Lush Mental Landscapes

Effects of Horticulture Therapy on Depression, Anxiety Disorder, Post-Traumatic Stress Disorder and Autism Spectrum Disorder

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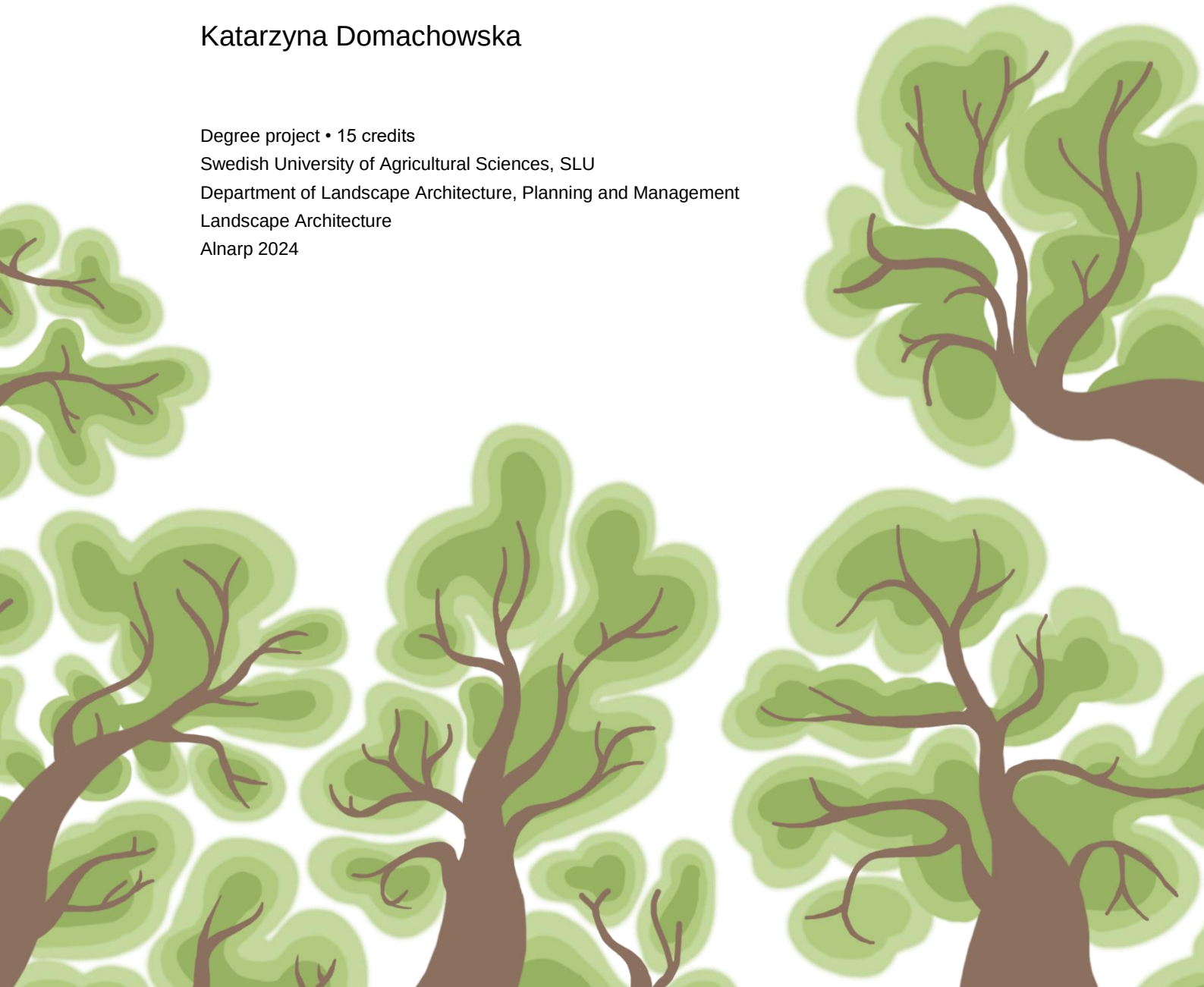

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Abstract

Every developing human brain is formed by the environment, which is why our surroundings are an important factor for mental health. The natural surroundings have been shown to enhance mood and reduce stress. Being in a natural environment offers a refreshing setting that enables the brain to recover from mental fatigue.

With every year, knowledge about mental disorders and their treatment is increasing. Despite this we are still very far from ultimate objective. Treatment approaches vary widely, ranging from pharmacotherapy and psychotherapy, but sometimes people are looking for a supporting solution. Horticulture therapy is an option as a treatment. It is based on an active process which occurs in the context of a settled treatment plan where the process itself is considered the therapeutic activity rather than the end product. However, it is more often considered since it brings positive effects in therapy.

This thesis concerns the opportunities within horticulture therapy to promote the development and its effects for mental disorders with a focus on depression disorder, anxiety disorder, post-traumatic stress disorder, and autism spectrum disorder. The overall aim is to explore important aspects of horticulture therapy and how this can bring positive effects on depression, anxiety, post-traumatic stress disorder and autism spectrum disorder. A literature review with references to the subject was completed, with the inspiration from a systematic review approach. The results evolved the patient's contact with the HT and it brings effects.

Keywords: horticultural therapy, mental disorders, effects of HT on human health, stress reduction, depression, anxiety, PTSD, ASD, therapeutic garden, hospital healing garden, effects of horticulture therapy on depression, effects of horticulture therapy on anxiety, effects of horticulture therapy on PTSD, effects of horticulture therapy on ASD

Preface

I selected this subject due to the growing prevalence of people diagnosed with mental disorders such as depression, anxiety, PTSD, and autism spectrum disorder these days.

Furthermore, all of those disorders are showing depression and anxiety symptoms. I specifically chose autism spectrum disorder from neurodevelopmental disorders, because of documented behavioral and psychiatric observations in autism such as depression and anxiety, which overlap with depression and anxiety disorder.

As a person struggling with depression and anxiety disorder, I experience how much our surroundings can influence us, and how quickly our mood or attitude can change depending on the place that we are in. I believe that the treatment could be improved not only through pharmacological treatment but also by other aspects such as horticulture therapy.

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Abbreviations

ADHD	Attention deficit hyperactivity disorder
AHTA	American Horticultural Therapy Association
ART	Attention Restoration Theory
ASD	Autism spectrum disorder
HT	Horticulture therapy
IHME	Institute For Health Metrics and Evaluation
MDD	Major depressive disorder
NBR	Nature-based rehabilitation
PTSD	Post-traumatic spectrum disorder
SIBs	Self-injurious behaviors
WHO	World Health Organization

1. Introduction

The amount of people struggling with mental disorders is rapidly increasing every year. “In 2019, one in every eight people, or 970 million people around the world were living with a mental disorder, with anxiety and depressive disorders the most common’’ (IHME). According to the WHO (2022a), people of higher risk are those who experience adverse circumstances such as discrimination, violations of human rights, disability, inequality, and stigma.

Additionally, WHO (2022b) declared that mental disorders include anxiety disorder, depression, bipolar disorder, post-traumatic stress disorder (PTSD), schizophrenia, eating disorders, disruptive behavior and dissocial disorders, and neurodevelopmental disorders such as attention deficit hyperactivity disorder (ADHD) and Autism spectrum disorder (ASD).

In addition to psychotherapy and medication, there are other treatments that can reduce the symptoms of disorders.

> “Horticultural therapy is the participation in horticultural activities facilitated by a registered horticultural therapist to achieve specific goals within an established treatment, rehabilitation, or vocational plan. Horticultural therapy is an active process which occurs in the context of an established treatment plan where the process itself is considered the therapeutic activity rather than the end product’’. (AHTA n.d. a)

These activities can reduce the symptoms of disorders including anxiety, sadness, stress, and feelings of emptiness, by increasing social skills, feelings of purpose, and emotional regulation.

In 2020, there was a notable increase number of people struggling with anxiety and depressive disorders, attributed to the impact of the COVID-19 pandemic (World Health Organization 2022c). Initial estimates show a 26% and 28% increase respectively for anxiety and major depressive disorders in just one year. This increase in mental health issues demonstrates an increased need for mental health supports and treatments.

1.1 Aim and Purpose

This thesis aims to explore important aspects of horticulture therapy and how this can bring positive effects on depression, anxiety, PTSD, and autism spectrum disorder. Moreover, to understand the research situation, and how horticulture therapy could have an impact on people struggling with mental disorders.

1.2 Research Questions

The following research question guided the study.

- How does Horticulture Therapy affect mental disorders?
- What are the different varieties and methods in HT?
- What characterizes mental disorders with a focus on depression, anxiety, post-traumatic stress disorder, and autism spectrum disorder?
- What are the positive effects of HT on depression, anxiety, post-traumatic stress disorder, and autism spectrum disorder?

1.3 Methodology

The selected literature was used to write a literature review with references of the subject, and inspiration from a systematic review approach.

> "A systematic review is a protocol driven comprehensive review and synthesis of data focusing on a topic or related key questions. It is typically performed by experienced methodologists with the input of domain experts.'' (Russell et al. 2009:13)

Further literature was found, using the snowball sampling method.

> "Snowball sampling is a recruitment technique in which research participants are asked to assist researchers in identifying other potential subjects.'' (Oregon State University 2010)

The beginning step was online research on Pubmed, Scopus, Web of Science, and Google Scholar databases. Data were gathered using English keywords: "Mental disorders'', "Horticultural therapy'', "Effects of HT on human health'', "Stress reduction'', "Depression'', "Anxiety'', "PTSD'', "ASD'', "Therapeutic garden'', "Hospital healing garden'', "Effects of Horticulture Therapy on Depression'', "Effects of Horticulture Therapy on Anxiety'', "Effects of Horticulture Therapy on PTSD'', "Effects of Horticulture Therapy on ASD''. Articles written in English and containing relevant data to answer the research questions were chosen for further investigation.

The results of the research revealed a lot of diverse articles. Prioritized literature in this study includes both contemporary publications and the latest research findings. Additionally, attention was given also to older sources to explore the origins of horticultural therapy and understand better the roots of stated questions. This thesis includes as well references to websites because of provide proven data that enable the use of valuable and key information.

Upon gaining familiarity with the literature, the sources showed that horticulture therapy did not appear to have any negative effects. That's why the focal point it's only on the positive results of horticulture therapy affecting focused mental disorders. Moreover one of the articles stated that they didn't observe any positive or negative outcomes, because of the four weeks of treatment. They assumed that the eight weeks would show more visible results (Xu et al. 2023).

2. Background

2.1 Mental Disorders

2.1.1 Description

It is accepted as a fact that 1 in every 8 people in the world live with a mental disorder, which involves significant disturbances in thinking, emotional regulation, or behavior (World Health Organization 2022b). There are many existing effective prevention and treatment options for different types of mental disorders.

According to WHO (2022b), mental disorders, alternatively called mental health conditions, cover a wide range, including psychosocial disability and other mental conditions characterized by significant distress, impaired functioning, or potential for self-harm. A mental disorder is diagnosed by clinically diagnosed in disturbances person's thinking processes, emotional regulation or behavior, usually leading to distress or impairment in key aspects of life.

2.1.2 Classification and Categorization of Mental Disorders

WHO (2022b) stated that mental disorders include: Anxiety Disorder, Depression, Bipolar Disorder, Post-Traumatic Stress Disorder (PTSD), Schizophrenia, Eating Disorders, Disruptive behawior, and dissocial disorders, Neurodevelopmental disorders such as autism spectrum disorder (ASD), and attention deficit hyperactivity disorder (ADHD).

The origins of mental disorders are complex and involve interactions between various genetic and non-genetic risk factors.

> “Gender is related to risk in many cases: males have higher rates of attention deficit hyperactivity disorder, autism, and substance use disorders; females have higher rates of major depressive disorder, most anxiety disorders, and eating disorders. Biochemical and morphological abnormalities of the brain associated with schizophrenia, autism, mood, and anxiety disorders are being identified using approaches such a postmortem analysis and noninvasive neuroimaging.’’ (Disease Control Priorities Project 2006:17)

2.2 Horticulture Therapy

"HT has been defined as the use of plants and plant-based activity for the purpose of human healing and rehabilitation'' (Rutgers University 2023). Using the knowledge of a landscape designer and a horticulture therapist can create places to restore and improve people's mental health. It is about connecting people with plants.

HT is a known method used for the treatment of different age and environment groups to promote better mental health and well-being. This kind of therapy "is one of the most effective treatments for people of all ages, backgrounds and abilities" (Pouya 2019:153). Engaging with the cultivation environment in horticultural therapy offers rewarding and upbeat encounters for individuals, involving both therapists and program participants. Additionally, horticultural therapy includes techniques used in a variety of fields such as therapeutic recreation, occupational therapy, psychology, education, vocational rehabilitation, and social work (Haller & Capra 2017).

According to Thansehwari et al. (2018), successful therapeutic gardens include the following principles (Fig. 1):

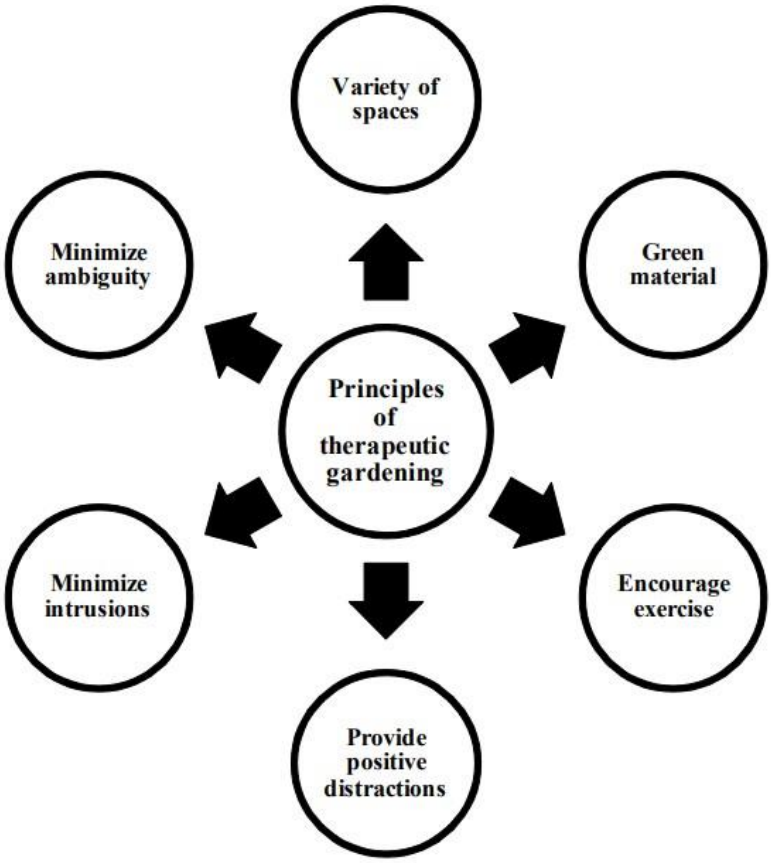

Fig. 1. Principles of therapeutic garden (Thansehwari et al. 2018:164)

2.2.1 Origin of Horticulture Therapy

Horticultural Therapy is an ancient practice,

> "In the 19th century, Dr. Benjamin Rush, a signer of the Declaration of Independence and recognized as the "Father of American Psychiatry,'' was the first to document the positive effect working in the garden had on individuals with mental illness.'' (AHTA n.d. b)

In the 1940s and 1950s, the rehabilitation of hospitalized war veterans played a key role in greatly expanding the acceptance of horticultural therapy. Moving beyond its initial focus on mental illness, the practice of horticultural therapy has gained greater reliability and has been adopted as a treatment option for a much broader spectrum of diagnoses.

According to the AHTA (n.d. a), HT is now widely acknowledged as a valuable and effective form of therapeutic intervention, which makes it nowadays rather a new profession.

2.2.2 Hospital Healing Garden/Therapeutic Garden

Therapeutic gardens are characterized as a non-pharmacological approach in the current health care system. Healing gardens are indoor or outdoor nature-oriented spaces with the purpose of creating a peaceful area for physical comfort, mainly used for physical therapy or horticultural therapy programs which may include both horticultural and non-horticultural activities (Thaneshwari et al. 2018).

A healing garden should create the opportunity to involve patients to work with relatives or friends, and therapist staff, in different activities.

> "Horticultural therapists bring unique and multidisciplinary skills to the process of change, emphasize the strengths in those served, and offer an intimate connection with nature through engagement in gardening" (Capra 2019:4)

For instance, patients can contribute by planting flower plant beds, watering and tending plants, harvesting and communicating. One of the many attitudes of those activities are diminishing the levels of tension, enhancing mood, mitigating stress, and increasing satisfaction. Additionally, seeing the nature of plants is connected to pain relief (Park & Mattson 2009).

It is important to remamber that therapeutic space can be made in public, as also in private space.

In accordance with Söderback et al. (2004) perspective, a correctly organized space created by a landscape designer should include a few important aspects. To begin, the vegetation selected is an important aspect of the garden. The focus should be on species of flowers, trees, and bushes that are visually appealing. For instance, plants in the garden beds should bloom during different seasons, ensuring leafy vegetation and colors are present year-round to engage patients. Additionally, the

vegetation should represent a variety of colors and shapes, which positively influence human perception by being more visually appealing. Moreover, the vegetation should attract butterflies and other insects. Encouraging birds can benefit patients with the sounds of bird song, which can calm down patients. To further soothe patients, healing gardens should include water features. Splash or small ponds will reflect the sky, brightening the area and improving people's mood. A source of running water will bring mollify sounds, giving an effect of calmness and relaxation. The entire design should invite one to visit, giving a sense of security and physical comfort. The area needs to bring calmness and quiet, giving visitors the chance to hear bird songs and water splash, allowing patients to enjoy the space and relax.

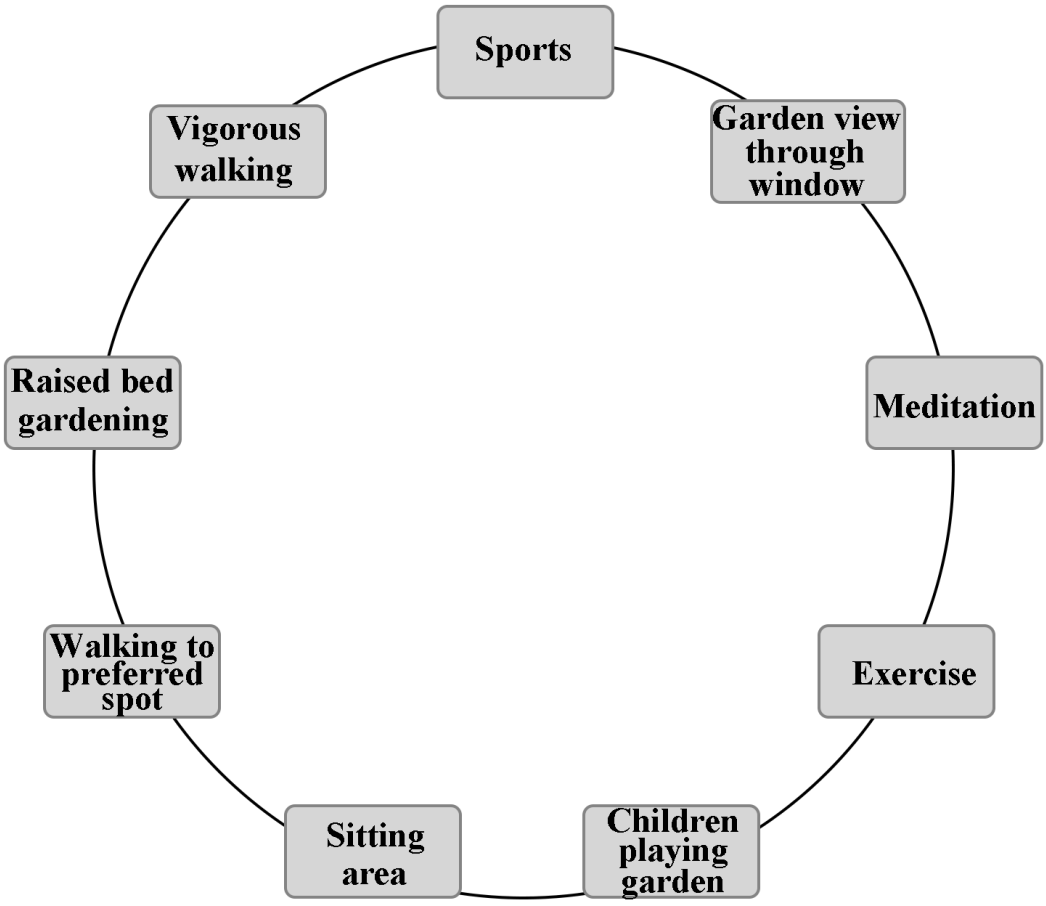

Fig. 2. Potential activities performed in a therapeutic garden (Thansehwari et al. 2018:163).

2.2.3 Variety of Treatment and Therapy Sessions of Horticulture Therapy

Four main kinds of horticultural therapy programs exist: horticultural therapy, vocational horticulture, therapeutic horticulture, and social horticulture (Haller & Capra 2017). In this paper, I will focus only on horticulture therapy.

Hagedorn (1995) states that there are five focuses for the "applied use of activities'': product, process, competent performance, the individual interacting with others, and the individual interacting with the environment. Each of these approaches is worthwhile in HT practice. "Product'' as a meaning of final result should be bringing the motivation in the participant. The whole process needs to give them the feeling that their participation is worthwhile, and what they are doing has a meaning. A focus on the "process'' stated as a process of activity, can elicit improved mood or attention, by taking part in the process of gardening, and other activities. As a third focus "competent performance'', patients can begin to improve self-concepts and break negative cycles of real or perceived abilities and control. These mentioned changes can be groundbreaking for psychotherapy, for example, can help patients become more receptive to other therapeutic interventions and make progress, which will help in the healing process. As the last ones "the individual interacting with others, and the individual interacting with the environment'', HT programs could be conducted in different ways for example individually or in groups, including guidance by a therapist (Scott et al. 2015). It can be helpful for patients to include the third person, such as families, friends and other people. That can create the possibility to learn how to work with different environments and other people, or how to improve social skills.

Every variety of treatment or activities should be individualized and based on prioritized needs or concerns of individuals. Haller and Capra (2017) mentioned that in some settings, therapists need to modify this process in order to fit in with existing methods. HT should be personalized and based on concerns and goals that we want to receive.

The process of horticulture therapy can be passive or active. An example of passive therapy can be viewing photographs, slides, and videos of outdoor nature and garden scenes. Additionally reaching solace or relief by envisaging natural scenes of water, sky, flowers, grass, trees, and so on (Söderback et al. 2004).
The addition of indoor plants can improve the hospital's indoor environment (Thanseshwari et al. 2018). Having interactive activities, which involve using an open window to look at gardens, listening to bird songs or sounds of nature, and potting plants could be included in horticultural therapy (Scott et al. 2015). This kind of treatment is very helpful for patients who cannot or don't want to go out, to participate in outside activities. Some symptoms of depression, anxiety, or PTSD like feelings of emptiness, social anxiety, or pessimistic thoughts, make it impossible to find the strength to leave their comfort zone. Moreover, some of the

medical facilities don’t have the possibility to create suitable conditions for outdoor treatment. That’s why it is so important to create any kind of possibility that patients could find any connection with nature, and help them mitigate symptoms of their disorders.

Active horticulture therapy is characterized by active participation in activities. Most of the tasks are conducted outdoors, in fresh air. According to Haller and Capra (2017) there are a few following rules:

- The activity is a tool for treatment,
- The type of the program influences the selection of activities or tasks,
- Treatment issues/goals are paramount considerations for choosing what to do,
- Participants each have varied backgrounds, skills, and interests.

The wellness outdoor program includes tasks such as harvesting, transplanting, fertilizing, watering, and so on. These activities provide opportunities for learning new leisure skills.

2.2.4 Effects of Horticulture Therapy

According to Hung-Ming (2021), “The effect size of HT on mental health was medium (0.55). The included studies had no negative effects on mental health.’’. Looking through the rest of the literature no sources were saying that horticultural therapy could bring any negative effects. That’s why the rest of the paper will focus only on the positive effects of horticultural therapy.

Following the principles of attention restoration theory, engagement in horticultural therapy program activities entails connecting with plants and nature. This is designed to shift focus away from negative emotions, fostering a decrease in feelings of depression and anxiety. Zhou and Zeng (2023) stated that horticultural therapy techniques can help improve memory and social skills, and increase feelings of purpose, empathy, and emotional regulation. Gardening tasks such as weeding, planting, and caring can bring distraction from the symptoms and increase cognitive abilities. Working in a group helps to socialize with other people.

Being active and busy with tasks is promoting patients' establishment of concepts of work and time. Moreover, such occupation is bringing distraction from the symptoms for example anxiety and control inactivity.

> ‘’Further research results show a very high likelihood of reduced stress and anxiety, improvement of patient satisfaction, a high likelihood of sleep improvement and a moderate likelihood of pain reduction’’ (Söderback et al. 2004:6)

3. Results and Discussion

3.1 Structure of the results

The overall structure of the result is organized into four main categories and their subcategories (see Table 1). Each of them adress different mental health conditions, depression, anxiety, PTSD and ASD, and explore the potential benefits of horticulture therapy in their treatment.

The differences in the subcategories within each main category are due to the different characteristics, symptoms, and treatment approaches associated with each mental disorder. Each major category, such as depression, anxiety, PTSD, and ASD represents a unique set of challenges and manifestations. To tailored approaches are required for understanding, addressing, and treating these conditions. The intention is to provide a comprehensive overview, acknowledging the diversity of challenges within mental disorders.

Table 1. The overall structure of the result

Section 3.2: Depression

- Subsection 3.2.1 Characteristics and Symptoms of Depression
    - Describes depression as an affective disorder with abnormal displays of mood.
    - Highlights visible symptoms, such as disturbances in mood and loss of interest.
    - Discusses difficulties related to mental processes such as concentration and decision-making.
- Subsection 3.2.2 Horticulture Therapy Treatment for Depression and its Positive Effects
    - Introduces horticulture therapy as a behavioral activation strategy.
    - Mentions the positive impact of active horticulture therapy on reducing symptoms of depression.

- Refers to the Attention Restoration Theory and its connection to the HT.

Section 3.3 Anxiety Disorder

- Subsection 3.3.1 Characteristics and Symptoms of Anxiety Disorder
  - Defines anxiety disorders
  - Describes various types of anxiety disorders
- Subsection 3.3.2 Depression in Anxiety Disorder
  - Discusses the coexistence of major depression in anxiety disorder.
- Subsection 3.3.3 Horticulture Therapy Treatment for Anxiety and its Positive Effects
  - Explores studies regarding the beneficial impacts of HT in reducing anxiety.
  - Discusses the role of nature in reducing anxiety and negative emotions.

Section 3.4 Post-traumatic Stress Disorder (PTSD)

- Subsection 3.4.1 Characteristics and Symptoms of PTSD
  - Describes PTSD as a mental disorder influenced by environmental factors.
  - Discusses traumatic events and their subsequent consequences.
- Subsection 3.4.2 Horticulture Therapy Treatment for PTSD and its Positive Effects
  - Explores the prevalence of PTSD and the examples of HT activities.
  - Highlights the application of horticulture therapy for firefighters and veterans.

Section 3.5: Autism Spectrum Disorder (ASD)

- Subsection 3.5.1 Characteristics and Symptoms of ASD
  - Defines ASD as neurobehavioral disorders.
- Subsection 3.5.2 Behavioral and Psychiatric Observations in Autism, Alluding to Mental Illnesses
  - Discusses the connection between ASD, depression and anxiety.
- Subsection 3.5.3 Horticulture Therapy Treatment for Autism and its Positive Effects
  - Explores the use of horticulture therapy in treating ASD.
  - Describes a horticulture therapy program and activities for individuals with ASD and its positive effects.

3.2 Depression

3.2.1 Characteristics and Symptoms

According to Hammen and Watkins (2018:5) “Depression is a universal, timeless and ageless human affliction.’’. Personal experiences may be different for every person struggling with depression, but all share features of the syndrome.

As Hammen and Watkins mention, depression is called an affective disorder, it is characterized by abnormal expressions of mood or affect, with such manifestations serving as a defining characteristic. The most visible symptom of depression is a disturbance of mood, including sadness, anger, irritability, and loss of interest. Furthermore, not all people with depression manifest those symptoms, “Instead, they may report feeling loss of interest or pleasure, a feeling of ‘blah’, listless, apathy’’ (Hammen & Watkins 2018:7). Most of the typical activities such as social interaction with friends or family, work, recreation don't seem enjoyable anymore.

“In addition to negativistic thinking, depression is often marked by difficulties in mental processes involving concentration, decision-making and memory’’ (Hammen & Watkins 2018:9). People struggling with depression may find it enormously difficult to make even simple decisions, focus for example on reading or watching television, and memory may be impaired.

3.2.2 Horticulture Therapy Treatment for Depression and its Positive Effects

Therapeutic gardening is considered as a general behavioral activation strategy and it is assumed that the activities included in HT will often be experienced as pleasant. It is hypothesized that general activation will contribute to the experience of socialization and pleasure (Gonzales 2010). Behavioral activation involves combining positive reinforcement activities with psychotherapy sessions to deal with depression. That’s why outdoor activities especially will influence common symptoms. Horticultural therapy was regularly adopted as a nonpharmacological treatment for depression (Detweiler et al. 2015). Behavioral activation involves combining positive reinforcement activities with psychotherapy sessions to deal with depression. According to Najja et al. (2018), horticulture therapy has been used to decrease psychological symptoms, and increase organizational function, as well as the memory of males who are chronically depressed.

Kaplan and Kaplan (1989) came with up the Attention Restoration Theory, that nature possesses the ability to renew attention after exerting mental energy. The theory itself is not about horticulture therapy, but it can be helpful to understand how HT can influence depression and bring benefits.

> ‘‘The process of renewing, recovering, or reestablishing physical, psychological, and social resources or capabilities diminished in ongoing efforts to meet adaptive demands’’ (Hartig 2004:273)

In conformity with Attention Restoration Theory, there are four key elements involved in experiencing restoration of the environment (Kaplan & Kaplan 1989). ART suggests that recovery from attention fatigue occurs when a person distances themselves physically or mentally from goals, tasks, and routine attention. To restore attention there needs to be a shift of attention, including an effortless and interest-based focus on the environment. This change allows the person to relax the inhibitory mechanism required for effortful, directed attention. The experience may be prolonged if the environment is perceived as rich in stimuli, well organized, and offering ample opportunities for exploration. Additionally, the theory emphasizes the importance of matching the individual's inclinations at the time, environmental requirements, and environmental supports for intended actions. Therefore, interest-based focus on the environment is identified as a central restorative element, supported by other aspects of interaction with the environment.

According to studies by Xu et al. (2023), the impact of horticulture therapy was shaped by the nature of the activities involved. They found that active HT as participatory activities, for example, watering, harvesting, or planting, were more helpful in reducing depression than passive HT as observational activities. People participating in active tasks find it easier to improve their physical condition, self-confidence, and self-esteem, start changing their monotonous life patterns, and divert attention from harmful emotions, such as anxiety and sadness. It's important to highlight that the outcomes of depression-reduction efforts are widely influenced by the environmental settings, activities, and duration of horticultural interventions. Townsend (2006) mentioned that people struggling with depression can experience a range of tactile sensations during participatory activities involving various plants. These sensations, including temperature, hardness, and texture, have the potential to stimulate intuitive and motor functions in the cerebral cortex, leading to feelings of comfort and pleasure.

3.3 Anxiety Disorder

3.3.1 Characteristics and Symptoms

According to WHO (2022b), anxiety disorders are characterized by chronic, excessive fear and worry, and associated behavioral disruptions. Those symptoms are severe enough to cause substantial distress or notable impairment in daily functioning.

There are various types of anxiety disorders: generalized anxiety disorder (marked by persistent worry), panic disorder, social anxiety disorder, separation anxiety disorder, and others.

Social anxiety disorder is characterized by an extreme fear of social situations in which the person may be looked over by others. ‘‘The person fears being negatively evaluated - for example, being judged as anxious, weak, stupid, boring, or unlikable. ’’ (Leichsenring & Leweke 2017:1). Individuals with social anxiety disorder often experience significant distress and may go to great lengths to avoid social interactions or endure them with intense anxiety.

Lang (1968) classified the symptoms of fear and anxiety into a system of three responses: verbal-subjective, overt motor acts, and somato-visceral activity. Within this framework, in line with the conceptualization of anxiety and fear, the symptoms of anxiety include worry (verbal-subjective), avoidance (overt motor acts), and muscle tension (somato-visceral activity). Fear symptoms include thoughts of imminent threat (verbal-subjective), escape (overt motor), and a strong autonomic surge resulting in physical symptoms such as sweating, trembling, heart palpitations, and nausea (somato-visceral).

3.3.2 Depression in Anxiety Disorder

As stated by Stein and Sareen (2015), major depression frequently coexists as a concurrent condition, although it may be difficult to differentiate from generalized anxiety disorder because many symptoms can overlap. Patients diagnosed with generalized anxiety disorder often describe a sense of helplessness, while those dealing with major depression may feel hopeless. However, persons struggling with anxiety disorder are at increased risk for deliberate self-harm, including suicide attempts (Chartrand et al. 2011). Moreover, Stein and Sareen (2015) mention that generalized anxiety disorder often serves as an underlying condition characterized by variation, with episodes of major depression surfacing during particularly stressful life circumstances in many patients. This co-occurrence of generalized anxiety disorder and major depression is sometimes referred to as ‘‘anxious depressio’’.

3.3.3 Horticulture Therapy Treatment for Anxiety and its Positive Effects

Stein and Sareen (2015) stated that various psychotherapeutic approaches have been assessed through randomized, controlled trials for generalized anxiety disorder. These included cognitive behavioral therapy, psychodynamic therapies (which address underlying conflicts that are thought to be the source of anxiety), mindfulness-based therapies (including acceptance and commitment therapy, which encourages a focus on the present and on core values that transcend

symptoms and illness), and applied relaxation therapy (which teaches approaches to induce a relaxed state). While horticulture therapy may not directly cure anxiety disorders, it can be a valuable and enjoyable addition to a comprehensive treatment plan. People suffering from related problems need to work closely with mental health specialists to determine the most advanced solutions and effective devices that meet their needs.

Rodiek (2002) studied the impact of an outdoor garden on the mood and stress levels of older people. The study found that cortisol levels were significantly lower in the garden compared to the interior, suggesting that the presence of the garden helped to reduce anxiety among older people. As Grahn et al. (2021) mentioned, the Calm and Connection Theory conditions of HT provide an opportunity to emit oxytocin, which reduces stress levels, as trust and well-being levels rise, which, in turn, fosters a stronger connection or attachment to the place. On the other hand, the results from the State-Trait Anxiety Inventory scores suggest that horticultural activities are associated with reduced levels of negative emotions like tension, anxiety, worry, and unhappiness (Park et al. 2011). This supplies additional evidence supporting the positive effects of horticultural activities on mental health. In line with other studies, findings, the results underscore that exposure to natural stimuli is linked to minimizing the chance of experiencing anxiety and negative emotions among participants.

The link between horticultural therapy and mental health is based on the idea that gardening promotes overall well-being.According to ART, HT program activities entail connecting with plants and nature to move attention away from negative emotions, ultimately reducing feelings of anxiety (Kenmochi et al. 2019). Moreover, the key to fighting an anxiety disorder combating negative and stress-producing thoughts and by getting your head busy, and calm. As von Lindern (2017) mentioned, taking up such recreational activities surrounded by nature generates a feeling of detachment from everyday life and the urban environment. In addition, activities with plant materials, and organized sensory experiences bring a lot of positive effects, such as calmness, relaxation, and help to clear the mind (Cipriani et al. 2017). This distraction plays a crucial role in improving mental well-being and reducing mental fatigue.

Social anxiety disorder is a disorder characterized by fear of social situations, it is important to implement at some point a group therapy. The key therapeutic element associated with psychotherapy in groups is group cohesiveness (Gonzales 2010). According to Lese and MacNair-Semands (2000), collective solidarity is assumed to include a sense of belonging, a feeling of acceptance, reciprocal trust, and group cooperation. Involving in collective activities, individuals recognize that they share their struggles with others, knowing they are not alone with their disorder. Experiencing acceptance and a sense of social and natural connectedness can help individuals with mental health problems to integrate socially and improve

their communication skills through shared reflection (Howarth et al. 2016). Guiding group therapy sessions, especially in the created HT environment, can benefit as a calming space, full of feeling safe and secure, which will help to calm down and open up the group.

3.4 Post-traumatic Stress Disorder

3.4.1 Characteristics and Symptoms

Post-traumatic stress disorder (PTSD) is a mental disorder that is influenced by well-documented environmental factors. However, there is considerable variation between individuals in their threshold for the severity of stress associated with PTSD as well as in the evidence from twin studies of genetic influences on stress reactivity in triggering PTSD (World Health Organization 2022b). Various conditions can expose trauma, including trauma during childhood, sexual abuse and assault, serious injury, cataclysmic events, and special professions like firefighters or in the military.

According to the WHO (1993), a traumatic event is specifically defined by an immediate subjective experience of distress during and after the event, characterized by negative emotions of fear, helplessness, revulsion, and/or horror. Moreover Spiegel et al. (2000) stated that as a consequence of the traumatic event, traumatic and peritraumatic dissociation presents as a decrease in consciousness and alterations in temporospatial perception, such as time dilation and perception of prolonged silence. It includes feelings of derealization (feeling that surroundings are unreal with altered sensory perceptions), depersonalization (out-of-body experience and undergoing body fragmentation), automatic motor behaviors (adaptive or otherwise), and partial or complete dissociative amnesia. Other immediate clinical manifestations involve restlessness, panicky flight, or shock and stupor. Shortly thereafter, anxiety often becomes predominant, although a confused state and psychotic disturbances are also possible.

While flashbacks are frequent in the hours and days immediately following the trauma, they typically subside for a latency period ranging from several days to several weeks (Andrews et al. 2007). This phase, characterized by mild symptoms, concludes with a return of flashbacks, triggered by implicit environmental cues or conscious thoughts evoking the trauma. Waddington et al. (2003) mentioned that occasionally, a stressor linked to a positive event, seemingly unrelated to the initial traumatic experience, may also be the trigger. Thereafter, chronic symptomatology may oscillate between periods of partial remission and active post-traumatic symptoms.

The pathogenic sign of PTSD involves reliving the traumatic incident, and re-experiencing the same distress, perceptions, emotions, and dissociation that were

originally experienced (Auxéméry 2018). Internal sensations of anxiety and negative thoughts are also recalled. These instances may manifest during sleep as traumatic nightmares and during waking periods as flashbacks. According to American Psychiatric Association (1994), additional expressions of the condition may include intrusive memories perceived as distinct from the original event, mental ruminations about the event, delusions of re-experiencing the event by recognising elements of it in the environment, elementary motor phenomena mirroring the motor response at the time of the event, and repetitive behaviors such as fugue states, crying, self-harm, or aggression.

Kessler et al. (1995) stated that people struggling with post-traumatic stress disorder commonly meet the criteria for other psychiatric disorders. A recent survey in epidemiology suggests that about 16% of patients with PTSD have one other psychiatric diagnosis, 17% have two other psychiatric diagnoses, and nearly 50% have three or more supplementary psychiatric diagnoses. These data indicate that individuals with PTSD commonly experience comorbidity with other psychiatric diagnoses for example depression or anxiety, making it more of a rule rather than the exception.

3.4.2 Horticulture Therapy Treatment for Post-traumatic Stress Disorder and its Positive Effects

Global epidemiological research found that 70% of people have experienced one or more traumatic events during their lifetime (Benjet et al. 2016), and 4% of the population have suffered from post-traumatic stress disorder following such experiences (Kessler et al. 2017). One of the most experiencing PTSD groups is firefighters. They are one of the most exposed groups, from emergency groups to traumatic events. These may encompass transport accidents, violent deaths, significant workplace or domestic accidents, or severe human suffering (Serrano-Ibáñez et al. 2022). Another exposed group from emergency groups is veterans. According to Mottershead and Ghisoni (2021), non-pharmacological interventions such as horticulture therapy are becoming more popular as a means to address the social and personal needs of veterans struggling with PTSD. Growing and sharing food together, reduces loneliness, the physical and mental health impacts of mental illness. Additionally, engaging in HT provides physical, neurological, and psychological rehabilitation, concurrently enhancing motor skills, strength, and endurance. Moreover, being outside in the natural environment has been shown to decrease stress levels and enhance concentration and cognitive function. (Cipriani et al. 2017). This has been recognized as a beneficial approach for veterans to start going back to civilian life. Dr. Rusk created a rehabilitation method that was so successful that it was adopted by the military (Blum & Fee 2008). According to the method, patients were discouraged from remaining in bed, instead, they were urged

to get up and start a re-conditioning program aimed at fostering remaining capabilities.

Reisman (2016) states that with the rising prevalence of PTSD, there is still a need to explore diverse therapeutic approaches including complementary alternative medicine.

3.5 Autism Spectrum Disorder

3.5.1 Characteristics and Symptoms

> ‘‘Autism spectrum disorder (ASD) consists of a group of heterogeneous genetic neurobehavioral disorders associated with developmental impairments in social communication skills and stereotypic, rigid or repetitive behaviors’’ (Genovese & Butler 2023)

According to WHO (2022b), impactful treatment options are psychosocial interventions, behavioral interventions, occupational, speech therapy, and pharmacotherapy, in individual cases. Genovese and Butler (2023) stated that the etiology of ASD involves a complex interplay of genetic inheritance and environmental factors, which are additionally influenced by epigenetics. Genetic factors influencing behavioral and psychiatric conditions in autism have meaningful effects for clinical assessment, counseling, diagnoses, therapeutic interventions, and treatment strategies. It is important to select therapy individually to the needs of the diagnosed person. One of those impactful therapies is horticultural therapy, that can be combined with someone.

Mazefsky and White (2014) described that autistic individuals often experience increased levels of irritability, frustration or angriness, and problem behaviors for example: physical aggression toward others, self-injurious behaviors, or property destruction. Limitations in emotional self-regulation, such as using dysfunctional emotion regulation strategies such as perseveration or shutting down. Moreover, deficiencies in social cognition including inaccurate assessments or misinterpreting social intent, can contribute to the development of aggressive behaviors.

Self-injurious behaviors (SIBs) refer to actions where an individual intentionally inflicts physical harm upon themselves. Examples include hitting, pinching, scratching, biting, head banging, and hair pulling. On the flip side, stereotyped self-stimulatory behaviors typically involve repetitive or ritualistic movements, gestures, or vocalizations, like the repetition of sounds, words, or phrases (Minshawi et al. 2018). These behaviors may manifest as persistent or episodic, spontaneous or repetitive, often lacking a discernible cause. They might occur within specific contexts or in response to certain triggers or seemingly without any identified reason. Factors that elevate the risk of SIBs include intellectual disability,

limited communication skills, lower adaptive functioning, impaired impulse control, sensory processing deficits, or chronic sleep problems.

3.5.2 Behavioral and Psychiatric Observations in Autism, Alluding to Mental Illnesses

An increasing volume of research indicates a consistent connection between Autism Spectrum Disorder and various challenges such as self-injurious behaviors, anxiety, depression, obsessive-compulsive disorder, mood disorders, and suicidality. According to Genovese and Ellerbeck (2022), the symptoms linked to several behavioral and psychiatric disorders often observed in individuals with ASD can intersect with the fundamental characteristics of ASD itself, leading to difficulties in diagnosis. Rosen et al. (2017) stated that the risk for concurrent behavioral and psychiatric disorders is influenced by individual differences including age, intellectual functioning, sex, and genetic factors.

3.5.2.1 Depression Disorder in ASD

Genovese and Butler (2023), stated that a population-based cohort study exposed an approximately two-fold risk of major depression in young adults with autism. The study additionally observed that major depressive disorder (MDD) is more common for those with ASD than it is in their non-autistic siblings. Especially autism, when the intellectual disability is not present, is associated with elevated rates of major depression. The likely explanation for this is the relation between shared genetic and environmental factors (Rai et al. 2018). Chandrasekhar and Sikich (2015), mentioned that recognizing major depression in ASD can be challenging due to shared symptoms such as sadness, anger, or irritability between autism and depression.

3.5.2.1 Anxiety Disorder in ASD

Kanner (1943) stated that excessive anxiety in individuals with autism often experiences heightened anxiety around unanticipated changes in their surroundings, unexpected events, or disruptions in their schedules. He views this behavior as driven by a strong desire to preserve consistency.

Among the anxiety disorders associated with ASD, the most prevalent ones include generalized anxiety disorder, followed by social anxiety disorder and separation anxiety disorder (Zaboski & Stroch 2018). According to van Steensel et al. (2011), diagnosing specific anxiety disorders alongside ASD can be clinically challenging due to overlapping features shared by both conditions.

Children with ASD often encounter emotional and behavioral challenges when they are overwhelmed by sensory stimulation (Genovese & Butler 2023).

Occupational therapy such as HT, has a calming effect thereby reducing sympathetic arousal in the child.

3.5.3 Horticulture Therapy Treatment for Autism and its Positive Effects

Söderback et al. (2004) emphasized the global use of horticultural therapy in various contexts. This includes applications in settings such as hospice care, acute care, interventions for sensory disorders and support for people with autism.

An example of HT program that was created by experts in child development, psychology, horticulture, landscaping, horticultural therapy, and special education (Genovese & Butler 2023). To the activities that they had included to the HT program are:

- Indoor activities like craft making using plants and plant based products, cooking with produce.
- Giving training on basic concepts of horticultural knowledge such as understanding soil, seeds, plant structure, propagation, and basic horticultural activities such as planting, watering, fertilizing, and harvesting.
- Outdoor activities like raising a horticultural therapy garden in the school, planting seeds, transplanting making and applying fertilizer, watering, harvesting, and observing plants insects.
- Horticultural therapy techniques like plant based meditation, hugging trees, visual imagination, talking to plants, watering using sponge, etc.

Genovese and Butler (2023) stated that the results after attending the HT program showed that emotional intelligence, including the utilization of emotions, recognition, and consideration of others' emotions, recognition and expression of their own emotions, emotional regulation, and impulse control significantly improved. Moreover, relationships with teachers, therapeutics, and peers are enhanced.

This success is primarily attributed to evoked varied feelings and authentic communication triggered among participants during HT activities. In addition, Beelaa and Thankappan (2021) stated that those activities are allowing children to naturally express their emotions and develop creativity. Horticultural therapy substantially reduces problematic behaviors such as discursiveness, social withdrawal, and fearfulness that impede interpersonal relationships, through experiences of touching and identifying vegetation.

Horticulture therapy can be combined with other therapies that can help a child with ASD to generalize skills, lessen hyper- or hypo-sensitivities and stress, increase motivation, and socialize, to name a few benefits (Flick 2012). The potential advantages include also calming quality of nature, the adaptability of

tasks, and the extensive range of applicable settings and materials is accessible and suitable regardless of functional abilities. Flick (2012) stated that based on the facts and the current understanding of autism spectrum disorder, HT can be very beneficial.

4. Concluding Remarks

This thesis analyzes peer-reviewed studies to investigate the effects of horticultural therapy and reflects on mental disorders. Chosen methods were occure, and selected literature answered for stated reaserch questions.

The horticultural therapy program employed diverse interventions, such as indoor and outdoor plant activities, along with plant-related arts and crafts. The incorporation of horticultural therapy by skilled therapists in healthcare environments has the potential to enhance the mental well-being of people struggling with mental disorders and help smoothly distract that individuals face during their illnesses (Scott el al. 2015). Additionally, integrates social and behavioral science with horticulture and the environment, showing an interdisciplinary approach to human development (Beela et al. 2010). The Calm and Connection Theory aspects of horticultural therapy offer a chance to release oxytocin, which reduces stress levels, as trust and well-being levels rise. This, in turn, promotes connection or attachment to the environment. Sources have shown that HT can bring a lot of positive effects for patients, for example: emotional regulation and impulse control, reducing levels of negative emotions like tension, anxiety, worry, or unhappiness. Moreover, teaching them how to regulate their symptoms, and showing some hope for improvement.

It is important to remember that every patient needs their own time to process the horticulture therapy. Some of them will react quickly, and some of them need more time to open up for this kind of treatment. The most crucial is to ensure a safe and understandable space, and it holds significance that an educated therapist will adapt treatment to the patient's needs.

Annually, with every year, there is growing curiosity in horticultural therapy research and more people are trying to explore and include horticultural therapy as an additional treatment. Consequently, it is important that therapists check the benefits of horticultural therapy and include them when they work with patients.

Moreover, there is a higher need for future research on horticultural therapy, and it is essential to perform more meticulously designed studies to reveal the specific types of environmental conditions and horticultural interventions that contribute to enhanced results (Xu et al. 2023). Subsequent research attempts should explore the implementation of horticultural activity programs with different age groups of

children and adults with randomized controlled trials studies to delve deeper into the advantages of such programs.

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