

Forest Therapy in China

Subjects: Health Care Sciences & Services

Contributor: ZHIYONG ZHANG

Forest therapy has emerged as a preventive and alternative therapy to cope with stress and enhance people's health and wellbeing as a result of spending time in a green and healthy environment. Forest therapy activities in China include Forest health and wellness, forest healthcare, forest tourism, forest experiences, and forest wellness.

Keywords: forest therapy ; Forest health and wellness ; public health ; policy suggestions

1. Introduction

As a result of rapid urbanization and urban sprawl, natural ecosystems, such as forests, green spaces, and water bodies, are adversely affected, are shrinking, or are fragmented, leading to changes in the structure and function of natural systems near urban areas. Environmental pollution, food security, and work pressure influence people's health and quality of life. As people are becoming increasingly aware of their psycho-physiological health, they have a desire to escape the concrete jungle and long for a natural environment.

Forests have always played an important role on satisfying the demand for natural environments. Research has demonstrated that a forest environment has positive influences on human health. When people are walking in forests or green spaces, nature helps them to regain attention and focus, improve their psychological state, and feel free and relaxed. Recent medical studies have shown that forest environments provide benefits, such as lowering blood pressure, pulse rate, and sympathetic nerve activity, decreasing salivary cortisol concentrations of stress hormones, and increasing natural killer (NK) cell activity. Therefore, forests are being viewed increasingly as being beneficial to people's health rather than only providing timber.

2. Definitions of Forest Therapy

2.1. Forest health and wellness

Different government departments and scholars have defined forest health and wellness in different ways based on their understanding and perspectives. Wu et al. defined forest health and wellness in a broad and narrow sense, respectively. In a narrow sense, it is defined as activities occurring in a high-quality forest environment benefitting people's physical and mental health. This activities of forest health and wellness is based on existing health theories and is supported by traditional and modern medicine, including forest healthcare, rehabilitation, recovery, health maintenance, wellness, as well as recreation, travel, and outings. In a broad sense, it refers to all activities to maintain, sustain, and restore human health occurring in a forest environment.

2.2. Forest Healthcare

There is no clear and consistent definition of forest healthcare in China, but the following elements are included: (1) forest medicine as the core and evidence-based medical research as the foundation; (2) conducted in a forest environment; (3) focused on disease prevention, stress relief, and health promotion.

2.3. Forest Tourism

Forest tourism is a traditional approach for the use of forest resources. In short, it refers to any form of tourism activities in forests, either in a forest environment or by using forests as a backdrop. Therefore, forest tourism can also be defined in a broad or narrow sense. Many people choose to walk, recreate, and have cook-outs in forests. In general, people regard forest tourism as an opportunity to get close to nature, and focus more on visual experiences.

2.4. Forest Experience

Cheng et al. described forest experience as a practice of using forest resources and forest landscape and guiding people to sense and understand the relationship between forest and human through sensual experience, thereby promoting physical and mental health and inspiring people to protect forests actively to achieve sustainable forest development. In forest experience, the infrastructures are built to enable recreation and enjoyment in forests, and the facilities and oral introductions are provided as a guide of exposing to forests and experiencing their beauty. Zhang et al. categorized forest experiences into sightseeing, cognitive, and recreational experience.

2.5. Forest Wellness

Forest wellness is an emerging activity that combines human wellness and forest environment and was first proposed by SFGA in the Notice on Promoting Forest Experience and Forest Wellness Development. Forest wellness is based on a high-quality forest environment and green forest products, and it refers to all activities that improve people's health and prevent, relieve, and cure diseases. In simple words, forest wellness refers to forest-based activities to maintain health.

Forest wellness is often combined with the traditional Chinese medicine, and mineral hot springs in forests. Health maintenance programs have been developed to prevent disease and enhance psycho-physiological health(Figure 1).

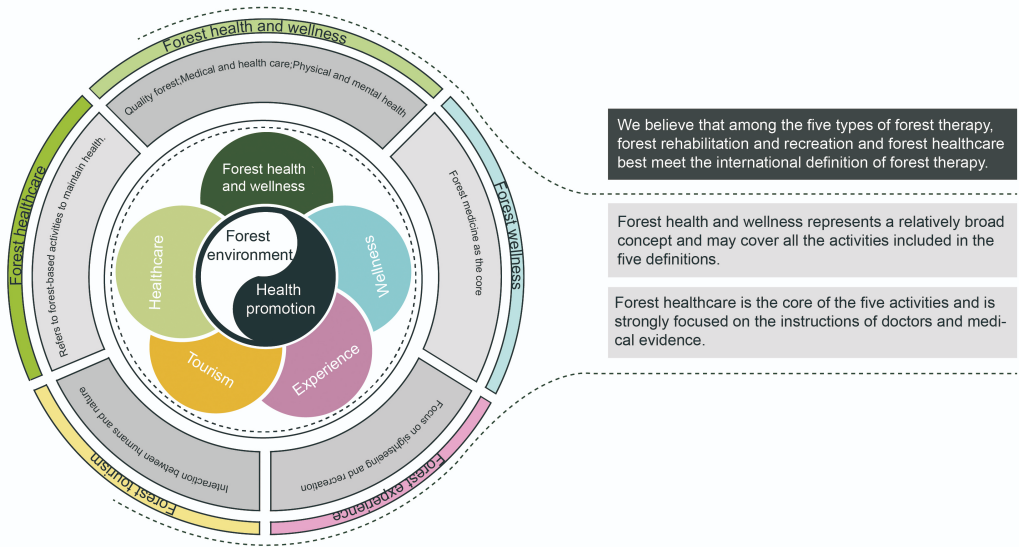


Figure 1. Relationship between the five types of forest therapy.

3. Development and Current Status

3.1. Basic Research

The study methods were mainly comparative experiments, most of which take the urban environment as the control, the number of participants ranged from 20 to more than 200, and the experiment cycle is 2–7 days, as explicated within the key in Table 1.

Table 1. Characteristics of selected studies about forest therapy in China.

Study	Population	Sample	Setting	Aim & Design	Findings	Advantages	Limitations
Lyu	Male college students from Sichuan Agricultural University were participated, none of the participants reported any physiological or psychiatric disorders in their personal histories, excluded subjects who smoked or alcoholic.	N = 60; ages from 19 to 24 years.	The bamboo forest site located near the city of Ya'an, the city site was located in the center of downtown in Chengdu city.	The subjects were randomly divided into four groups. The effects of bamboo forest therapy were explored by comparing the difference in the psycho-physiologic responses of participants before and after the test.	The bamboo forest therapy significantly increased natural killer cells activity, the number of natural killer cells and perforin-, granzyme A/B-expressing cells and significantly decreased the corticosterone level in peripheral blood lymphocytes in the male participants.	This study is the first to research the benefits of bamboo forest therapy. An explanation of the mechanism underlying the interactions between the nervous, endocrine and immune systems is given.	The sample size is small; the subjects with illness is not included.
Tsao	100 Staff members who live in the forest and 90 urban staff members who live in Taipei were recruited to determine the health effects on NK cells. 11 middle-aged volunteers were invited to investigate the health effects of a forest trip.	N = 211; mean ages 44.8 in the urban groups and 45.2 in the forest groups.	The forest site located in The Xitou Experimental Forest, the urban site located in Taipei city.	All participants were subjected to cardiovascular health and biochemical examinations and NK cell measurements. 11 middle-aged volunteers were invited to participate in a five-day/four-night forest trip to Xitou forest to investigate the health effects of a forest trip on NK cells and activating NK cells.	NK cells were higher in the forest group than in the urban group. The percentage of activating NK cells of the invited participants from Taipei increased significantly after the trip to Xitou forest.	On the basis of comparative experiments, the volunteers were added to participate in a forest trip to investigate the health effects of a forest trip.	The specific health effects of biogenic volatile organic compounds from tree leaves in forest environments are not investigated. The sample size of the forest trip group is small.
Mao	Normal male university students were enrolled. None of the subjects reported any physiological or psychiatric disorders in their personal histories.	N = 20; age 20.79 ± 0.54 years.	The experiments were conducted in a broad-leaved evergreen forest in Wuchao Mountain, An urban area was used for comparison in Hangzhou city, Zhejiang Province.	The participants were randomly divided into two groups. One group was sent on a two-night trip to a broad-leaved evergreen forest, and the other was sent to a city area. Serum cytokine levels, the distribution of leukocyte subsets, and plasma endothelin-1 concentrations were measured before and after the experiment to evaluate the positive health effects of forest environments.	Mid- and short-time exposure to an evergreen broad-leaved forest could reduce oxidative stress and pro-inflammatory and serum cortisol levels.	The physiological and psychiatric indicator are together used to assess the health effects of forest environments.	The sample size is small. The factor of climate and air quality are not monitored at each experimental site.

Study	Population	Sample	Setting	Aim & Design	Findings	Advantages	Limitations
Mao	Elderly patients with diagnosed essential hypertension were recruited from Hangzhou.	N = 24; ages from 60 to 75 years.	The experiment was conducted in a broad-leaved evergreen forest in White Horse Mountain National Forest Park in Suichang County, an urban area in Hangzhou was used for comparison.	Two groups of participants were respectively sent to the forest or an urban control area for a 7-day trip to evaluate the effect of forest bathing on blood pressure. Blood pressure indicators, cardiovascular disease-related pathological factors and tumor necrosis factor were detected.	The results provided direct evidence that forest bathing has therapeutic effects on human hypertension and induces inhibition of the renin-angiotensin system and inflammation, and thus inspiring its preventive efficacy against cardiovascular disorders.	The physiological and psychiatric indicator are together used to assess the health effects of forest environments. The air quality in the two experimental sites is monitored.	The sample size is small. The age range of participants is limited. The factors of climate are not monitored.
Zhou	The students majoring in forest ecology were recruited as volunteers from Guizhou University. They were informed to prohibit any of vigorous physical activity, smoking, and alcohol consumption before and throughout the whole experiment.	N = 43; 8 male and 35 female, ages from 19 to 23 years.	Qianlingshan Park and Xiaoche River Park were set as test site in Guiyang City, Guizhou Province.	To know about the urban forest therapy effect of anxiety alleviation with reference to the rural forest, the forest experience was separated by four sceneries. Participants were asked to complete questionnaires by self-evaluating specific anxiety change from 12 questions with scores from 1 to 10 at both entrance and exit of the parks.	University students were recommended to pay a short visit to the urban forest with partners if they felt anxious about personal affairs and felt necessary to talk with others. For general people's visiting, urban forest trees can be controlled in diversity to some extent to look orderly and alleviate perceived anxiety.	This study find that forest bathing can alleviate perceived anxiety even in very detailed aspects, such as financial state, exam pass pressure, and love-affair relationship.	The sample size is small. The factors of forest and climate are not monitored. The physiological indicators are not used to evaluate. The control site is not set.
Wang	Undergraduate and graduate students without heart disease or a diagnosis of irregular heart beat were participated from Tongji University.	N = 140; 50% male and 50% female, ages from 18 to 24 years.	N/A	This study explored the stress recovery effects of different videotaped scenes, using six urban parks and one urban roadway scene. Subjects were randomly assigned to watch one of the seven video scenes, with twenty subjects watching each scene.	Urban park scenes relieved stress and restored attention levels, whereas viewing urban roadways increased negative feelings. Outdoor scenes without people were more restorative than scenes depicting people.	The videotaped scenes are used as stimuli. Compared with direct experience of a site, this method has the advantage of controlling extraneous conditions.	Only one semi-enclosed scene is included, and the types of urban park is also limited. The physiological indicator are not used to evaluate.

Study	Population	Sample	Setting	Aim & Design	Findings	Advantages	Limitations
Mao	Elderly patients with Chronic Heart Failure (CHF) were recruited in Hangzhou city.	N = 43	Huangtan forest park located in Pan'an County was set as the forest site and an urban site located in the downtown area of Hangzhou that was set as the control, Zhejiang Province.	To further investigate the duration of the impact and the optimal frequency of forest bathing trips in patients with CHF, those subjects who had experienced the first forest bathing trip were recruited again after 4 weeks and randomly categorized into two groups, namely, the urban control group (city) and the forest bathing group (forest).	A steady decline in the brain natriuretic peptide levels, and an attenuated inflammatory response as well as oxidative stress. The additive benefits of twice forest bathing trips in elderly patients with CHF were demonstrated.	Additive benefits of twice forest bathing trips are demonstrated. This study provides supportive evidence that two 4-day forest bathing trips with a 4-week interval could offer additive benefits in elderly patients with CHF.	The sample size is small. The factors of forest and climate are not monitored. The age range of participants is limited.
Guan	All participants were recruited from undergraduates in the major of urban horticulture from Jilin Agricultural University. They were informed to prohibit any of vigorous physical activity, smoking, and alcohol consumption before and throughout the whole experiment.	N = 69; 25 male and 44 female, ages from 19 to 22 years.	The study site locates at the Nanhu Park in Changchun City, Jilin Province.	This study aimed to evaluate the tree-species effect of forest bathing on perceived anxiety alleviation. The participants were recruited to visit urban forests dominated by birch, maple and oak trees, respectively.	The anxiety of the participants was reduced in the maple forest, the largest anxiety alleviation effects were observed in the birch forest, and female participants perceived more anxiety alleviation than male participants.	This study finds that urban forests have a tree-species-specific effect on anxiety alleviation in university students.	The number of species, psychological mechanism and physiological responses are limited. The control site is not set.
Tsao	107 forest staff members (FSM) and 114 urban staff members (USM) to recruited to determine the long-term health effects of a forest environment.	N = 221; mean ages 43.2 in USM and 44.3 in FSM.	The FSM working in an experimental forest of National Taiwan University, Nantou County and the USM working in an urban environment in Taipei city.	To demonstrate the long-term health effects of living in a forest environment on subclinical cardiovascular diseases (CVDs) and health-related quality of life (HRQOL) compared with that in an urban environment. The detailed health examination and questionnaire assessment were investigated by the FSM and USM.	Levels of total cholesterol, low-density lipoprotein cholesterol, and fasting glucose in the USM group were significantly higher than those in the FSM group. Furthermore, a significantly higher intima-media thickness of the internal carotid artery was found in the USM group compared with that in the FSM group.	FSM working in an experimental forest and USM working in an urban environment is recruited. The FSM group or USM group have worked in the forest or urban environment for more than 1 year.	The CV effects of changes in seasons have not been considered. The beneficial health factors of a forest environment have not been monitored and assessed.

Study	Population	Sample	Setting	Aim & Design	Findings	Advantages	Limitations
Jia	Elderly patients with chronic obstructive pulmonary disease (COPD) were enrolled in Hangzhou city, who had been without the acute exacerbation for at least 6 weeks.	N = 20	The experiment was conducted in a broad-leaved evergreen forest in White Horse Mountain National Forest Park in Suichang County, an urban area in Hangzhou was used for comparison.	This study aimed to evaluate the health effects of forest bathing trip on elderly patients with COPD. The patients were randomly divided into two groups. One group was sent to forest, and the other was sent to an urban area as control.	In the forest group, there was a significant decrease of perforin and granzyme B expressions, accompanied by decreased levels of pro-inflammatory cytokines and stress hormones. Meanwhile, the scores in the negative subscales of POMS decreased after forest bathing trip.	The physiological and psychiatric indicator are together used to assess the health effects of forest environments.	The sample size is small. The factors of forest and climate are not monitored.
Yu	Middle-aged and elderly participants were recruited. 59 subjects (46.1%) reported chronic diseases including diabetes, hypertension, heart and other diseases.	N = 128; 85 females and 43 males, age from 45 to 86 (60.0 ± 7.44) years.	The experiment site was in the planted forest mainly containing <i>Cryptomeria japonica</i> and <i>Phyllostachys pubescens</i> and, the stand age ranged between 40 and 90 years old in Xitou Nature Education Area.	This study sought to understand the physiological and psychological effects of the short forest bathing program on middle-aged and elderly individuals. Physiological responses, pulse rate, systolic and diastolic blood pressure, heart rate variability (HRV), and psychological indices were measured before and after the program.	The short forest bathing program is a promising therapeutic method for enhancing heart rate and blood pressure functions as well as an effective psychological relaxation strategy for middle-aged and elderly individuals.	The physiological and psychiatric indicator are together used to assess the health effects of forest environments. The sample size is big.	The effects of socio-economic status, medication usage, habits and personality are not collected. The environmental factors and environmental conditions are not included as covariates.
Wang	College students and social workers were selected as effective participants. All the subjects had normal vision or corrected normal vision, no mental disorder, no stress disorder, no abnormal organic disease, no brain trauma, and no endocrine diseases.	N = 96; 33 males and 63 females, age 24.03 ± 5.29 years.	N/A	To explore the effects of different types of forest environments for forest therapy, the study focused on forest resting environments. Seven representative forest resting environments found in field research in Beijing were used as independent variables and were shown to subjects by a virtual reality (VR) video.	This study found that all the seven different types of forest resting environments can produce stress relief effects to some extent. Different types of forest resting environments have different effects on relieving stress. The most natural environment does not have the most significant effect on stress relief. A water landscape has a positive effect on the relief of stress.	This study find that different types of forest resting environments have different effects on relieving stress.	Only seven types of forest resting environments are explored. The visual angle of the VR video was fixed. Only visual factors are focused.

3.2. Development of the Forest Therapy Industry

Health issues are a public concern. Since the national strategy "Healthy China" was launched, forest therapy, which is an integral part of the health industry, has developed rapidly in China.

Multiple institutions and organizations dedicated to the development of forest therapy were founded after the implementation of the policies. On 18 September 2015, the Forest Medicine and Health Promotion Committee (FMHPC) of the China Forestry Industry Association (CFIA) was founded, with the goals of connecting different industries, improving forest medicine and health industry, and promoting coordinated and sustainable development of forest medicine, health care, recreation, and wellness. On 14 October 2015, the International Forest Therapy Cooperation Committee (IFTCC) of the China Forestry Economy Society (CFES) was established to promote forest-based healthcare in China. On 30 November 2017, the Forest Rehabilitation and Recreation Committee (FRRC) of the China National Forest Farm Association (CNFFA) was founded. On 1 April 2018, the Forest Therapy Committee (FTC) of the China Forestry Society (CFS) was established.

4. Suggestions for the Development of Forest Therapy

In the future, both quantitative and qualitative studies on the health functions of forests should be enhanced, with particular focus on identifying a direct causative relationship between forests ecosystem services and the human health.

What is needed right now is an improvement in the policies and the establishment of a government-led initiative in conjunction with private participation. With targeted policies and increased capital input, the whole society will take part in the industry, and the development of the industry would benefit from low-interest loans, tax cuts, and program-based financing. Meanwhile, the related costs of forest therapy activities should be committed to add in the national or regional medical insurance system, which should play a key role in enhancing overall sense of well-being and balance in life.

How to better apply the latest research results to solve practical problems is still a major problem faced by the majority of researchers and practitioners. On the basis of what has been achieved so far, the researchers need to actively explore new development concepts, and work with decision-making departments and forest therapy centers to maximize the health functions of forests, and let the general public feel the healthcare and well-being of forests. This will be the direction of our efforts in the future.