	79.5 ± 8.0	20/20	First day, the first group conducted a transplanting activity using soil with plants; the second group conducted a transplanting activity using soil without plants, the next day, 2 groups exchanged activities	15 min per day/2 days	HT reduced blood pressure and anxiety, persuaded the elderly to relax	(1)(30)(31)(32)	

(Continued)

Table 2. Continued

Author	Years	Location	Study design	Participant		Intervention		Main findings	Outcome measures
				Age (year)	Sample size (observation group/control group)	Measure	Duration and frequency		
Masuya et al. ²⁴	2014	Japan	Quasi-experimental study	≥65	9/9	Intervention group performed planting and cooking activities, and the rest were the same as the control group	30–40 min per week/6 weeks	A significant improvement was observed in short-term depression and life satisfaction	(6)(19)(21)(33)
Tse ²⁵	2010	China (Hong Kong)	Quasi-experimental study	≥60	27/26	The intervention group did indoor plant planting, discussion, and diary writing activities, then the rest were the same as the control group	8 weeks, duration and frequency were not mentioned	Significant improvement in physical activity level, the ability of moving, life satisfaction, and social level, then HT reduced loneliness	(34)(35)(36)(37)
Zushi ³⁰	2008	Japan	Mixed methods research	64–90	6/6/6	Three groups of elderly people were conducted indoor and outdoor gardening activities.	8 weeks, duration and frequency were not mentioned	Interest, motivation, communication skills, self-confidence, and self-achievement improved significantly	(38)

Note: (1), Blood pressure; (2), GWB Schedule Scale; (3), EuroQoL; (4), CSDD; (5), AES-I; (6), MMSE; (7), QOL-AD; (8), BI; (9), SOC; (10), SFT; (11), Hand function ability (Digital grip dynamometer, Jamar hydraulic pinch gauge; Grooved pegboard); (12), MMSE; (13), Metabolic profiling techniques (ELISA); (14), UCLA Loneliness Scale version 3; (15), GDS-SF; (16), General Self-Efficacy Scale; (17), Social Engagement Scale; (18), SHS; (19), ADL; (20), TUG test; (21), GDS-15; (22), 20-item UCLA Loneliness Scale; version 3 (RULS-V3); (23), C-CMAI; (24), CHI; (25), MLS; (26), IIS; (27), PRS; (28), EQ-VAS; (29), DEMQOL; DEMQOL-Proxy; (30), EEG; (31), STAI; (32), Semantic differential scale; (33), Vi; (34), Life Satisfaction-A Index Form; (35), UCLA Loneliness Scale (UCLA); (36), LSNS; (37), The MBI; (38), Evaluation form.

ADL, activities of daily living; AES-I, Apathy Evaluation Scale-informant version; BI, Barthel Index; LTCF, Long-term care facility; BDNF, brain-derived neurotrophic factor; C-CMAI, Chinese version of the Cohen-Mansfield Agitation Inventory; CHI, Chinese Happiness Inventory; CSDD, Cornell Scale for Depression in Dementia; EEG, electroencephalogram; EQ-VAS, Visual Analogue Scale; GDS-15, 15-item Geriatric Depression Scale; GDS-SF, Geriatric Depression Scale-Short Form; GWB, General Wellbeing; HT, horticultural therapy; IIS, Interpersonal Intimacy Scale; LSNS, Lubben Social Network Scale; MBI, modified Barthel Index; MLS, Meaning of Life Scale; MMSE, Mini-Mental State Examination; PRS, Perceived Restorativeness Scale; QOL-AD, quality of life in Alzheimer's disease; RCTs, randomised controlled trials; SFT, Senior Fitness Test; SHS, Subjective Happiness Scale; SOC, Sense of Coherence; STAI, State-Trait Anxiety Inventory; TUG, Timed Up and Go; Vi, Vitality Index.

Table 2. Summarised characteristics of eligible articles.

health. Participants' perceptions of their own health were evaluated using the Perceived Restorativeness Scale (PRS),^{17,26} the Visual Analogue Scale,²⁶ and the Semantic Differential Scale.¹⁶

- (3) Social health: The effect of HT interventions on social health was evaluated using the Social Engagement Scale,¹⁷ Interpersonal Intimacy Scale (IIS),¹⁷ and Lubben Social Network Scale (LSNS).²⁵ Additionally, quality of life^{14,18,26,28} was the most commonly used indicator of comprehensive health.

The intervention process and results were evaluated using subjective evaluation tools such as evaluation forms,³⁰ but the indirect benefits of horticultural intervention were rarely reported.

4. Discussion

4.1. To design activities for more elderly people in pension institutions for the purpose of healthy ageing

HT has been applied to individuals of all ages and has a wide range of applications. As a special treatment technique in the field of non-traditional medicine, HT initially improves psychological status and cognitive function, reduces stress, and improves emotional disorders in the elderly population through the effects of viewing the natural landscape of botanical gardens, viewing (and planting) indoor plants, and specific HT rehabilitation training courses on the sensory system of the population.³⁰ In the context of the development of the theory of healthy ageing, elderly people who maintain good physiological, psychological, and social adaptive functions have a high quality of life and delay disease and life because they cannot take care of themselves to the last stage of life, which has become a new challenge for researchers in implementing HT intervention research. Due to the increasing amount of attention devoted to the main influencing factors of chronic diseases, the activity patterns and daily living abilities of chronically ill elderly individuals and self-care elderly individuals in nursing institutions have become important issues in HT intervention research. Previous studies¹⁸ have confirmed that indoor HT interventions can be performed at the bedside for people with limited mobility, and health promotion intervention programs in elderly care institutions that are partially dependent on elderly people and completely dependent on elderly people are worth exploring.

4.2. Clarification of the duration and intensity of HT intervention activities for elderly people in nursing homes

In the present study, HT was used as a nontraditional treatment, with a short duration and a relatively high frequency of intervention. When it is applied for the purpose of changing the activity pattern of elderly people in nursing homes, the weekly intervention duration should be the main measurement, and the total intervention duration, activity frequency, and duration of a single activity cannot be independently considered. In addition, as an intervention study aimed at changing activity behavior habits, the total duration of intervention activities should be at least 6 months³¹ to ensure the establishment and maintenance of behavior habits so that HT intervention activities can be maintained to the greatest extent. When formulating the content of the intervention program, researchers have considered age, health characteristics, activity ability, research purpose, and other factors of elderly people in nursing home institutions. The program content is rich, but there is a lack of demonstration of the structure of the intervention program and investigation of the acceptance of the content of the intervention activities of the research subjects, which may directly affect the implementation effect of the intervention program.³² In particular, in studies aimed at changing the physical functions and ADL of the target population, due to the influence of places, weather and other factors, the study site was not restricted. Although the researchers considered factors such as activity frequency and duration, they were still unable to confirm that the intervention activities reached the required intensity.³² In addition, in the implementation of HT intervention activities in elderly care institutions, the safety of the elderly population should be prioritized, and corresponding safety plans should be formulated according to the characteristics of the elderly population included in the study and the layout of the elderly care institutions.³³

4.3. Further exploration of the mechanism of effect of HT intervention activities and the evaluation method of activity benefits

As the main outcome measurement of the study, the data collected by the subjective evaluation tool confirmed that the HT intervention had an impact on the activity ability, cognitive function, depression level, loneliness level, anxiety level, social participation, and quality of life of the elderly individuals in the nursing home institutions. Fewer studies have used changes in

objective physiological indicators to illustrate the impact of an intervention on representative symptom levels of a disease (or specific health problem). Most studies aimed at changing the activity ability of elderly people in pension institutions need to combine the calculation of activity intensity and activity metabolism value in program design to verify the influence level of scientific and reasonable programs on the physical activity ability of elderly people.³⁴ At present, the combination of medical care and health care with the development of the elderly care service industry has significantly improved the service concept and spatial transformation of elderly care institutions, thus enabling the implementation and promotion of HT intervention activities, which can be further explored through more real-world research designs while paying attention to elderly people's compliance with intervention activities and the benefits of intervention activities.^{35–37}

5. Conclusions

As a low-cost and nontraditional treatment intervention, HT has been applied in nursing institutions for the self-supporting elderly individuals, elderly individuals with early cognitive impairment and elderly individuals with prominent mental health problems. The intervention program is rich in content, and the intervention activity cycle, frequency, and duration are different. The evaluation indicators of the intervention effect mainly included physical health, psycho-mental health, social health with obvious improvement effect, and quality of life level, as

well as the quality evaluation of intervention activities and direct evaluation of intervention effect.

Reflecting on the research objectives of this study, it is hoped that through this scoping review, future studies could explore the effect of HT intervention activities applied in elderly care institutions that are partially dependent on elderly people and completely dependent on elderly people. When implementing intervention activities for 6 months or more, a scientific activity intensity plan should be formulated, an activity safety assessment and safety plan should be made and outcome-evaluation indicators such as compliance and benefit of intervention activities should be included.

Authors' contributions

WJJ: Designed and conceptualized the study, collected and analyzed data, made critical revisions to the manuscript, and gave the final approval of the version to be published. NXY: Collected and analyzed data, drafted the manuscript, and made revisions to the manuscript. ZML: Analyzed data and gave final approval of the version to be published.

Ethical approval

Ethical issues are not involved in this paper.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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