

# ***The Role of Horticulture Therapy in Autism Spectrum Disorder of Chinese Children***

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**Abstract:** Autism spectrum disorder (ASD) is a subtype of pervasive developmental disorder which mainly characterized by cognitive and communication impairments, often accompanied by symptoms such as social disorder, Stereotypical behavior, and Perceptual disorders, which not only affect the physical and mental health development of children but also brings a heavy burden to the families and society of patients. Horticultural therapy, as an ecological psychotherapeutic method, has more obvious and positive intervention effects on the above-mentioned symptoms in children with autism and has gradually gained attention in recent years. However, its application sites are mainly concentrated in special education schools and medical institutions, and it has not been widely used and promoted; its researchers are mainly concentrated in garden designers and special educators, with less participation from psychologists and horticultural therapists. This paper describes the current intervention methods and effects of horticultural therapy on the above three major impairment characteristics of children with autism in China, summarizes the application overview and progress of horticultural therapy, and gives some perspectives and recommendations for the following research.

**Keywords:** Horticulture therapy, Autism spectrum disorder, Chinese children

## **1. Introduction**

Autism spectrum disorder (ASD) is also called "mental cancer" that affects the healthy development of children and places a heavy burden on their families and society. 2015 China Autism Education and Rehabilitation Industry Development Status Report shows that there are currently more than 10 million people with ASD in China (more than 2 million children aged 0-14), and the trend is growing by 200,000 per year [1]. Horticultural therapy, as one of the complementary therapies for children with ASD, has more significant intervention effects on improving children's psychological anxiety and depression and improving the symptoms of children with ASD. Based on the summary of previous studies, this paper gives new ideas and perspectives. We aim to raise the social attention of the children group with ASD, improve the application of horticultural therapy in the field of interventions for children with ASD, and promote the social development of children with ASD.

## **2. Horticulture Therapy**

### **2.1. Definitions of Horticulture Therapy**

The American Horticulture Therapy (AHTA) defined horticulture therapy as an effective method that exploits planting growing and horticulture activities from society, education, psychology, body, and other aspects to help people who need to be improved in such aspects as body and spirit to adjust [2]. Scholars further refined the definition of horticulture therapy the activities like planting flowers, fruits, vegetables, and other plants, even have a beneficial influence on cognition and professional skills [3].

### **2.2. The Characteristic of Horticulture Therapy**

#### **2.2.1.Naturality**

Horticulture therapy is different from physics therapy and chemistry therapy, it's a natural therapy that mainly depends on plants or activities around plants to obtain benefits. This kind of therapy is based on nature, therefore the horticulture therapy's therapeutic instruments are also wide so that the patient has more options and more opportunities to get treatment.

#### **2.2.2.Diversity of Service Population**

Horticulture therapy is not only for patients but also for healthy and sub-healthy people. It's not specific to a particular disease. We are often exposed to nature in our daily life. When we feel tired or irritable, seeing a flower in full bloom or a potted plant with a well-arranged, our minds and bodies are relaxed. Both the patient and the healthy person who are in such a beautiful landscape can also get the beneficial factor.

#### **2.2.3.The Initiative and the Passivity**

The initiative signifies an operating horticulture activity, for instance, composting, weeding, planting, picking, flowering and potting, which can produce the initiative healing to strengthen our immunity and enhance a sense of accomplishment and satisfaction, to promote the healthy development of body and mind. This is a treatment in which the sufferer is personally involved in gardening and taking the patient as the subject of the activity to treat. The patient is no longer a "patient", but a person who has a choice. The passivity signifies a passive therapy through designing a therapeutic landscape and choosing plants that have a health-care function. With the help of a horticulturist therapist, the patient goes passively to enjoy the garden landscape signed by the designer. Under this kind of targeted design, the patient can obtain the targeted treatment.

#### **2.2.4.Economical Efficiency**

The implementation of the horticulture therapy compared with the hospital, which doesn't need to invest a lot of money in building and equipment. When we're implementing the horticulture therapy, even just through planting a pot of flowers or stepping up a simple flower arrangement to assist the psychological state of the patient.

#### **2.2.5.The Long-Term Nature**

We must keep our resolve to do the horticulture therapy so that we can obtain satisfactory results. What ever the therapy is, we have to go through long-term interventions and document from a baseline period to the intervention period, what is the change in the patient's behavior [3].

### **2.3. The Relationship Between the Horticulture Therapy and Healing Garden**

The generalized horticulture therapy includes the healing garden, using landscape elements to create space and environment to stimulate the user's senses for relaxing and producing the passive function[4]. And someone defined the generalized horticulture therapy as a static benefit and a dynamic benefit. The static benefit represents the healing garden and the dynamic benefit represents the narrow horticulture therapy. For their part, there is a mutual promotion of the two-way impact [5]. As far as I'm concerned, the healing garden is a carrier that provides a suitable place, to implement the horticulture therapy. According to the characteristic of initiative and passivity, developing the initiative horticulture activities in the healing garden and designing the healing garden as a passive horticulture therapy to help the patient recover.

## **3. Autism**

In 1943, the father of psychological medicine in America Leo Kanner proposed the concept of autism for the first time [6]. Bao and Zhuang analyzed that autism often starts before the age of three when the symptoms are not obvious, and it is a kind of mental disorder with wide impact. It is different from a withdrawn or introverted personality, which mainly shows stereotyped behavior, no eye contact, dislike or do not communicate with others, and so on [7]. Children with autism have four typical disorders: stereotyped behavior, sensory disturbance, impaired social interaction, and language handicap.

### **3.1. Stereotyped Behavior**

Narrow interests, stereotyped thinking, abnormal attachment behavior to some non-main characteristics of objects, and unwillingness to change their daily habits, some things will be ritualistic or compulsive behavior and often repetitive actions.

### **3.2. Sensory Disturbance**

Because they focus on the objects, not the person, they care about the details of everything, are immersed in their world, and do not respond to the call of others. Due to the perceptual dysplasia, some children do not feel pain, they will hurt their way to seek stimulation, in terms of taste and smell will be only interested in certain special flavors, tactile side is willing to contact with only a few things, at the same time, vestibular and proprioception dysplasia so that they can't feel me, so different from ordinary people balance. It can also be accompanied by distraction and other behaviors

### **3.3. Impaired Social Interaction**

Generally, autistic children lack interest in the people around them, lack mutual social communication skills, and are not interested in peer groups or games, which results in significant differences between autistic children and ordinary children in social aspects. Horticultural therapy is effective in treating sensory perception, stereotyped behavior, and social interaction in children with autism.

## **4. Intervention Progress of Horticultural Therapy for Autistic Children**

Horticultural therapy is an art and psychological therapy that aims to improve autistic children's disorder characteristics by making them observe, cultivate, accompany and manage, pick and

harvest, make handicrafts, and other horticultural activities around the theme of "plants", to make them get pleasant physical and mental experience.

#### **4.1. The Intervention Process of Stereotyped Behaviors**

Previous studies have pointed out that it will help to arouse the attention of children with ASD when they do horticultural ornamental. They perceive the plants themselves initially then be aware of the owner's presence, and thus enhance their attention to the world around them (including the ecological and human, and social environment), improving their sense of cooperation and awareness of sharing behaviors. And the ultimate goal is to change stereotypical behavior and broaden the scope of their interests and socialization [8].

Another study conducted an intervention practice for more than 2 years to specifically aim for stereotypical behaviors in children with ASD through the use of compartmentalized design, curriculum-based operation, functional assessment, and establish a scientific intervention system for horticultural therapy for children with ASD. And the follow-up recording and analysis of study data showed that horticultural therapy had a significant effect on improving stereotypical behaviors in children with ASD [9].

A recent study used a structured teaching method to follow the sequence of "visit and experience - cultivate - company and manage – feel and experience - use - harvest" to give a 9-month follow-up therapy for a child with ASD. Using transcripts, the researcher demonstrated that emotions, behaviors, and cognitive-communication skills developed to a great extent after the horticultural therapy intervention [10].

#### **4.2. The Intervention Process of Sensory-Perception**

By reading the successful cases of rehabilitation gardens at domestic and foreign, Yuan Wang summarized the waterscape design types of rehabilitation gardens into four types: relaxation, meditation, emotional and interactive. He found that these four types of waterscape design had different healing effects on the perception, thinking, and emotion of autistic children respectively. Through the analysis and study of the above cases, the water-scape evidence-based design and practice is carried out with The Example of Ren 'ai School in Suzhou Industrial Park. By making children with ASD observe and experience the process of water from turbid to clear, the intervention of sensory and perceptual disorders, especially for the behavior of distraction, can improve children's thinking ability and have a positive effect on the cognition of surrounding things. It is concluded that the continuous training of ASD children under the guidance of the treatment in the hydrotherapy-themed gardening activities has a positive effect on the improvement of attention. The results of this case study suggest that horticultural therapy, in combination with other treatments, can have significant therapeutic effects on sensory integration in children with autism, as well as effective interventions for sensory and perceptual disorders [11].

Zhang and Guo integrated the rehabilitation theory of medical characteristics and horticultural therapy through the individual case of "Little Star Garden" in Chengdu and the symptoms of sensory and perceptual disorders of autistic children: Attention recovery theory, emotional aesthetics theory, brain mechanism, and mind-calming theory, immersion theory, etc., horticultural therapy is proposed to stimulate and restore senses from five aspects of vision, hearing, touch, taste, and smell, and can be adjusted according to the situation, which is beneficial to alleviate the sensory and perceptual abnormalities of autistic children. In cooperation with the alliance of organizations related to autistic children, five children were organized to conduct horticultural therapy activities for three months, which proved that horticultural therapy has a positive effect on children's common attention [5].

Zhu combined the situation of Special education schools in China and took Xuzhou Special education School as an example. Aiming at the existing problems of the school landscape, Zhu took sensory and perceptual integration as the leading design and constructed three important sensory areas dominated by tactile, auditory and olfactory integration: music fountain, sensory wall and sensory garden. The combination of fun, interactivity, therapeutic, playfulness and rehabilitation garden can promote the interaction and communication between children with sensory disorders and the outside world, which proves that landscape interaction can promote the sensory development of children with sensory disorders and can effectively intervene with sensory disorders [12].

Sun and Gao took the reconstruction of Yan 'a Hospital as an example to design a rehabilitation garden for the intervention of sensory and perceptual disorders of autistic children from the aspects of vision, hearing, smell and touch. To improve the attraction and attention of children with autism, vegetation with bright colors, unique smells and different textures in the waterscape garden can stimulate children's senses. Combination of play therapy for gardening activities and entertainment, making full use of interactive this principle let children experience the nature, fulfillment and satisfaction in the activity, effectively improve the enthusiasm of the children through the interaction with the outside world, promote the development of the senses and effectively adjust bad feelings, perceptual barriers for effective intervention[13].

#### **4.3. The Intervention Progress of Social Barriers**

Lei use the horticulture therapy to intervene with 20 Autistic children for nearly two years. This confirms that it has an obvious effect on the social function of Autistic children, and the horticulture therapy is scientific. As a scholar that she was the first to focus on Autistic children who used the horticulture therapy. She put forward three treatments of horticulture: the horticulture therapy of adopting plants, the horticulture therapy of growing, and the horticulture therapy of touching nature [14].

The horticulture therapy can be successful in getting results. It is because of the two kinds of reactions that occur when Autistic children treat plants: Normal reaction and Special reaction. One of the reactions is known as the special that uses plants that the Autistic children are interested in growing can enhance their interest in external things to step into an interpersonal relationship.

In case study used the horticultural implementation record sheet to record a certain Autistic child's intervention effect for the year. The process of Using and Picking made a noteworthy effect on active communication between Autistic children and teachers. The providing of confidence and achievability is the result of labor. The sociality has been a remarkable development [15].

According to a study, about a young child's exposure to high-stress environments will interfere with their social confidence. It has been further suggested that this can be appropriate for the children with ASD because these children are in a high-pressure environment of communication difficulty for the long term so they have adverse effects on social development. Horticultural therapy can provide a relaxed and pleasant environment for children with ASD to try to connect with people [16].

#### **5. Suggestions for Future Research**

Currently, horticultural therapy for children with ASD in China is used in medical institutions and school programs, but not in families. Since horticultural therapy is long-term in nature and the primary place of living and parenting for children especially pre-school children with ASD in the home, home is an indispensable part of the intervention. If family members of children with ASD can provide continuous support therapy under the guidance of horticulturists and teachers, the



efficiency of horticultural therapy interventions can be improved and the rehabilitation cycle of children with ASD can be shortened.

There are few studies of horticultural therapy on language disorders in children with ASD in China, most studies integrate language disorders into stereotyped behaviors and social disorders. They consider stereotyped language as one of the manifestations of stereotyped behavior and the inability to use language normally for communication as one of the manifestations of social disorders, and the results of these studies only reflect that horticultural therapy has led to the development of active speech in ASD children, and a large number of intervention experiments are needed to see whether this therapy can have intervention effects on their articulation, rhythm, and speech rate.

In the experiments on horticultural therapy interventions for children with ASD, we found that much of the work of designing solutions and exploring intervention sites was done by garden researchers and less by special educators, psychologists, and horticultural therapy practitioners, so we encourage these researchers to provide more research results.

If we want to make horticultural therapy develop better, researchers should not be limited to small indoor gardens, and even more so to planting experience activities of small potted plants, but we should look at larger horticultural sites - city parks, large experiential plantations, mountain forests, etc.

## 6. Conclusion

With the growing number of children with ASD, the attention to this group has become more widespread, the research on people with ASD in various disciplines has been intensified, and the effectiveness and scientific validity of horticultural therapy has been proven more and more. With the establishment of the horticultural therapy rehabilitation center, we call for more communities, families, schools, and individuals to pay more attention to children with ASD, and we hope that horticultural therapy and other effective intervention methods will be more widely disseminated and applied.

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