



Journal of Therapeutic Horticulture

AMERICAN HORTICULTURAL THERAPY ASSOCIATION

2023 VOLUME XXXIII | ISSUE 1

ISSN 2381-5337



AHTA JOURNAL OF THERAPEUTIC HORTICULTURE

2023 VOLUME XXXIII | ISSUE I

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Journal of Therapeutic Horticulture

Volume XXXIII, Number I

2023

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Bonsai: “A Life in Balance”. The Therapeutic Benefits of Growing Bonsai Trees.

Stephen Pack PhD



Introduction

According to Wichrowski et al. (2005) horticultural therapy is a process in which gardening activities, plants, and closeness to nature present opportunity for therapy and rehabilitation programs. One form of horticulture not widely considered as a form of therapy is that of creating bonsai trees. Few research studies exist currently. However, Ochiai et al. (2017) investigated whether viewing bonsai afforded self-induced mental relaxation amongst a group of male patients with spinal cord injury. The participants reported feeling significantly more comfortable, relaxed, and natural when viewing bonsai compared with a control condition. POMS scores for vigour were significantly higher when viewing bonsai, and scores for global 'total mood disturbance', 'tension-anxiety', 'depression', 'anger-hostility', and 'fatigue' were significantly lower when viewing bonsai. Using the same protocol Song et al. (2018) explored the therapeutic effects of bonsai for elderly people (aged 64–91 years) and demonstrated that viewing bonsai similarly induced physiological and psychological relaxation. Other studies have explored subjective experiences of creating bonsai. Hermann and Edwards (2021) demonstrated that for 255 skilled bonsai practitioners their practice provided meaningful healing qualities and promoted integral health (e.g., ecological, spiritual, and emotional awareness). Also, creativity, resilience, adaptability, and social, physical, and personal health improved. Hermann (2021), using bonsai lessons as a form of group therapy for 15 traumatised youths, demonstrated positive shifts in mental states. Creating bonsai represented positive metaphors for life, for "new beginnings" and "growing strong with it" (i.e., the bonsai) (p. 83). Working on bonsai during therapy enabled the youths to speak about their troubles without feeling judged which helped them to move past traumatic experiences.

Therefore, bonsai appears to offer participatory (e.g., pruning) and ornamental (e.g., viewing) therapeutic effects (e.g., improving mood state,

flow states, physical and mental relaxation, enhanced quality of life) in formal recovery and rehabilitation contexts. However, research evidence remains sparse. Consequently, the current study sought to explore: 1) why and how people began bonsai as a hobby and/or profession, 2) whether bonsai provided therapeutic qualities, and 3) the experiences of caring for bonsai amongst amateur and professional growers.

Method

Researcher's involvement

Prior to beginning this study I had been growing, and caring for, bonsai trees for eight years during which I had experienced very mixed success, had quickly amassed a relatively large number of bonsai, and had increasingly recognised a number of therapeutic benefits (particularly with respect to my experiences with anxiety). As a bonsai society member I discovered that such experiences were common and, during a particular casual discussion (regarding work-related stress) with some fellow society members, the possibility of a research study began to formulate in my mind. I was keen to 'capture' peoples' experiences, the passion, the dedication, the companionship, and the direct therapeutic benefits – things I had witnessed time and again. Above all else, bonsai seemed to be intricately rooted in many people's lives – as it had become in my life – as a form of 'therapy' for stress (amongst other things).

As a member of an academic sport science department I was unsure how a proposed study would be received but, based on what I repeatedly heard and observed within the bonsai community, I was convinced that this study was needed. I had a growing 'informal content analysis' of people's stories, anecdotes, and experiences circulating in my head, and this analysis became the basis for creating some broad questions which I hoped would give people scope to share stories about their life with bonsai. There were very few published

studies at that time and these didn't seem to capture what I was hearing and observing from the community (e.g. at bonsai society/club events, at annual shows), so there was plenty of scope for further research. And so I pressed ahead with the study using a survey (based on what I had heard and observed) which I believed would be the best method for capturing stories from the worldwide bonsai community.

Having collected the data I realised that I was analysing peoples' experiences whilst wearing two 'hats'; one 'hat' as a psychologist, and another 'hat' as a forest therapist (I'm certified with the ANFT and FTHub). I was 'seeing' common therapeutic benefits which could be explained via psychological mechanisms, and I was also 'seeing' therapeutic benefits as discussed within the forest therapy community and research literature. The combination of these two 'hats' became a comfortable blend which seemed to give some unique perspectives on life with bonsai and, indeed, on life itself. This blend of 'hats' also created a sense of acceptance and authenticity within me - I haven't quite figured out yet what this means for me. But one participant had stated that bonsai is "a life in balance", and as I write this paper my life has rarely seemed as balanced as it does right now.

Participants

254 bonsai clubs/societies/groups based in the UK, USA, Canada, South America, Australia, and New Zealand were contacted to determine interest in participating in the study.

161 amateur bonsai artists (ABA) subsequently participated. Of these participants, 155 divulged demographic data (UK: $n = 108$; USA: $n = 33$; Canada: $n = 9$; Mexico: $n = 1$; Australia: $n = 3$; New Zealand: $n = 1$). 28 described themselves as female and 127 as male. Years spent working with bonsai ranged from 1-62 years ($m = 20.8$ years). 117 participants divulged their age: (18-30 years: $n = 6$ / 30-40 years: $n = 6$ / 40-50 years: $n = 16$ / 50-60

years: $n = 20$ / 60-70 years: $n = 43$ / 70-80 years: $n = 22$ / 80-90 years; $n = 4$). Additionally, 11 professional bonsai artists (PBA) participated of which 9 divulged demographic data (UK: $n = 4$ / USA: $n = 5$), all described themselves as male (aged: 30-40 years: $n = 2$ / 40-50 years: $n = 5$ / 50-60 years: $n = 1$ / 60-70 years: $n = 1$). Years spent working with bonsai ranged from 30-61 years ($m = 35.2$ years).

Survey Instrument

A survey was constructed, using Qualtrics (Qualtrics, Provo, UT) online survey software, to gain breadth of response via convenience/opportunistic sampling and comprised demographic questions including age, country of residence, and years spent creating bonsai. A second section comprised six open-ended questions which focused on participants' experiences and the therapeutic possibilities of creating bonsai. Examples of questions are: a) Please describe how, and why, you got into doing bonsai? b) Please describe some of your best 'successes/failures' in bonsai e.g. what were you working on/trying to do, why, what happened, how long did it take, what was the outcome, how did you feel throughout the process? c) What is your opinion on the following statement?: 'Bonsai is a form of therapy', and d) What have you gained personally from doing bonsai? These questions were based upon existing literature (e.g., Hermann & Edwards, 2021; Hermann, 2021), the author's personal experiences of working with bonsai, and from discussions with fellow society members.

Procedure

Following receipt of institutional ethical approval, contacts for bonsai clubs/societies/groups worldwide were sent a briefing that outlined the research, the potential risks of participation and corresponding safeguards, an invitation to participate, and a URL (which also contained a further URL to the research briefing) to the online survey for distribution to members. Each

participant was deemed to have given consent by way of their completion of the survey.

Data Analysis

A thematic analysis was conducted using guidelines provided by Braun and Clarke (2013). Initially all open-ended responses per question were retrieved from Qualtrics, and reviewed by the author. Following Braun and Clarke (2006), the first step in analysis involved reading all survey responses to gain a 'feel' for the data and to create a list of key words that indicated preliminary themes. Following Patton (2014), and Braun and Clarke (2006), five further steps were involved in data analysis: a) generation of initial codes (subtheme), b) searching for themes, c) reviewing themes, d) defining and naming themes, and e) constructing a report. Analysis involved an iterative process of moving between the complete transcript, paragraphs, and sentences (within and between each participant) to construct emerging themes in detail (Braun & Clarke, 2006).

Results and Discussion

Nine major themes emerged from the analysis and are presented below together with representative verbatim quotes: 1) how I got into bonsai, 2) a bonsai is for life, 3) an authentic life through bonsai, 4) a personal medicine, 5) patience, 6) quiet enjoyment, 7) people connections, 8) nature connections, and 9) one of the family.

How I got into bonsai

Most participants described humble beginnings and often they had entered the world of bonsai with mixed success:

"As a child I found a small black and white photo of a Japanese Bonsai in one of my father's gardening books fascinating. My wife then gave me a tree as a present in about 1986" (ABA).

"My initial foray into Bonsai was probably about

10 years ago when I was given a garden centre 'indoor' Chinese elm. This took several months to die entirely due to inappropriate care although I was unaware of this at the time" (ABA).

Other participants had inherited bonsai, had grown them from seed out of curiosity, been inspired by friends and/or by attending a bonsai show, or had begun the hobby to spend time with family members also involved in the hobby. Some were interested in Japanese culture, and described foreign travels and how this led to them becoming involved in bonsai. There had also been admiration of the fictional movie character 'Mr Miyagi' (i.e., 'The Karate Kid', 1984):

"My first exposure to them was through the original Karate Kid movie!! The image of the serene master patiently attending to these staggeringly beautiful, almost other worldly trees, was very powerful" (PBA).

The ethereal, and symbolic, aspects of bonsai appealed to many participants. As Doyle et al. (2019) stated, bonsai draw people to them due to their sense of mystery, metaphor, and awe. Regardless of how participants had begun the hobby, bonsai had rapidly become a consuming activity. For some, however, the discovery of bonsai was a "slow-burn" (ABA):

"My partner bought me one after I'd spent years looking at trees in garden centres. I was worried about looking after one, but she was fed up with me constantly looking at them, so bought me one and said here you go get on with it" (ABA).

Other participants considered that they were part of creating, and sustaining, a family legacy:

"My mother-in-law took great pleasure in growing little trees in pots - even made her own pots, she gave me some of these trees and that got me started" (ABA).

Doyle et al. (2019) suggested that bonsai reflect

familial history, and contributing to this history was considered as “something big” (ABA). Therefore, there was a range of early ‘beginnings’ in bonsai. However, for all participants, bonsai had rapidly become a consuming, and lifelong, activity.

A bonsai is for life

All participants had developed meaningful long-term relationships with bonsai (this was reflected in the number of bonsai cared for, the daily care of bonsai, and years spent caring for bonsai):

“Bonsai is very important to me. I work with my trees daily. I have about 150 at various stages of development. Some I have been working on from 20+ years” (ABA).

“I acquired a Black Pine 30 years ago and 2 years ago it was finally put into a bonsai pot. It’s slowly becoming a lovely bonsai” (ABA).

There was an ‘addictive quality’ to bonsai, and most participants had amassed large numbers of bonsai which often required a daily commitment of 2+ hours care (e.g., watering, styling, pruning, viewing, combatting pests and diseases, building stands and shelters). However, some spent considerably more time regardless of the season. The fondness for their bonsai extended to handing over care whilst on vacation or business trips. However, there was a great responsibility in doing so: “Don’t trust many people to care for them in my absence” (ABA). When not present with their bonsai time was often spent thinking about them, and planning the next stage/s of development – this was motivating and perceived as a mutual journey: “I look forward to living another ten years to watch it take more shape” (ABA). Bonsai also provided opportunity for associated hobbies (e.g., making bonsai pots, attending shows, authoring books, teaching others), therefore opportunity to broaden horizons, which deepened understanding of bonsai.

For some, bonsai had become a professional venture:

“I was in Japan on holiday longing for nature in a concrete heavy city, and when I visited a Japanese bonsai nursery in Tokyo my journey into Bonsai began. I started going to a weekend school and I later started a full time six year apprenticeship at that nursery” (PBA).

“My father asked me when I was unhappy at my last corporate job ‘If money wasn’t an issue and you could do anything you want what would you do?’ I told him collect trees and do bonsai for a living. He replied, ‘then that’s what you should do.’ So I did” (PBA).

“On a day off I went to explore the sub-alpine region of a local mountain. Up at 10,000ft I bumped into a Forest Ranger and he showed me the oldest living tree, a Bristlecone Pine. I was amazed seeing a 4,000 year old tree. That was in 1981. I discovered a small bonsai retail store and they were selling a magazine called ‘Bonsai Today’, I subscribed, and I went back to school and became a Horticulturist and Arborist” (PBA).

Bonsai had become a ‘calling in life’, and the participants had become lifelong custodians of miniature trees (sometimes “ancient magnificent trees”; PBA). However, for some this responsibility had become burdensome against other commitments (e.g., family, career, club/society role/s), and they had regretfully reduced their collection: “When one becomes proficient it is easy to end up with too many specimens and a chore attitude can return due to having to look after large numbers” (ABA). Yet, the allure of bonsai remained: “There is an emotional attachment to the trees that is hard to explain. You become a caretaker as the trees can live a very long time” (ABA). Another participant described bonsai as: “My life” (ABA). Therefore, bonsai had become deeply embedded in participants’ lives, there was a deep sense of respect and responsibility toward bonsai, and most had experienced deep changes in how they lived their lives.

An authentic life through bonsai

For many participants bonsai had facilitated opportunity to become, and live as, their 'true self' based on a set of values informed by routine, respect, and duty of care:

"I completed a full apprenticeship in Japan and gained recognition from my peers, it took around six long years and I felt absolutely every emotion under the sun. The outcome was that I grew incredibly as a person and was able to pursue bonsai as a career" (PBA).

"Lifelong purpose, a value system that is based on respect for living things and an understanding of what commitment and dedication is all about" (ABA).

The care required by bonsai and the physical and emotional closeness and observation when providing this care had created great respect for bonsai – which had many things to 'teach' their custodians including the virtues needed to overcome adversity: "Respect...for nature and the conditions in adversity that make us strong and unique" (ABA). Caring for bonsai appeared to instil a fresh sense of morality. Nartova-Bochaver and Muhortova (2020) demonstrated that moral motives are connected with a positive attitude toward flora, and that an individual's ecological world view embodies the moral qualities of that person. However, the authors concluded that natural and social identities are not necessarily harmonised, and that "respect for nature does not mean respect for the social reality" (p. 2028). However, it seemed that natural (ecological) and social identities had become harmonised and bonsai had become a 'measure' of morality:

"Understanding the trees tells me a lot about the people that are working with them. This insight does help to figure out if to trust or not some people" (ABA).

"For me, if you give trees attention, and give them

what they need and want, they won't let you down. Unlike people" (ABA).

Bonsai had instilled a set of ethical, moral, and ideological values, and structure to life guided by what had become meaningful in life. This set of values centred upon the act of care-giving:

"Every relationship between a human and another living creature is a constant ongoing connection. Bonsai are forcing us to understand the needs of a fragile living creature that doesn't either speak, move or interact. In the case of bonsai, the life of the trees depends upon the actions of the caretaker" (PBA).

The skills and qualities needed to create bonsai were considered a reflection of a person's essence. Some participants offered a philosophical perspective on their relationship with bonsai and life in general. One profoundly attributed "Everything I have now" to bonsai:

"Emotional stability, the insight into life that I was looking for as a young man, a reason to get out of bed in the morning. Appreciation of my place in the universe. Understanding that I will die. Being part of the process is more important than the final result" (ABA).

"Can't explain the whole thing, there is so much to tell. Friendships. Memories. Nature connection. Bonsai is mindfulness. Impermanence – keeping things in perspective, being in the moment, appreciation of life" (ABA).

For some participants bonsai presented a humbling response to early-life existential nihilistic angst. A deep appreciation of the value of life had emerged alongside an awareness, and acceptance, of their own impermanence - this provided a sense of peace, calm, and preparedness for life and to engage with life. Others drew comparison between their life-cycle and that of bonsai, and the impermanence of seasons, and therefore depicted bonsai as a metaphor for life: "Each tree

has its own 'story' and symbolises this 'story' e.g. battered by wind, clinging to a cliff-face etc" (ABA). Consequently, bonsai presented messages about creation, growth, balance, harmony, and thriving. Doyle et al. (2019) suggested that a deep focus on bonsai affords an understanding of how the custodian is like the tree, and "the ways that we are too pruned, and wired by life" (p. 107). Similarly, Hermann and Edwards (2021) illustrated that bonsai presented narrative metaphors that were effective in revealing and increasing understanding, and acceptance of, self and traumatic personal experiences. Furthermore, Mansourian (2021) stated that bonsai "helps give a visceral experience of the passage of time", and a sense of purpose in times of "chaotic nothingness" (p. 22). It also seemed that a greater sense of self-congruence emerged as a result of creating bonsai: "We can learn a lot about ourself from the practise of the art" (ABA). Bonsai also presented a spiritual journey: "It is a constant source of spiritual renewal" (ABA). Another stated: "It combines art, the Japanese aesthetic, science, and spirituality" (PBA).

Overall, many participants observed life relative to bonsai and as their experience and knowledge had grown so had their self-understanding. Nguyen (2007) stated that bonsai is a way of living, and a "form of art that spiritually connects the crafter of the bonsai and the bonsai itself with nature" (p. 30). Contact with the world of trees (including bonsai) changes people, it affects their identity (Garner, 2004; Mansourian, 2021). "From a Western perspective, bonsai falls between many cracks. It is neither purely art, nor horticulture; neither craft nor science" (Warren, 2014, p.9). Moreover, bonsai provides meaning in life (Warren, 2014). Therefore, bonsai seemed to have become all of these things including the essence of who they were: "To me, bonsai on many levels is life in balance. Bonsai is a large portion of who I have become and who I am" (ABA).

A personal medicine

Doyle et al. (2019) stated that bonsai have

"therapeutic relevance for those who engage in the art to other aspects of their lives" (p. 109). Growing, and developing bonsai, is an activity which incorporates creativity and art which has a positive impact on mental health and wellbeing (Hermann & Edwards, 2021). Nguyen (2007) suggested that as people learn to follow the "flow of life" their creativity is afforded opportunity to emerge (p. 31). This positions bonsai as a potential personal medicine which Deegan (2005) described as nonpharmaceutical (self-care) strategies that afford meaning and purpose in life. When asked whether bonsai provided a form of 'personal therapy' the responses were unequivocally positive:

"Like many activities, it deeply involves the participant. It has helped to save my sanity at times" (PBA).

"Bonsai is an incredible practice that bridges emotions and it has been the saviour for me and many others" (PBA).

"They (*i.e. bonsai*) have offered huge solace when other parts of my life were dark and threatening. I cannot think of life without my trees and will grow them until I am no longer able to do so" (ABA).

"Whilst suffering major depression and then a stroke I needed something to calm my mind and occupy myself in a relaxing way. I had always admired bonsais and had an interest in them and this led the way to my taking up bonsai" (ABA).

Bonsai seemed to be the 'go-to' choice of 'therapy' during times of difficulty, and participants mentioned many health-related difficulties that bonsai had helped them to live with:

"I had an addiction problem for many years and find that I no longer feel the need having found Bonsai" (ABA).

"It has helped to distract me from daily pressures and deflects me from grief related anxiety" (ABA).

"After treatment for cancer, I suffered from short

term memory loss/forgetfulness, poor attention span and chemotherapy induced peripheral neuropathy. The neuropathy left me with a burning sensation in my hands and feet, plus struggling to walk or stand without pain. My physiotherapist suggested I took up a new hobby to help with my memory issues. When I told her I was interested in bonsai she thought that would be a good hobby for me to take part in as it also helps stimulate the damaged nerves in my fingers" (ABA).

"I have a friend in the hobby who just received a diagnosis of cancer and whose first reaction was to go out and spend some time with their trees. It does require focus so it can distract from other concerns and give the brain something of a break" (ABA).

Bonsai provided an engrossing past-time which seemed to offer many therapeutic benefits, so much so that one participant described how they had integrated bonsai into their work as a horticultural therapist:

"I had an existing interest in horticulture. When I was exposed to the art of bonsai, I became fascinated and began with my collection. Now, as a registered horticultural therapist I also use it as a therapeutic tool with my patients during horticultural therapy sessions" (ABA).

Many participants specifically described bonsai as a distractor from work-related stressors and as a source of "respite" (ABA):

"My job has a fairly high level of stress. I went to the doctor for suspected heart issues that turned out to be stress related. Since taking up bonsai my symptoms have nearly disappeared" (ABA).

"Until I retired I owned a small business, which involved long hours and a lot of stress. My first port of call after a hard day was my bonsai bench and a pair of bonsai scissors. The simple act of assessing and styling my trees in short but intense sessions I found incredibly relaxing" (ABA).

Therefore, bonsai was a preferred method for coping with daily hassles, work-related stressors, times of crisis, and life-threatening illness. The participants' bonsai were an ever-present source of mindfulness, creative decision-making, and disassociation from illness and stressors. Previous researchers have recommended bonsai as a form of mindfulness practice (e.g., Toll & Orabone, 2016). Interestingly, for the current participants, different tasks (e.g., pruning) afforded higher levels of positive impact, and some tasks were described as "not remotely relaxing" (e.g., "working on a difficult root system"), but nevertheless were satisfying once completed (ABA). Overall, bonsai provided an avenue of escape, security and comfort, and there was a deep sense of gratitude emerging within participants' stories.

Patience

Many participants simply replied "patience" (ABA) when asked whether, and how, developing bonsai was therapeutic. There also seemed to be suggestion that the development/improvement of patience coincided with other beneficial changes:

"Perspective, increased patience, peacefulness, knowledge of horticulture generally as well as the art of bonsai, new friends/colleagues, self-awareness and self-acceptance" (ABA).

"Patience, joy, wonder, friends, solace, tree skills, experimentation. A better life" (PBA).

Schnitker (2012) defined patience as the "propensity of a person to wait calmly in the face of frustration, adversity, or suffering" (p. 263). Consequently, patience is considered to be a desirable trait and character strength related positively to flourishing, wellbeing, and coping (Schnitker & Emmons, 2007). Schnitker et al. (2017) argued that the manifestation of patience depends on both behavioural (i.e., waiting) and emotional (i.e., low arousal positive affect and absence of high arousal negative affect) components – these components were frequently evident within participants' responses. For example, the art and

craft of bonsai demanded that the participants: “Wait calmly for the trees to grow and develop, to appreciate working with nature not against it” (ABA).

Several participants also mentioned the ‘pace of life’:

“Bonsai is about us trying to re-create what mother nature does naturally, in miniature. Mother nature works at a very slow pace by comparison to how we in the world live our lives, wanting to do/be/have/get to all at breakneck speed. Bonsai gives everyone who chooses to pursue this fabulous pastime/hobby the chance to slow down” (ABA).

‘Pace of life’ has been defined as the “relative rapidity or density of experiences, meanings, perceptions and activities” (Werner et al., 1985, p. 14). Modern societies experience an accelerated pace of life, and time-pressure (Keinan et al., 2019) which has been linked to increased stress levels (Melnikov et al., 2020), decreased life satisfaction and wellbeing (Cotton et al., 2002; Levine & Norenzayan, 1999), and unhealthy work-life balance (Levine & Bartlett, 1984). Pace of life is related to patience (Levine, 1997), and one participant reflected on how bonsai helped them to resist a fast-paced modern way of life:

“Bonsai gives me a means to be creative and make in my opinion beautiful art. I now have many trees in my collection and can tell you the history of each one. I know it can take a while when you start out on this bonsai journey but how satisfying it can be in this world where everything is wanted now instead of being aware of the seasons and how nature works” (ABA).

Schnitker (2012) argued that patience helps buffer against negative emotions, and enables more adaptive coping, particularly in difficult situations. Such self-regulation, and cognitive and behavioural adaptation, seemed to be necessary determinants of successfully creating bonsai: “I also learned how

to stop being impatient. This is a very good hobby to be involved with as it teaches you patience, reminds you that routine is necessary” (ABA). This participant referred to overcoming their need for instant gratification and maintaining a necessary sense of order in their life. Patience allows people to cope more adaptively with daily frustrations (i.e., “daily hassles patience”) and life hardships (i.e., “life hardships patience”) (Schnitker, 2012, p. 264), and is “presently engaged and forward-looking” (Schnitker et al., 2020, p. 301). Doyle et al. (2019) suggested that bonsai artists often draw upon their inner qualities and incorporate these into their work. Thus, a bonsai reflects the history of the artist – including their level of patience. Many participants described their ‘worst failure’ as a lack of patience – often to the detriment of their bonsai. However, it seemed that bonsai helped ‘teach’ participants how to overcome impatience and frustration, whilst also reminding that routine is important in life. Therefore, the learning (and reinforcing) of patience seemed linked to the slowness of developing bonsai and the maintenance tasks that often required a combination of deep concentration, reflection, and careful execution of fine motor skills.

Quiet enjoyment

Many participants described experiencing a sense of calm, serenity, and meditative absorption whilst working (usually alone) with bonsai. One PBA stated: “It is totally absorbing. I believe it quickly puts one in a flow state”. A number of ‘flow-like’ characteristics were described by other participants including an unconscious passing of time: “When they need work done I can spend hours and not realise it” (ABA). DelSesto (2019) suggested that plant-human interactions (in a garden) might expose people to ‘new durations of time’ (p. 207). Another participant, who described having had a difficult working-life, said:

“I have retired recently, 35 years I worked and although it was a good job it was very stressful

and a hard life. When I got home I would go out and water the trees, my wife would say don't be long dinner is nearly ready. I would be out there for ages and she would come round to get me because I would be out there for hours. Time just slips away when you have bonsai" (ABA).

Working with bonsai often induced a mind free from unwanted intrusions which one participant described as: "A state of intense stillness" (PBA). Doyle et al. (2019) suggested that as bonsai artists gain knowledge, and understanding, they experience shifts from an analytical focus into a "feeling-sense" wherein relaxation, reflection, contemplation, and energisation are awakened – an unconscious shift of attention from head to heart, a "gateway to one's inner being" and a state of meditation (p. 107). This state of mind, and altered perception of time, enabled participants to "shut out the rest of the world" (ABA):

"I love the quiet time I spend on pruning and styling. I'm in my own little world" (ABA).

"Many hours of QUIET pleasure and contemplation" (ABA).

Bonsai enabled participants to nurture inner tranquillity and to create a deep sense of emotional restoration. Nguyen (2007) and Mansourian (2021) suggested that crafting, and caring for, bonsai is meditative. Indeed, the maintenance tasks, and processes of designing a bonsai, often required a prolonged, narrowed, and enjoyed ('healthy') focus of attention and noticing of detail:

"They make me happy to look at them. I notice details, shape, colours, the shades of green now in the spring make me happy" (ABA).

"I think without my interest in bonsai I would not be as well and focussed as if I didn't do bonsai" (ABA).

According to Kaplan and Kaplan (1989) being in natural environments, even for brief moments, can

help restore directed attention and concentration and offset 'attention fatigue'. Kaplan (1995) also suggested that this restorative effect is characterised by people reporting that they "lost track of time" or "forgot" what they were thinking about (p. 170). It seemed that creating bonsai provided adequate exposure to a natural environment which afforded a restorative impact. The sense of quietness and tranquillity was evident in all participants' responses and, for some, was something that had previously been missing in their lives. The bonsai-custodian relationship focused on achieving an elusive outcome; some participants mentioned that a bonsai is never 'finished' as it continually needs care, maintenance, and redesign. Consequently, there was frequent immersion in this restorative environment. Mansourian (2021) demonstrated that immersion in the art and nurturing of bonsai, and not the outcome, was most important to participants. According to Doyle et al. (2019) bonsai artists are constantly challenged to "expose and celebrate" the tree's essence, and to "appreciate the latent potential in the tree". This involves the artist using their learnt technical skills, and also their "feeling-sense" (p. 104). Thus, satisfaction in performing routine maintenance tasks (including observation and reflection) was equally important (if not more important) than achieving a 'finished' bonsai. Certainly, bonsai afforded quiet time, in an intimate personal space.

People connections

All participants were members of a bonsai club/society/group and the importance of this social aspect was evident:

"One of the biggest factors or motivators for me to continue with bonsai has been through joining a local club. Having a group of individuals with a shared passion/common interest has been crucial in remaining active and interested in bonsai" (ABA).

Whilst bonsai afforded much needed quiet

enjoyment, ironically, this quiet enjoyment seemed to present a somewhat isolated endeavour often with participants working alone, intensely, for long hours: “I prefer working on my trees in private and find it very relaxing to focus on an individual tree” (ABA). Social connection was a crucial counter to isolation, and membership of a club/society/group led to opportunities relating to, and beyond, bonsai: “Met some interesting people. Plenty of hints and tips, nice cakes, laughter” (ABA). Often participants would travel together to exhibitions which offered opportunity for further involvement (e.g., helping set up displays and demonstrations, discussion with PBA’s, sightseeing). Bonsai appealed to a diverse demographic, and it was the ‘lighter’ personal side of life that often connected people: “The community is full of interesting and sometimes eccentric people” (ABA). “We have an amazing group here, some of the kindest, funniest and smartest people I’ve ever been around” (ABA).

“Bonsai folk in the main are very nice and friendly, helpful people who are only too willing to share experience and advice” (ABA).

There was an appreciation of like-minded people, for their diverse characteristics and qualities, so much so that one participant commented: “The friendships through the hobby became more important than the trees” (ABA). These friendships afforded a strong sense of community and belonging, and also helped personal growth - one participant mentioned that joining a club had improved their: “Confidence in talking to people” (ABA). Another participant appreciated the growing sense of comfort with other people that had emerged since joining a club:

“A sense of belonging to a community of like-minded people, this is especially important for me having had social anxiety all my life, being accepted, feeling part of something” (ABA).

However, for a few participants bonsai provided opportunity to avoid contact with other people: “It’s just my nature as a misanthrope to direct my energy

towards non-human life” (ABA). Overall, bonsai provided opportunity to create a balanced sense of connection with other people (when needed).

Nature connections

Working with bonsai helps develop an awareness of the resonance between nature, wild trees, and bonsai (Doyle et al., 2019). Indeed, many participants described how their ability to notice, and observe, had improved, and this improvement also extended beyond the world of bonsai to a greater understanding and appreciation for nature:

“A greater respect for nature. I no longer have what is called ‘tree blindness’, as in I now see the different types of vegetation as I move through the world” (ABA).

“Bonsai teaches you to notice details. It brings something natural to eye level. Bonsai trains you to notice detail and enjoy how special such ordinary things are. It also showed me how trees/plants are fascinating creatures” (ABA).

“A greater appreciation for trees and stones when hiking in nature. Once involved in bonsai your focus on trees in the natural environment is significantly enhanced. Drives or walks have never been the same since I started this hobby” (ABA).

It seemed that participants were actively noticing (i.e., Langer, 1989) and, as such, living authentically in the moment (i.e., Carson & Langer, 2006). For many participants there had been a move from an anthropocentric position to holding a much greater respect and value for the other-than-human-world:

“I feel very strongly that the activity of bonsai can help people relate more to the natural world as well as see and appreciate the aesthetic beauty in nature” (ABA).

“Overall my appreciation of trees as a whole has grown beyond measure. I marvel at

some which are among the largest and oldest living things on the planet” (ABA).

There was a deep sense of appreciation, thankfulness, and admiration for nature; and an increased appreciation for ‘one’s place in the universe’. One PBA commented that bonsai had given them: “An eye to SEE nature as it really is, a way to communicate with nature”. Bonsai, it seemed, provided a means of connecting not only with nature but with “something larger than ourselves” (Doyle et al., 2019, p. 109). Other researchers have also noted the sense of “awe and wonder of nature” derived from growing bonsai (Mansourian, 2021, p. 18). Awe is considered a complex emotion, and as the feeling of being in the presence of something vast that transcends current understanding of the world (Keltner & Haidt, 2003). Recent research (e.g., Shiota et al., Kuo, 2015; Liu et al., 2023) indicates that awe facilitates nature connection and considerable benefits to wellbeing. Therefore, creating bonsai afforded nature connection and the associated benefits.

One of the family

A strong attachment between the participants and their bonsai was evident to the extent that some considered bonsai as a family member:

“Other than my children, they are what I think about...there isn’t a day that goes by that I don’t think about them, what they need, or how I can improve them” (ABA).

“My trees are just as much a part of my life as my family, my friends” (ABA).

“There is a commitment as with a child. They need certain things at certain times to remain healthy and develop their full beauty” (PBA).

The participants often described a lifelong emotional attachment to bonsai, and spoke of bonsai possessing human qualities frequently ascribed to close family members (e.g., the capacity

to nurture, comfort, and provide emotional security). According to DelSesto (2019) plants respond to care and, through providing care, people can become attached (emotionally) to plants. Early conceptions of attachment related to human interpersonal relationships. Bowlby (1969) described attachment as “lasting psychological connectedness between human beings” (p. 194), and was particularly interested in understanding interpersonal connection, and the anxiety and distress that children experience when separated from primary caregivers. Separation anxiety has frequently been discussed in relation to pet ownership, and research suggests that human- and animal-related separation anxiety are strongly correlated (Dowsett et al., 2020). For some participants there was a tangible sense of anxiety linked to the prospect of being separated from their bonsai, and one participant described their anxiety on leaving their bonsai whilst on holiday:

“I felt compelled to check on the weather my trees were experiencing every day I was away. On my return even before I took my suitcase from the car, I went to check on my trees and spent the next 45 minutes watering, moving them into the sun and generally fussing over them” (ABA).

Other participants likened bonsai to a pet: “I find it’s a bit like looking after a pet, you have to feed and water it and maintain it to keep it in good health” (ABA):

“It’s a strange relationship really, I’m very protective of them, and delight in seeing them progress, knowing what I’ve done has partly led to this. I feel very strongly about my trees, not the same as for my partner or dog! But the trees are up there certainly in relation to other things in the garden and in fact in my life!” (ABA).

“My trees are much like my dog who is dependent on me for nourishment as well as grooming etc. In fact my dog is usually nearby when I’m doing bonsai” (ABA).

This sentiment was also illustrated by Mansourian (2018). Similarly, as with pet dogs, some of the current participants described having a deep form of communication with bonsai that defied an exact explanation: “The art of bonsai is not only artistic and horticultural, it’s communicating at a subliminal level with these living plants” (PBA). This was a relationship largely based on “listening” to a bonsai (ABA) – understanding its needs by observing its ‘behaviours’ over time. Yet, there was more to this relationship than ‘listening’ and one PBA stated: “As they cannot communicate with us to care for them we must empathise, be compassionate, place the trees needs above ours”. Several participants mentioned keeping photographic albums, and detailed records, of their developing bonsai. Whilst this photography was intended to aid the design, and development, of bonsai there also seemed to be a sentimental undertone to this.

Inevitably the role of custodian included the loss of bonsai: “The death of a tree is painful, but a reminder of the non-permanence of life” (PBA). Other participants also described the loss of bonsai and, for some, the sense of grief was akin to a family “bereavement” (ABA):

“To lose a bonsai to poor care or accident or theft is very upsetting after all the time one spends. They are almost like children” (ABA).

“I’ve had dogs my whole life. It was no different than when your dog dies” (PBA).

“It was a bit like the death of a friend” (ABA).

Therefore, many participants expressed a sense of lingering helplessness, loss, and grief when a bonsai died: “To watch powerlessly as the tree gradually weakened over a period of 2- 3 years and then eventually died was both frustrating and upsetting” (ABA). For some there was also a deep sense of anger, and guilt, if a bonsai had died due to (often unintentional) neglect and a lack of patience – which caused one participant to abandon the

hobby for many years. In such cases it was felt that not only had the artist let the bonsai down, but they had also let themselves down: “The only failure in bonsai is when you fail yourself because you didn’t do your best to help develop a tree at the best” (ABA). Others commented:

“Thinking I was so good that I could get away with something outside horticultural common sense always came back to bite me. Always felt stupid when I did something like that” (ABA).

“The worst failure was losing some expensive material this past year at my nursery. The trees were several hundreds of years old, and they died due to an unchecked fungal issue while I was away on a teaching tour. It was a terrible experience, not so much for the monetary loss but rather for the loss of such old trees” (PBA).

Another PBA had experienced a similar unforeseeable ‘attack’ on a special ancient bonsai:

“The cause was found to be a pine borer (i.e., insect) which girdled the tree under the bark. The loss resulted from my failure to take preventative action to protect the tree from this rare but natural pest. It was a bit like the death of a friend. Like elderly people, elderly trees require a certain amount of protective care” (PBA).

However, even in death it seemed that bonsai had things to ‘teach’ – this time, regarding responsibility, and learning from life’s ‘ups and downs’:

“The death of any tree is an unfortunate part of the process of bonsai and it hurts to know that you have been directly responsible. I have lost several important trees and ones which I have been working on for many years. It is a painful experience but one which invariably leads to a greater insight into bonsai as a practice and life itself” (PBA).

One participant also described a further source of tree-related bereavement – yet they were similarly

able to rationalise this loss: “When I’ve had trees stolen, the learning that has taken place with those trees far exceeds the loss” (PBA). Therefore, bonsai were valued highly as ‘one of the family hierarchy’, akin to a child or pet, and were mourned when lost. As such bonsai ‘offered’ further important life lessons for their custodians including the importance of appreciating life, staying grounded, and the importance of attachment. Indeed, such attachment (to plants) is important to the maintenance of psychological well-being (Nartova-Bochaver & Muhortova, 2019).

General Discussion

The current study supports and extends existing literature by illustrating: why and how people began bonsai as a hobby/profession, and that the creation of bonsai afforded a number of therapeutic (personal medicine) benefits including experiences of success and failure with bonsai. Whilst not possible to infer causal relationships the following general discussion focuses on particularly salient (and under-researched) mechanisms through which wellbeing was enhanced.

Joseph (2019) argued that humans strive to become more authentic, and that leading an authentic life permits people to follow their passion more closely, and to discover their inherent abilities and strengths. Therefore, authenticity is considered as part of healthy psychological functioning (Smallenbroek et al., 2017) and as a form of eudaimonic wellbeing (Smallenbroek et al., 2017; Joseph, 2019). Yet, the conditions that lead to experiences of authenticity have been under-researched (Seligman & Csikszentmihalyi, 2000). However, Smallenbroek et al. (2017) found a relationship between acting in accordance with one’s values and experiencing authenticity. Many participants in the current study described how bonsai afforded opportunity to create authenticity, meaning, and purpose in life. Bonsai had helped create a set of values (counter to an anthropocentric perspective) informed by the duty of care necessary for the wellbeing of bonsai. It also seemed that

natural (ecological) and social identities had become harmonised, and bonsai had become a ‘measure’ by which personal morality might be judged in a meaningful way.

Interestingly, some participants mentioned impermanence of life/bonsai/seasons in relation to a greater appreciation of life. Martin et al. (2004) argued that an acknowledgement of the impermanence of existence (catalysed by near-death experiences) can represent a “wake-up call” which leads to greater self-congruence and authenticity (p. 431). Martin et al. (2004) also argued that acknowledgment of impermanence might lead to positive outcomes (e.g., a decreased fear of death, unforeseen opportunities, greater attention given to one’s uniqueness, less pressure to conform to cultural standards, and experiencing feelings of freedom and forgiveness). Furthermore, there is greater engagement in life and, in essence, adoption of a new worldview. Only two current participants mentioned near-death experiences, and how bonsai had helped them (and/or others) cope in those circumstances, therefore caution must be used again in inferring causal links. However, the majority of participants were aged 60+ years, and so it is feasible that they were increasingly aware of their inevitable demise – often prompted by the loss of bonsai, and/or the passing of seasons. Yet, it was evident that this awareness had led to personal positive growth. Indeed, Yalom (1980) argued that such growth might be facilitated in non-threatening environments.

The majority of participants mentioned patience as a quality facilitated by bonsai, and as a quality needed to care for bonsai. Mansourian (2021) also identified patience as a necessary quality for bonsai and suggested that patience, combined with passion, helps to develop a new identity for the bonsai artist. Patience during life hardship has been linked to improved regulation of sadness (Shubert et al., 2022), coping better with daily frustrations, life satisfaction, happiness, affect, and interpersonal interaction (Schnitker, 2012). In turn, this self-regulation enhances commitment,

effort toward goal attainment, and achievement satisfaction (Schnitker et al., 2020). It was evident that participants often experienced an altered sense of time, and deep absorption, when working with bonsai. Glickson (2001) suggested that situations which encourage absorption, and engagement of attention, will decrease time estimates and consequently increase patience. Garnefski and Kraaj (2007) argued that patience is derived from cognitive reappraisal – this was evident when participants described their ‘worst failures’ with bonsai and how these had frequently become learning opportunities.

Miller et al. (2001) used the term ‘quiet enjoyment’ in reference to subjective experiences of time spent in National Parks. In particular, ‘quiet enjoyment’ referred to experiences of quietude, peacefulness, tranquillity, and serenity afforded by natural environments. It also links to the more “ethereal concepts of landscape setting and character, and attitudes of mind such as spiritual refreshment” (Pearlman et al., 1999, p. 59). Many of the participants had used such words to describe their experiences with bonsai. Moreover, a variety of mindful ‘flow-like’ characteristics were experienced by participants when working with bonsai including an altered (unconscious) passing of time, a deep sense of meditative absorption, and a state of intense quiet/silence and stillness. Bonsai therefore seemed to provide respite from daily stressors similar to that provided by natural/wilderness environments. According to Attention Restoration Theory (ART) (Kaplan, 1995) mental fatigue and concentration can be improved by time spent in, or observing, nature. Therefore, natural environments can be restorative. Basu et al. (2019) argued that ‘soft fascination’ requires little effort and also permits mental space for reflection – consequently ‘internal noise’ can be resolved and reflection can be achieved. Subsequently, future attentional demands are reduced, and recovery from mental fatigue requires less effort. Basu et al. (2019) also suggested that everyday activities might afford opportunity for soft fascination. Furthermore,

Korpela (1991) concluded that ‘favourite places’ are related to deeper levels of restorative experience. As such, bonsai appeared to help create an environment wherein all restorative components (i.e., Kaplan, 1992), and soft fascination (i.e., Basu et al., 2019) were afforded in a favourite place (i.e., Korpela, 1991). Bonsai afforded a sense of quiet enjoyment, rest and respite, and time for reflection. Other research, for example Burns (2012), has also highlighted the important restorative impact of the silence often found in natural environments – and that seemed to apply equally to bonsai.

All participants described having a strong connection with their bonsai, and in many cases this connection extended to nature, wild trees and plants. Hermann and Edwards (2021) also noted that participants had a profound awareness of, and respect and love for, nature. The current participants’ connection to bonsai and nature also extended to an increased awareness of, and alignment with, the seasons. Giri (2019) argued that humans can interact in harmony with the rhythms of the earth – indeed, this ability seemed inherent to providing care for bonsai. Kuo (2015) proposed a number of nature connection mechanisms (e.g., exposure to natural sights and sounds, mycobacterium vaccae, phytoncides, negative ions) which are feasibly associated with the frequent physical contact with bonsai. The intimate sense of connection also seemed linked to the experiencing of awe - which can be considered as a type of altered state of consciousness (i.e., self-transcendent experience; STE) marked by decreased self- salience and increased feelings of connectedness (Yaden et al., 2017). Shiota et al. (2007) illustrated that nature can elicit a sense of awe, and that a sense of awe can be related to “complexity of detail” (p. 945). For the current participants, bonsai presented a rare opportunity to closely notice ‘detail’ in nature. Furthermore, many participants described experiencing a sense of awe when working with bonsai. Rudd et al. (2012) demonstrated that awe, compared to happiness, is associated with the perception that time is plentiful

and expansive. Additionally, awe is associated with greater life satisfaction and appreciating the 'here and now'. Indeed, many of the participants commented on how bonsai afforded a preferable pace of life and an immersion in the present moment. Therefore, it might be concluded that bonsai presented an opportunity for STEs, mindfulness, and flow-like states.

Conclusion

The current research sought to explore: 1) why and how people began bonsai as a hobby and/or profession, 2) whether bonsai provided therapeutic qualities, and 3) the experiences of caring for bonsai amongst amateur and professional bonsai growers. The participants' responses highlighted a number of reasons for beginning bonsai, only a few of which initially related to therapeutic benefits – generally, participants had begun bonsai due to curiosity, being gifted a bonsai, or having been intrigued by cultural depictions of bonsai. However, the research identified a number of previously unexplored ways in which bonsai offered meaningful therapeutic benefits. For example, it might be concluded that close connection to bonsai afforded greater authenticity, self-congruence, self-understanding, and opportunity to develop a new sense of moral self. Bonsai also afforded development of a personal quality (i.e., patience), positive states (e.g., awe), cognitive restoration (e.g., soft fascination), nature connections, and interpersonal connections, which offered considerable benefits to wellbeing. Further research should therefore, in particular, explore bonsai as an STE, and how this helps people reconcile their sense of self (especially during times of ill-health and crisis). Further research might also explore bonsai and nature connection, awe, and experiences of patience with the aim of developing interventions targeted toward encouraging each of these.

The therapeutic benefits identified were common regardless of experience with bonsai and level of practise (i.e., amateur or professional). However, while there was a considerable number of

participants it must be acknowledged that this study only included English-speaking participants. Bonsai conventions (i.e., style, design, horticultural practises, culture, terminology, tradition), species grown, and weather patterns differ around the world. Therefore, it is likely that differences in therapeutic benefits might be found dependent upon these factors; hence, transferability of findings might be questioned. Consequently further research might seek to explore therapeutic benefits amongst non-English-speaking population groups and in countries such as Japan and China (where the practise of bonsai originated). Furthermore, according to Patton (2002) 'conveniently' selecting participants might threaten a loss of information-rich stories - although this did not appear to be the case. Indeed, many participants were seemingly generous with their time and wrote lengthy responses to the survey questions. Also, survey data might be 'contaminated' by self-reporting biases (Patton, 2002, 2014). However, when asked to describe their 'worst failures in bonsai' many participants (including professional artists) gave detailed stories regarding, for example, poor horticultural practises. Thus, in general, there seemed to be a genuine desire to share and learn from one another in the bonsai community. It must also be acknowledged that the survey was distributed via society/club representatives and consequently a possible unequal distribution, and opportunity to participate, occurred thereafter.

Overall, this study has contributed much with regards to how a specialised form of horticultural practise might enhance wellbeing. This ancient form of art and science surely deserves a greater focus from researchers and practitioners alike.

Acknowledgements

The author would like to express his sincerest gratitude to all participants who kindly gave their time to complete the survey.

Appendix

As a member of a bonsai club/society you are being invited to take part in a research study being conducted at the University of Hertfordshire.

The study is focusing on:

- 1) how and why people began growing and developing bonsai trees/landscapes etc, 2) personal gains from growing bonsai trees, and 3) whether, and how, growing bonsai trees might be a form of therapy.

Please take your time to answer the following questions:

Q1 How long have you been 'doing' bonsai?

Q2 Which of the following best describes you?

- Amateur bonsai artist.
- Professional bonsai artist.

Q3 Please describe how, and why, you got into doing bonsai.

Q4 Please describe your relationship with / to your bonsai (e.g. time, commitment, importance).

Q5 Please describe some of your best 'successes' in bonsai e.g. what were you working on/trying to do, why, what happened, how long did it take, what was the outcome, how did you feel throughout the process?

Q6 Please describe some of your worst 'failures' in bonsai e.g. what were you working on/trying to do, why, what happened, how long did it take, what was the outcome, how did you feel throughout the process?

Q7 What is your opinion on the following statement?: 'Bonsai is a form of art therapy'.

Q8 What have you gained personally from doing bonsai?

Q9 Would you like to add anything else?

Biography

Stephen Pack (PhD) is a Senior Lecturer in Sport and Exercise Psychology at the University of Hertfordshire, UK. He is a British Psychological Society Chartered Psychologist and Associate Fellow (CPsychol. AFBPsS), and is registered with the Health and Care Professions Council (HCPC) as a practitioner psychologist. Besides teaching undergraduate students Stephen also supervises MSc and PhD students, is currently supervising Clinical Psychology trainee/students, and has contributed to a range of degree programmes within Life and Medical Sciences at the University in various capacities. Stephen's research has focused largely on professional practice processes/issues within sport psychology support. He has also provided extensive sport psychology support within a range of sports and to a number of Polar explorers. Stephen has a growing interest in nature-based exercise, nature-connection, and is a qualified forest-bathing and forest-therapy guide.

Self-Regulation, Its Neuroscience Foundations and Horticultural Therapy: Growing the Connections

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Abstract

Self-regulation is a health challenge experienced by individuals and populations across the lifespan that can impact relationships, safety of the individual and community, and ability to function in society. Challenges to self-regulation manifest in many ways based on an individual's neurodiversity. The neuroscience foundations of self-regulation are complex and play an important role in human behavior. Strategies that can effectively address and treat self-regulation challenges are in demand because of the variety of populations exhibiting dysregulation. Horticultural therapy, a modality that can be delivered as treatment, less formalized therapeutic intervention, or recreation is being used across

corrections, addictions, mental health, pediatric and other populations where self-regulation is a challenge. Understanding self-regulation, neuroscience connections to self-regulation, and applications of horticultural therapy can shed light on this topic which has limited literature within the profession.

Defining Self-Regulation

Self-regulation is defined as an individual's processing of sensory, biological, neurological, environmental, and societal inputs to interpret and manage thoughts, behaviors, emotions and neurological/physiological responses to the world around them. This very complex web of inputs involves multiple biological systems, the brain, emotional intelligence, learned behavior, and social norms that present as an individual's planning and executive functions, choices, impulses, thoughts, emotions and overall societal behaviors (Heatherton & Wagner, 2011; Mayhugh et al., 2018; Porges & Carter, 2017). Self-regulation that is considered positive and healthy involves the individual balancing inputs, conflicts, impulses and social norms to respond in a manner appropriate for the situation, according to accepted rules of society (Shanker & Barker, 2017).

Humans have an extraordinary capacity for self-regulation and adaptive behavior responding to self-regulatory modifications (Porges, 2022). Challenges to self-regulation manifest in many ways. These can cause dysfunction, inappropriate or criminal behavior, relationship issues, lack of self-control or inhibition, and fight or flight response to threats, among other behaviors (Shanker & Baker, 2017; Heatherton, 2011). Current literature makes a

distinction between self-regulation and self-control, the latter related to inhibiting impulses, with the two often inter-related (Shanker & Baker, 2017; McClelland et al., 2017).

Theories on self-regulation are numerous, with multiple disciplines providing insight and research on this very expansive, complex topic. Theories from the field of psychology discuss self-regulation in terms of self-control, cognitive function, impulsivity, emotions and goals (Inzlicht et al., 2021). The fields of neurology, neuroanatomy, neurophysiology, and psychophysiology link the physiological aspects of self-regulation to multiple regions in the brain. The polyvagal theory is one of several frameworks for understanding the physiological basis of self-regulation; it is currently the most widely accepted on self-regulation (Porges, 2022; Dana, 2018).

How Self-Regulation Develops

Self-regulation is not considered to be present at birth though internal and external inputs are present. Scientists suggest self-regulation—managing and responding to inputs—is a skill that is learned over time. It is during childhood that the concept and requirement for self-regulation is introduced though not expressed as such, more often encouraged as responding appropriately

with emotions and behavior (Felton, 2022). Self-regulation is pivotal in helping people take on everyday challenges and succeed in life. Research reveals that individuals who can self-regulate exhibit mental wellness, successful employment, enhanced relationships and sound decision capabilities, which contribute to avoiding more harmful activities such as substance misuse, self-harm, and addictions (Heatherton & Wagner, 2011; Shanker & Barker, 2017). The development and maturation of self-regulation involves self-awareness, societal guidance (from responsive adults such as parents, teachers, religious leaders) and understanding and acceptance of social norms, neurological inputs interpreted in step with society's rules, and strategies dealing with adverse experiences, trauma, dysfunction across health domains, ("a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2023), among other factors (McCoy & Raver, 2014). Health interventions over an individual's lifespan can support positive self-regulation and improvements in specific areas where dysfunction exists. These include physiological elements like vagal nerve and limbic arousal responses which are involved in self-regulation (Porges, 2022).

Neuroscience Connections to Self-Regulation

The complexities of self-regulation, involving brain functioning and neuroscience components continue to be investigated across disciplines. Neuroscience-based theories discuss autonomic nervous and limbic systems where neurophysiological processes and neuroanatomical structures are involved in processing of inputs (Heatherton, 2022). Research has established bi-directional communication between central (brain) and peripheral (autonomic, behavioral) components, with adaptive functions and stages playing important roles (Porges, 2007). Current practice emphasizes polyvagal theory, with the autonomic nervous system (and its sympathetic and parasympathetic branches) playing a primary role, this frequently cited in the literature and

evident in polyvagal-informed therapy (Porges, 2004; 2007; Dana, 2018; Bailey et al., 2020).

Porges' seminal work on polyvagal theory uses a framework where the autonomic nervous system's reactive adaptive behavior is based on a predictable hierarchy of three states (connecting, mobilizing and disconnecting) which helps explain an individual's response to internal, external and nervous system inputs, and "functioning below the level of the thinking brain" (Porges, 2004; 2007; 2009; 2022; Dana, 2018). "Neural evaluation of risk and safety reflexively triggers shifts in autonomic state without requiring conscious awareness" (Porges, 2022). The polyvagal theory postulates that phylogenetic changes in neural structures regulate the autonomic nervous system and the two vagal motor systems, which originate in the nucleus ambiguus. The dorsal motor nucleus of the vagus plays a role in neuroception which triggers or inhibits fight-flight response and social engagement behaviors. Phylogenetic stages have been behaviorally linked to social communication, mobilization system (active avoidance) and immobilization, which calms or mobilizes individuals with the vagal brake. More recent research on vagal brake and vagal efficiency suggests these contribute to varying degrees of behavior regulation (Porges, 2022). Social engagement behavior is regulated by more than one variable.

The role of the amygdala, particularly as it relates to emotional regulation and top-down control over subcortical regions, influences imbalance or diminished control impacting self-regulatory failure - reward systems, or activity related to threats (Blair & Ku, 2022; Heatherton, 2022; Dambacher et al., 2014; Giuliani et al., 2014, Lopez et al., 2017; Meyer & Bucci, 2016). Neural connections between the prefrontal cortex (PFC) and dysfunctional amygdala, and their possible mediation of each other have been identified in some disorders involving emotional regulation (Wagner & Heatherton, 2017).

Current cognitive neuroscience research identifies the PFC as an important region of the brain and its control over subcortical regions regulating executive function, emotion and reward (Heatherton, 2022; Heatherton & Wagner, 2011; Krendl & Heatherton, 2009; Palacios-Barrios & Hanson, 2018). It along with neural mechanisms of the mesolimbic dopamine system in the nucleus accumbens and the mesolimbic reward system appear to trigger cues and reactivity, visual stimuli, lapse and other activations involved in for example, resisting temptation, this central to self-regulation related to addictive behavior seen in obesity, substance abuse, negative mental health outcomes and criminal behavior (Heatherton, 2022; Heatherton & Wagner, 2011; Baumeister & Vonasch, 2017; Mayhugh et al., 2018; Palacios-Barrios & Hanson, 2018). Inzlicht, Legault & Temper suggest a relationship between frontal cortex and the limbic system with impact on self-control (2014). Studies showing damage to the lateral PFC, anterior cingulate cortex, ventromedial PFC, and orbitofrontal cortex result in inappropriate choices, behaviors and social interactions (Beer et al., 2003; Kuehn et al., 2022). Their research and others suggest patients with damage to these parts of the brain “impact memory behavior norms, [though they] are fully aware of their improprieties but are unable to control dysregulation of social behavior and difficulty controlling physiological drives”. Research on the medial prefrontal core postulates that processing of semantic information (more generally about other people) versus information processing about self shows “heightened activity in medial prefrontal cortex, posterior cingulate cortex, and precuneus” (Heatherton, 2022; Northoff et al., 2006; Moran et al., 2010).

The mid-brain areas—the periaqueductal gray—is considered to mediate instant defense responses, and ascending monoaminergic tracts related to longer-term changes in arousal, mood, drive and motivation responses when dopaminergic tracts are imbalanced, these critical to self-regulation (Wager et al., 2008; Corrigan et al., 2010). The temporal lobe

involved in detecting and evaluating risk, regulating fight or flight behavior also regulates adaptive defensive behaviors and autonomic states (Porges, 2007; Porges, 2022; Meyer & Bucci, 2016).

Current scientific research identifies multiple inputs, both neural and external stimuli that impact and influence behavior, thoughts, and emotions (Porges, 2022). The concept of psychophysiological parallelism where both psychological and physiological activity work concurrently to self-regulate is mentioned in the literature. Polyvagal theory (Porges et al., 1996; Porges, 2022) and its hierarchical model of self-regulation dependent on survival-focused systems embedded in the brainstem, and autonomic nervous system, where multiple brain regions play a role in self-regulation, seems to have broader acceptance within the medical and therapeutic communities though some consider it to be nascent.

Common Self-Regulation Problems and Populations

Current health practices identify self-regulatory failure or dysregulation as contributing to social and mental health challenges related to a wide range of problems, including “obesity, addiction, poor financial decisions, and sexual infidelity”, social exclusion, poor self-esteem and confidence, and lack of resiliency in coping with adversity (Heatherton & Wagner, 2011; McCoy and Raver, 2014, Palacios-Barrios & Hanson, 2018). Self-regulation issues can involve physiological components and have been linked to cognitive impairment, inflammatory disease, digestive and respiratory issues, impaired immune functions, chronic fatigue, depression, and anxiety (Dana, 2022; Bailey et al., 2020).

Strategies for Addressing Self-Regulation

Finding strategies to support healthy self-regulation across the life span in an ever-changing complex society is challenging for individuals and health

professionals. Evolving work in the field of neuroscience and neurobiology is demonstrating the need for an individual's brain function to be in "balance", an important concept in self-regulation. Siegel & Bryson discuss this, where integration in brain function creates stability and regulation of the body (physical), and the brain (psychological, emotional and spiritual) (2011). Perry discusses this in terms of balance with self, family, friends, and the community at large. He uses the *Tree of Regulation* model to demonstrate how brain function processes an individual's response to stress through self-regulation (Perry, 2016; Perry & Winfrey, 2021). Individuals may use the same strategy but may have differing outcomes, for example, using emotional or expressive suppression hiding their emotional response (i.e., burying their anger) to a situation and venting afterwards may be effective for one person, while another may do so regularly to avoid conflict which over time negatively impacts interpersonal relationships.

Seigel's Window of Tolerance, another important concept, explains the impact of stress and trauma on an individual's ability to self-regulate (2011). Theory and practice related to self-regulation is informed by *The Process Model of Emotional Regulation*, a framework for identifying the adaptive and maladaptive ways an individual responds to stress and trauma (Gross, 2002), and meta-analysis

research by Pena-Sarrionandia, Mikolajczak and Gross. They examined the need to incorporate knowledge of both regulation strategies and regulation styles of adaptation within the context of self, family, friends, and the broader community (2015).

Horticultural therapy (HT) is a modality grounded in the therapeutic treatment process. The use of hands-on plant activities addressing therapeutic goals with measurable outcomes, along with design of therapeutic environments offering safe spaces physically, psychologically, emotionally, and spiritually within HT, is being incorporated into health services addressing self-regulation, particularly versatile across the generational spectrum, and with all types of health challenges.

Horticultural Therapy Applications for Addressing Self-Regulation Challenges

Current HT literature and research is limited on the topic of self-regulation though this health component impacts all aspects of human functioning. Stone Rice (2019) touches on important aspects of brain functioning – the triune brain including the reptilian brain with fight or flight responses, limbic brain emotional and hormonal reactions, long-term memory challenges (Goleman, 1995), and "higher brain functions"

Strategies used in self-regulation include:

- Mindfulness (Being present and aware without judgement)
- Being optimistic (Self-compassion / nurturing self)
- Distraction (Commitment to building skills (finding purpose)
- Avoidance (Building adaptability skills)
- Substance use (Self-harm)
- Venting
- Seeking support/help (developing a social support network)
- Expressing expectations (outlining a routine or outcome)
- Acceptance (acknowledgement of the extent to which you can/cannot change the situation)
- Cognitive change/reframing (changing the way we perceive something in order to feel differently)
- Body-awareness (recognizing your bodies cues for "flight, fight" responses)
- Problem-solving (i.e., using a worry tree to determine course of action)

of planning, abstract reasoning, self-awareness, attention, voluntary muscle movement, and somatosensory function (Siegel, 2008). While these are involved in self-regulation, they do not directly address self-regulation vis a vis HT.

The field of HT is expanding its awareness in several areas directly related to self-regulation. Of note are concepts of neurotypical and neurodiverse individuals, interventions using neurosequential and neurodevelopmental approaches (Perry, 2016, Slagle, 2019), and deeper understanding of sensory inputs-autonomic nervous system response (Fleming, 2022a; Fleming, 2022b; Gabaldo, 2019). Crossover of theoretical knowledge and practice, specifically from mental health disciplines, is growing including integration of polyvagal theory (Porges, 2022), Gilbert's hypothesis of three emotional regulation systems (threat and protection, drive and excitement, and contentment/soothing/social safeness and imbalances in these) (2009), and Siegel's nine domains of self-regulation involving interpersonal integration, consciousness, and perceptions (2010).

One significant area of self-regulation dysfunction is social interactions. Horticultural therapy can be used to address deficits to promote positive social engagement including sense of self, awareness of others' feelings, and connections to others including healthy attachments (the literature describes as opportunities for mirror neurons and social neuroscience) (Freedberg & Gallese, 2007; Yuill et al., 2007). Current HT services are being delivered to a variety of individuals and groups including those identified with diagnostic features related to self-regulation dysfunction - "psychiatric diagnoses including autism, social anxiety, post-traumatic stress disorder, and reactive attachment disorder" (American Psychiatric Association, 2013; Porges 2007). The degree to which HT specifically addresses self-regulation in these programs has not been quantified. However, HT like other therapeutic modalities, deals with a variety of maladaptive behaviors such as inappropriately

intense, impulsive or hypervigilance behaviors. HT interventions focused on coping strategies improving receptivity of inputs, practice shifting internal distress to external inputs (modeling calm measured behavior) and fostering sense of well-being optimizing integration of brain and mind functioning are within the scope of the discipline and can be expected to grow with increased awareness.

Delivery sites for HT—plant-rich green spaces, gardens, greenhouses and natural landscapes can be effective in contributing to restoration, calm, and sense of safety, all identified as significant elements for improved self-regulation outcomes (Porges, 2022; Kaplan, 1978; Van den Berg et al., 2016; Detwiler et al., 2008; Gonzales & Kirkevold, 2014; White et al., 2018). The explicit sensory component of HT and plant-based activities support self-regulation interventions targeting the management and integration of appropriate responses to sensory inputs, aligning brain inputs improving communication and managing misunderstood cues, and enhancing emotional regulation of contentment/soothing/social safeness (Seo et al., 2015; Gabaldo, 2019; Wagenfeld, 2021). Research validates gardening-based interventions capable of providing opportunities for mindfulness (Murray, 2012; Hart & Reisner, 2021), a key strategy in addressing dysregulation.

An examination of specific populations sheds light on how HT can address self-regulation challenges. Analysis by population can inform practitioners on this topic. It is recommended that medical precautions be followed as advised by a client's physician prior to engaging in an activity which could have significant impact on cardiac, vagal nerve or other physiological systems.

Autism

Autism, defined as a developmental disability caused by differences in the brain (CDC, 2023) is mentioned in self-regulation literature as

individuals having challenges processing neurological, sensory and other inputs (Patriquin et al., 2019; Bal et al., 2010). The neuro-connection is explained by Porges. “If visceral homeostasis is challenged and the vagal brake is unable to regulate visceral homeostasis, then social engagement behaviors will be minimized. Thus, it is possible that psychiatric disorders, (e.g., autism, schizophrenia, reactive attachment disorder) in which compromised social behaviors are diagnostic features, are associated with neurobiological state regulation strategies that foster defensive and not social behaviors” (2007).

Awareness of a neurobiological connection to autism by medical professionals and the general public is gaining ground, and strategies involving self-regulation for people living with an autism spectrum disorder have been integrated into health services including HT. Such HT programs are in place at schools and botanical gardens (Fairchild Tropical Botanic Gardens Miami FL, Missouri Botanical Garden, The Huntington Library, Art Museum and Botanical Gardens CA, Cincinnati Zoo & Botanical Garden OH) (Flick, 2012). Horticultural therapy goals, sometimes expressed as sensory processing and integration goals include working cooperatively with others, responding to school or other environments appropriately interpreting cues/directions/peer comments, and integrating sensory inputs. Therapeutic horticulture activities addressing these goals include gardening tasks like mixing soil and planting seeds as individual or group activities, the latter focused on promoting and practicing social interactions (Etherington, 2016; Sommerfield et al., 2021). Horticultural therapy programs have been used to improve emotional intelligence of school aged children living with an autism spectrum disorder (Beela & Thankappan, 2021). Applications of HT for people living with an autism spectrum disorder are part of current practice, and as greater awareness of HT as a modality that can address self-regulation and neuro-based health challenges expands, so too will the applications.

Senior and Dementia Populations

Self-regulation challenges among senior and dementia populations span a wide array of behaviors and health challenges. Research suggests age can be a factor in emotion regulation, a key component of self-regulation, as is self-awareness (Charles & Luong, 2013; Urry & Gross, 2010). Implications of research - Reed et al. suggests “older adults may rely less on neurobiological resources and more on practice and experiences for self-regulation efforts” (2020; Whitson et al., 2016). Research by Perach et al. (2020) and Mograbi et al. (2021) examined persons living with dementia, and the impact diminished cognition has on the ability to regulate emotions and decision-making. Williams et al. (2018) identified the need for developing well-being interventions in this context, this having implications and applications for HT.

Horticultural therapy practice presently addresses disruptive behavior, inappropriate responses and vocalization, outbursts used as self-stimulation, and responses to pain exhibited by seniors, and more often by people living with dementia (Blake & Mitchell, 2016; Detweiler et al., 2008). Other HT therapeutic goals related to self-regulation within this population include sensory stimulation for compromised cognition (and for intellectual stimulation), coping strategies for misinterpretation of cues, and plant-based activities promoting appropriate behavior for social interactions (Park et al., 2019). Therapeutic horticulture activities include celebrating holidays with plant themes (distraction from pain), reminiscing using plant prompts like summertime watermelon and oranges in Christmas stocking, taking turns watering plants (practicing appropriate behavior, calming others who become agitated over delays or reactions to vocal/behavioral disruptions), and increasing physical exercise by walking in a garden touching and smelling plants (sensory stimulation). Horticultural therapy interventions are more often delivered as therapeutic horticulture for senior and dementia populations. Programs addressing self-

regulation challenges focus on mediating social behaviors related to communal living at senior facilities during plant-based activity versus clinical treatment addressing neural based optimization of brain-mind functioning.

Another important facet of HT services for senior and dementia populations involves safety. Both safe delivery sites like reducing opportunities for elopement, tripping over hazards, or touching/ingesting poisonous plants, and safety from disruptive or inappropriate behavior of other participants. Feeling safe is a component of self-regulation and involves reaction to inputs and reactive behavior according to Porges (2022).

Veterans and Active Military Personnel

Self-regulation challenges identified with veteran and active military populations are related to stress, post-traumatic stress disorder, and hypervigilance, often associated with difficulty shifting internal distress to external inputs, modelling calm measured behavior, fostering sense of wellbeing, optimizing integration of brain and mind functioning, and addressing suicide ideation to name a few (Williamson et al., 2014). Porges' research identifies stress as both a response and a trigger with complexities of it, neural pathways, removal of external triggers, and the ability to return to homeostasis which may not be solely stimulus-response model according to polyvagal theory (2022). Understanding the neural, multi-faceted self-regulation processing that individual military members experience, sheds light on therapeutic interventions which may be effective. Horticultural therapy is one such modality that is addressing these health challenges. Some examples in this context – structuring therapeutic activities akin to military missions (the goal/cycle of harvesting a crop including planting and tending plants requiring ongoing attention and regular physical activity) (Kelley et al., 2017); group activity caring for plants promoting positive social interactions (including vocational HT programs); and meditative self-reflective physical activity

as seen at Green Road walking path in Bethesda Healing Garden, at Walter Reed National Military Medical Center (MD) (Goldstein et al., 2018). Research by Detweiler et al. investigated outcomes from HT in the neurophysiological modulation of cortisol levels, PTSD, and quality of life in veterans (2015; Mottershead & Ghisoni, 2021). Meore et al. examined HT's impact on veterans with history of suicide (2021). Research has identified nature-based interventions as alternative strategies for addressing veteran and active military challenges, these often a component of HT (Ameli, et al, 2012; Greer & Vin-Raviv, 2019; Hart & Zanzaskas, 2021; Westlund, 2014).

The recognition of neurobiological, psychological, and psychosocial factors involved in self-regulation for this population, and the individualized responses to these, are part of current health services. Greater acknowledgement and integration into HT services will augment interventions currently in place and where clinical HT services with neurological goals, and not just general therapeutic goals of “improving” coping will expand HT foundational knowledge.

Children at Risk (Child Poverty) - The Early Years

According to the 2021 Census 9.1% of children in Canada live in poverty; a child living in a single parent female led household increases to 31.3%. (Government of Canada, 2022). It is well established across disciplines that the time from birth to age five is a period of rapid growth and development for children. Lived experience during this period shapes overall neurological brain development, including self-regulation and self-control. This stage represents one of the important “turning points” across the life course as self-regulation in children undergoes continuous rapid change (McClelland et al., 2017).

Children living in poverty within the early years have an increased risk for what Palacios-Barrios and Hanson (2018) term “externalizing (e.g., aggression,

delinquency) and internalizing (e.g., depression, anxiety) symptomatology; which can be observed as maladaptive behavior; misinterpretation of social cues, and lack of impulse control. Developing therapeutic interventions that foster resiliency in children to further strengthen their self-regulation skills has the potential to mediate adverse childhood experiences. Research has indicated that interventions to further develop self-regulation are more effective when introduced to individuals at “turning points” or periods of intense, rapid growth such as the early years (McClelland, et al., 2017).

The horticultural therapy modality presents an opportunity to work with children at risk in safe, nurturing nature-based environments (Flick, 2012). McClelland et al. note that research into the impact of mindfulness practices (and yoga) on self-regulation is promising (2017). Research conducted by Diamond & Lee (2011) showed that aerobic exercises, motor-skill development and mindfulness practices resulted in improved executive functions of seven to nine year olds. Mindfulness practices inclusive of yoga and HT have been used to achieve wide ranging therapeutic goals. Aerobic exercise within HT practices ranges from weeding, digging, raking, compost turning to planting. Work by Oh et al. shows that school age children engaged in plant-based activities leads to reduced stress, positive emotional states, enhanced emotional intelligence and social competence (2020). Horticultural activities can be delivered as group or individual sessions. This presents opportunities for children to be supported to express their emotions, to develop social skills, empathy and cooperation within group sharing (Park et al., 2016), all of which can support the strengthening of self-regulation within children.

Incarcerated Populations

Incarcerated populations are complex and multidimensional. This marginalized population faces a dynamic set of diagnoses that often contribute to criminal behavior and likely influence the probability of recidivism (Zgoba et al., 2020;

Adams et al., 2017). When considering potential therapeutic treatment plans for inmates, a holistic understanding of the presenting diagnoses, including behavioral implications related to self-regulation, will inform the approach to rehabilitation and strategies for addressing the behaviors that present themselves when interacting with other inmates and staff in corrections settings. Prevalent mental health challenges among incarcerated people include childhood trauma, sexual trauma, stress-related disorders, personality disorders, developmental disorders (e.g., including fetal alcohol spectrum disorder and attention deficit hyperactivity disorder), neuro-cognitive impairments, and substance use (Liu et al., 2021; Butler et al., 2022; Gottfried & Christopher, 2017; MacPhail & Verdun-Jones, 2013; Dunbar Winsor, 2020; Chaplin et al., 2021). Numerous studies have examined the extent to which these conditions are present in inmates.

McPhail and Verdun-Jones conducted a study using a broad definition of mental health, including antisocial personality disorder and substance use, and noted that 80-90% of offenders have a mental disorder (2013). According to the Canadian Centre for Addictions, over 50% of federal inmates admitted that, directly or indirectly, substance use, or abuse was related to at least one of their convictions (Fletcher, 2023). A variety of addiction theories hypothesize that chronic and acute stress plays a prominent role in an individual's motivation to misuse an addictive substance and negatively affects a person's coping mechanisms (Palis et al., 2022).

Incarcerated people living with the challenges of substance use, mental illness or reduced mental wellbeing are more likely to suffer from the impacts of trauma as compared to the general community. Ecological and intergenerational contexts often witnessed among this population indicate the presence of early childhood traumas (Gottfried & Christopher, 2017; Finlay et al., 2022). “Research has shown beyond any doubt that early childhood

experience molds behaviors, emotional patterns, unconscious beliefs, learning styles, relational dynamics, and the ability to handle stress and regulate ourselves” (Mate & Mate, 2022). The lack of early childhood well-being can prohibit the development of traits such as empathy, a necessity for self-regulation (Shanker & Barker, 2017; Palacios-Barrios & Hanson, 2018).

Trauma often presents during incarceration, and prisons can be a site of new trauma as inmates are further exposed to violent and traumatic experiences (Adams et al., 2017). Trauma is linked to Post Traumatic Stress Syndrome (PTSD), which presents varying degrees of anxiety, depression, and low self-esteem (Liu et al., 2021). Of note is research by Lighthart et al. that suggests “brain function connected with self-regulation declines after 3 months of imprisonment” (2019; Hazelett, 2022). Many of the characteristics associated with incarcerated people and their diagnoses involve self-regulation dysfunction.

Horticultural therapy programs are being used within corrections environments to address a variety of health challenges. These vary considerably within prison systems and include vocational horticulture and landscaping programs, working farms, formal and informal horticulture programs (Krus, 2019; Farrier et al., 2019). Horticultural therapy interventions implemented across populations have some diagnoses and health challenges in common with incarcerated individuals and have been effective according to practitioners, though not all are focused on self-regulation (Holmes & Waliczek, 2019; Hart & Reisner, 2021). Other HT programs address elements of self-regulation like social cognition (Ascencio, 2018), emotional stability and mental health (Lee et al., 2021; Park et al., 2022), and focus on behavioral challenges common in incarcerated populations like anxiety, depression, and aggression which are associated with self-regulation deficits. Therapeutic goals within HT can assist with the development of self-soothing approaches for symptoms of anxiety and panic, self-control

mechanisms to build healthy anger and agitation management behaviors, and coping strategies for stressors while incarcerated and at post-release, which is significant for this population (Haller & Capra, 2016). Aromatherapy (jasmine and other fragrances) can have diminishing effects on the overactive sympathetic nervous system, known to be involved in neurophysio responses associated with self-regulation (Selhub & Logan, 2012).

The development of HT programs in conjunction with other interventions, including substance use treatments and psychological supports, can increase the overall effectiveness of the practice of HT for this population and therapeutic goals related to self-regulation, all of which can contribute to lower recidivism rates.

Discussion

Limited Awareness Within HT Practice of Self-Regulation and Neuroscience Components

The understanding of self-regulation and its neuroscience components appears limited within HT theory and practice. The neuroscience component does not appear to be part of HT Certificate curriculum at this time (L. Diehl, personal communication 2.13.23). Practitioners grounded in the fields of mental health and wellbeing who are incorporating HT into their services are more likely to be familiar with polyvagal theory, an important part of the mental health field (M. Whitaker Smith, personal communication 2.13.23). Examining HT literature, few therapeutic goals focus specifically on self-regulation or interventions adapting neurological functioning. Strategies used in redirecting and calming/moderating responses to behaviors associated with self-regulation dysfunction are part of HT services. However, an integration of knowledge related to the primary role the autonomic nervous system plays in self-regulation (behavior etc.) appears limited within HT as does understanding the polyvagal theory and polyvagal-informed interventions.

Knowledge of Self-Regulation Can Inform HT Practice

Expanding knowledge about self-regulation can be impactful to HT foundational knowledge and practice. Practitioners shifting from the mindset and theory that physical and psychological responses are the driving forces that cause people to act, think and respond, with limited awareness or acceptance of neurological/ biological/physiological reasons for self-regulation is a seismic change in HT theory and practice.

Recognizing the principle that each person has individualized responses to multiple inputs, and that these are rooted in neurophysiology, shifts the understanding of human functioning significantly. Current HT practice recognizes individualized deficits and uses targeted goals and treatment plans. This focus on individualized responses is also foundational for neurophysiology and self-regulation, the latter placing greater emphasis on individual actions, thoughts and responses.

The principles of neurophysiological basis for behavior, cognitive awareness of maladaptive behavior functioning below the level of the thinking brain, and multiple inputs and activation of brain regions contributing to behavior (inappropriate and appropriate) are significant for understanding clients, treatment and science-based knowledge of human functioning. Porges expresses this as understanding the autonomic state as “an intervening variable [that] would have profound consequences on understanding of behavior and the often-faulty assumption that a behavior is intentional and reliably regulated by rewards and punishments” (2022). Further, cognitive intent and bodily state can have competing behavioral outcomes, for example where a threat to survival exists (Porges, 2022). Porges and Dana’s 2018 book *Clinical Applications of the Polyvagal Theory: The Emergence of Polyvagal-Informed Therapies*, and Dana’s 2018 book *The Polyvagal Theory in Therapy: Engaging the Rhythm of Regulation* provide

foundational information on this topic which can inform HT practice.

This redirect in understanding why people act as they do based on polyvagal theory has significant impact on populations participating in HT. Autonomic nervous system and dysfunctional behavior can be triggered by trauma and other events, with self-regulation challenges evidenced in substance abuse, chronic anxiety disorders, and dysthymic disorders (Wagner & Heatherton, 2017). Trauma is a thread throughout HT services evident in multiple populations.

Within HT practice (and general awareness) some populations are perceived and defined as having neurological features. Mental health and HT professional Morgan Whitaker Smith comments about current understanding: “The terms neurodiversity, neurotypical, and neurodivergent refer to a growing understanding within the mental health and medical world that each individual’s brain is structured according to their unique genetics, experiences, and differences. In practice, however, the terms neurodiverse and neurodivergent are typically used to refer to individuals who have neurodevelopmental conditions such as Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD)...[and their brains] are naturally wired to interpret their experiences and the world around them through a different lens than individuals who are neurotypical” (2023).

Broadening this neurophysiological framework to include all individuals and populations is a profound shift in HT theory, with fundamental impact on treatment. Incorporating research-based knowledge on polyvagal informed approaches (Porges, 2022; Whitson et al., 2016; Muehsam et al., 2017; Dana, 2018; George et al., 2000; Maniscalaco & Rinaman, 2018) within an HT treatment plan expands client assessment to include such elements as seeking a nature-based environment that will engage the autonomic nervous system from a state

of vigilance which creates a barrier to therapy to a state of enjoyment or relaxation allowing for a deeper and more effective therapeutic connection creating the potential for positive outcomes. Plant-based therapeutic treatment plans can be designed to incorporate an individual's favorite plant with sensory cues (olfactory - wearing of an herb sachet, or other visual or tactile cues) to aid an individual in achieving strengthened self-regulation which can result in down-regulating and opening up to what is happening in the surrounding environment.

Applying Neurophysiological Framework to Populations

This paper discusses self-regulation and neurophysiology within the context of HT applications and specific populations – autism, senior and dementia, veterans and active military, children at risk (early years), and incarcerated individuals. It is not limited to these populations, nor are neuroscience-based theories that are mentioned in this paper. Trauma-informed theories, mindfulness interventions and research on healthy self-regulation are foundational for many health disciplines (mental health, social work, behavioral sciences) (LaRoque, 2019). Polyvagal theory and polyvagal-informed interventions as presented in this paper are widely accepted within the health sector and important for understanding neurophysiological processes in behavior and cognition. Some HT practitioners are applying a neurophysiological framework within their practice. For example, a client's experiences and feelings are understood as part of reflexive and autonomic nervous systems, not as intentional responses, and where modifying the association and actively inhibiting threat reactions are co-regulated behavioral and physiological states (Porges & Dana, 2018). Therapeutic goals of practicing cooperation, developing strategies for appropriate responses without emotional distress, practicing self-care and positive relationships with others and community, healthy attachments, and adapting to situations, are evident in HT practice (Jordan, 2015; Ng et al., 2021; Makizako et al., 2015).

Summary

The very complex nature of self-regulation and its role in all aspects of human functioning makes it an important topic for health practitioners across disciplines including HT. Horticultural therapy can be impactful for self-regulation challenges across populations because its foundational elements can align with treatment of self-regulation dysfunction offering applications that can be dynamic, kinetic, sensory, somatic or a combination of all these. Expanding the awareness of self-regulation and its neuroscience foundations within the HT field will expand and elevate theory and practice for this therapeutic modality that can be adaptive, flexible, and appropriate for all populations with its use of people-plant engagement and treatment.

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Biographies

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Maureen G. Bethel DEC, BA, BEd, CAE is currently Manager of Daybreak Parent Child Centre, Community and Parent Programs in St. John's, NL. She has degrees from Vanier CEGEP, Concordia University, Memorial University of Newfoundland and St. Xavier University in the fields of social studies, geography, education (elementary, secondary and post-secondary) and adult education. Maureen has worked in the field of community capacity building with focus on early learning and working with the complex needs of families for over 22 years. She has extensive experience in supporting young children and families through strengths-based holistic programs nested in neighborhoods and community at-large. Maureen is currently pursuing professional development in the field of horticultural therapy.

Tasha Roberts is a private therapeutic horticulture practitioner, entrepreneur, business coach and trainer based in Newfoundland, Canada. She has spent the last 20 years helping businesses, people and plants grow. Tasha graduated from the University of Guelph, Canada as a horticulturist and trained in Horticulture as Therapy. Additional professional development courses include mental health and mindfulness core concepts. Her experience encompasses community wellness, mental health and addictions support groups, and the incarcerated population. She focuses on developing community therapeutic horticulture programs to empower individuals to cultivate stress reduction techniques, self-regulation, and overall health and emotional well-being. Tasha is a membership committee volunteer with the Canadian Horticultural Therapy Association (CHTA) and is pursuing professional registration with the CHTA.

Horticultural Therapy Health Interventions with Female Survivors of Human Trafficking: Program Models

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Abstract

Human trafficking is a growing issue in society, with numbers continuing to expand exponentially. Part of a larger health issue of trauma, in a field dealing with wide-ranging causes of trauma, this paper focuses on female survivors of human trafficking (FSHT) and a specific health intervention of horticultural therapy, now being introduced into therapeutic services for this population. Horticultural therapy, a recognized modality within therapeutic and medical communities, uses plant and gardening activities delivered by trained therapists, in both formalized treatment processes and less formal interventions to address the multi-faceted complexities

of this health and human crisis which includes sexual abuse, violence, physical harm and psychological trauma. To date applications of horticultural therapy for FSHT have been limited. This paper will provide background information and applications of horticultural therapy for female survivors of human trafficking. Informing health care professionals and those working in the field of human trafficking about this health modality will expand its applications, so that more services are available to women surviving human trafficking to aid in their recovery and healing.

Human Trafficking

Human trafficking is defined by the United Nations Convention Against Transnational Organized Crime, referred to as the Palermo Protocol as, “the recruitment, transportation, transfer, harbouring or receipt of people through force, fraud or deception, with the aim of exploiting them for profit. Men, women, and children of all ages and from all backgrounds can become victims of this crime, which occurs in every region of the world” (UNGA, 2000; UNODC, n.d.). Human trafficking exploitation generally falls into two categories - labor trafficking and sex trafficking. It has other dimensions like early child marriages, debt bondage, child soldiers, organ removal, forced begging, and domestic servitude (UNGA, 2000; U.S. Dept. of Health & Human Services, 2020; ATEST, 2021). Organizations like the U.S. Department of Health and Human Services - Office on Trafficking in Persons (2020), U.S. Department of Justice (2023), Destiny Rescue, Polaris, and the National Human Trafficking Hotline (2023) among others, use indices to identify signs of human trafficking, these used across sectors (health, child and family services, law enforcement).

The scope of human trafficking is challenging to quantify. Statistics provide some insight into the scope of the issue, with these numbers constantly

changing due to the dynamic nature of human trafficking and the jurisdictions such reporting covers (national, regional, or global perspectives). The (U.S.) National Human Trafficking Hotline identifies 16,710 victims or survivors of human trafficking in 2021 (2023). The U.S. Department of Defense’s 2023 statistics states that 4.5 million people throughout the world are victims of forced sexual exploitation (2023). One in six endangered runaways reported in the U.S. are likely to become victims of sex trafficking; 20% of human trafficking victims are children (2023; UNODC, 2022). According to the International Labour Organization 49.6 million people globally were living in modern slavery in 2021, of which 27.6 million were in forced labour and 22 million in forced marriage (2022). Of the 27.6 million people in forced labour, 6.3 million in forced commercial sexual exploitation, women and girls account for 4.9 million of those in forced commercial sexual exploitation, and for 6 million of those in forced labour in other economic sectors and 12% of all those in forced labour are children. More than half of these children are in commercial sexual exploitation (International Labour Organization, 2022; UNODC, 2022).

The focus of this paper is on female survivors of human trafficking (FSHT), one group within human trafficking. The negative impacts on health faced by female survivors of human trafficking (FSHT)

are significant, occurring in all health domains including physical, mental, emotional, social, and spiritual spheres (DHHS, n.d.; Gordon et al., 2018; Reid et al., 2020). Research has confirmed the correlation to substance abuse and sexual abuse by those being trafficked and by survivors of trafficking (Altun et al., 2017; De Shalit et al., 2020; Ottisova et al., 2016; UNGA, 2000). Co-occurring health challenges underscore the complexity faced by those who have been trafficked, evident in biopsychosocial domains (Chen et al., 2023; Okech et al., 2018; Vellani & Kristof, 2021; Chivers-Wilson, 2006). Re-triggering of trauma, seen not just in FSHT but in all types of trauma, reveals the depth of health harm, and the long process involving multiple stages in recovery and healing (Coverdale et al., 2020; Hemmings et al., 2016; Ramaj, 2021; Stockl et al., 2021). Poláčková's 2023 article *Horticultural Therapy with Female Survivors of Human Trafficking* describes the current context, providing an overview of the health challenges, related background correlations, recent research, and some emerging health interventions specific to FSHT.

The Broader Context: Trauma and Trauma-informed Care

Human trafficking is part of the larger field of trauma and its related trauma-informed care. The foundations of trauma-informed care (TIC) are significant for services for all types of trauma, generally grouped as personal trauma (acute, chronic, complex trauma) or collective trauma (multi-generational trauma, abuse and sexual trauma, disaster and terrorism, war and military trauma) (Missouri Dept. of Mental Health, n.d.; U.S. Dept. of Veterans Affairs, n.d.). Trauma experienced by female survivors of human trafficking falls into both categories.

Trauma, defined by physician Gábor Maté is “a psychic injury, lodged in [the] nervous system, mind, and body, lasting long past the originating incident(s), triggerable at any moment.... trauma

is what happens inside the individual not what happens to the individual” (Mate & Mate, 2022). This is aligned with findings from the Substance Abuse and Mental Health Services Administration (SAMHSA), which identifies three key aspects of trauma—the event, the experience, and the effects (SAMHSA, 2014; Perry & Winfrey, 2021). Trauma impacts how an individual perceives the world, limiting response flexibility among other psychological deficits, distorting the understanding of the world and their place in it often fostering a shame-based view of themselves (SAMHSA, 2014; Crane, 2017; Mate & Mate, 2022). Medical professionals identify 7 symptoms of trauma: eating disturbance, sleep disturbance, somatic complaints, feeling of helplessness, and irritability to name a few (Center for Health Care Strategies, 2021; University of Buffalo, 2023). These can be experienced by patients, families and staff.

Trauma care seeks to address the pervasive nature and impact of trauma, along with paths to recovery, empowering patients to participate in their health care in safe, caring inclusive environments providing services (Center for Health Care Strategies, 2021). There is consensus on six core “Guiding Principles” of TIC which are both clinical and organizational: a focus on safety, trustworthiness and transparency, peer support, collaboration and mutuality, empowerment/voice/choice, and cultural issues (American Hospital Association, 2019; Duquesne University, 2020).

Trauma-informed care practiced as part of human anti-trafficking work is considered nascent, with the development of guidelines and protocols continuing to be developed addressing the co-occurring health challenges of trafficking survivors, recognizing various phases of behavioral health throughout the healing process (Lanehurst et al., 2022; Costa et al., 2019; Chambers et al., 2022). Research by Ades et al. (2019) notes that most existing services for survivors of sexual violence which would include FSHT focus on acute care immediately following the violence though health

needs exist long after the traumatic event. Re-triggering of trauma, for example, is not unusual.

Horticultural Therapy as a Health Intervention for Female Survivors of Human Trafficking

The horticultural therapy modality is used worldwide, both as formalized treatment (HT), and its less clinical adaptation of therapeutic horticulture (TH). These health interventions are delivered across populations including veterans, seniors, children, mental health and refugee groups and individuals (American Horticultural Therapy Association (AHTA), 2023a). The variety of health challenges that are addressed by HT and TH are broad including physical, mental, emotional, vocational, and cognitive deficits. The versatility, adaptability, and positivity that HT offers as a health intervention has made it an effective strategy for improving lives of individuals with concurrent or single health challenges. Applications are being expanded as health care professionals in other fields develop expertise in HT, integrating this modality into their respective disciplines. In particular, HT services for people with mental health and trauma challenges have grown in the last five years (Whitaker Smith & Lindsay, 2022; Fleming & Kelejian, 2023; Freedle & Slagle, 2018; Kenmochi et al., 2019; Meore et al., 2021; LaRocque, 2019). Horticultural therapy is now being delivered with FSHT, a newer population within the HT field (Poláčková, 2023; Poláčková & Fleming, 2023).

Understanding health challenges faced by FSHT is essential when selecting health interventions capable of delivering health outcomes sought by individuals and their health providers. Horticultural therapy is now emerging as one such intervention. Specific research on female survivors of human trafficking and HT is however limited. Related research includes Branco's study of TH with domestic violence survivors (2022), and Silva-Rodriguez Bonazzi & Febles' examination of survivors of trauma (2022), which FSHT typically experience. Some health challenges and health

outcomes experienced by other populations may be pertinent to survivors of human trafficking and inform their HT treatment such as reducing stress and psychiatric symptoms, stabilizing mood (Shao et al., 2020; Olszewsla-Guizzo et al., 2022; Cipriani et al., 2022; Hart & Zanskas, 2021); increasing self-esteem; reduction in mental dysfunction (Park, 2021; Wiesinger et al., 2006); strategies for coping with trauma (Wise, 2019; Silva-Rodriguez Bonazzi & Febles, 2022); and sexual assault related PTSD dysregulation in neural, endocrine and immune systems (Chivers-Wilson, 2006).

Health challenges identified for FSHT, as single health issues and as co-occurring issues include:

Physical - substance abuse, sexually transmitted diseases, pregnancy, pelvic pain, rectal trauma, and urinary difficulties, transgender challenges, speechlessness, stuttering, muteness, seizure-like responses (Hemmings et al., 2016; Coverdale et al, 2020; DHHS, n.d.; Barnert et al., 2020; Bath et al., 2020; Trinidad, 2022; Sarson & MacDonald, 2021)

Psychological and emotional challenges including lack of self-worth, depression, stress-related disorders, mood swings, psychological trauma, confusion, disorientation, denial, shame, helplessness, disbelief, or panic attacks, grief, chronic stress, deep physical and mental pain, guilt, anxiety, suicidal ideations, PTSD, PTSR (post-traumatic stress response), and nervous system dysregulation (Vellani & Kristof, 2023; Altun et al., 2017; Self-Brown et al., 2022; Meza et al., 2023)

Trauma - from rape, sexual assault, physical and sexual abuse, psychological trauma, and re-triggering of trauma (Casassa et al., 2021; Ades et al., 2019; Chambers et al., 2022), torture with horrific memories, and verbal torture (Sarson & MacDonald, 2021)

Cognitive challenges due to trauma, intellectual disabilities, neurological and nervous system dysregulation (Vellani & Kristof, 2023; Altun et al., 2017; Chivers-Wilson, 2006; Perry et al., 2022)

Social challenges - uncontrollable mood swings which might be expressed through unhealthy behavioural patterns due to distorted and dysfunctional coping mechanisms (SAMHSA, 2014; Reid et al, 2020; Casassa et al, 2021; Van der Kolk, 2000; Okech et al., 2018), distancing dissociative survival responses (Sarson & MacDonald, 2021), and housing instability (Dierkhising et al., 2022).

Horticultural therapy, like other therapeutic modalities, utilizes a treatment process methodology. Health goals are identified with intervention activities selected that can address the deficits, working towards measurable health outcomes. In the case of FSHT, wide-ranging health goals span all health domains. One of the complexities with this population – they have concurrent health challenges across health domains and re-triggering of trauma often occurs. Goals for FSHT include building resiliency, increasing self-esteem, and strengthening physical functioning. An individual's exploitation may require very specific (less general) treatment goals depending on their type of trauma and trafficking. Listed below is a sampling of health goals, therapeutic horticulture activities and measurable outcomes used in HT practice with FSHT.

Development of Horticultural Therapy Programs for Female Victims of Human Trafficking

The FSHT population, individually and collectively, present with multiple and serious health deficits. Because of the complexity, FSHT are probably best served by involving health professionals from several disciplines, specifically trauma specialists or mental health practitioners in addition to horticultural therapists. Interdisciplinary treatment teams may be effective in providing expertise in various specialties of trauma, substance abuse, and physical health challenges. The use of a TIC framework with a holistic approach to healing and health improvements is becoming more prevalent.

This paper seeks to identify models of HT/TH programs developed and delivered for FSHT. There are few in number at this time. Some facilities prefer to remain unnamed for safety reasons; some have been overwhelmed by requests for services when specifically identified. For purposes of this paper, some have been identified as “Model: Country” to protect their anonymity.

Common themes emerged when the seven models were examined. Several of the HT/TH program models with FSHT participants were initially implemented for vulnerable populations of individuals who had experienced trauma, many with substance abuse, domestic violence, and sexual abuse problems. It is too early to determine if this will become a trend but given the desire for organizations and participants to avoid being labelled, categorized or singled out as those providing services for survivors of trafficking, this may occur. What does appear to be a commonality in the programs, were women who were unreported survivors of sex trafficking. Survivors did not or would not always recognize their situation. The impetus for more specialized focus on female victims of trafficking evolved from some programs developed for vulnerable populations; subsequent HT/TH programs may be able to address health deficits more effectively where FSHT are not grouped within this broader population and programming, unless remaining part of such a group, unlabeled as FSHT offers greater benefits and health outcomes.

Program Descriptions

Model: A Facility: Kenya

A facility in Kenya working with vulnerable populations delivers services enabling girls and women to become self-sufficient for themselves and their families, addressing the cycle of poverty and oppression. For over a decade, girls as young as 8-10 years old have run from their villages to the facility to escape female genital mutilation

Health Goal	Therapeutic Horticulture Activity	Measurable Outcome
Identify & explore tasks that represent renewal in human & plant life (spiritual, emotional, cognitive)	Plant seeds, re-pot vegetative transplants too large for current container, divide plants, or prune unhealthy stems/branches from plants	Identify 3 stages of plant growth and renewal, relating them to personal renewal & growth; group discussion or one on one with therapist & completion of Flourishing Scale* (Diener et al., 2020)
Develop 3 mechanisms for channeling strong emotions & outbursts (cognitive, emotional)	Make seed bombs	Using Pre/Post Retrospective Evaluation* client reflects on stress/anxiety before and after activity & life situations; identifies 3 strategies for channeling strong emotions
Strengthen sense of empowerment & self awareness (emotional, spiritual, cognitive)	Practice making personal choices-choose plants to care for (seeds, transplants, or established garden)	Client self-identifies 5 expressions of sense of empowerment/choice influenced by heightened self-awareness in verbal or written format
Learn to be in the present moment (emotional, psychological)	Walking in garden or greenhouse, client selects a plant that resonates with them during the session, discussing reasons for selection	In group discussion, client indicates 2 reasons why they chose their plant on this day
Create healthy boundaries in social settings, relationships (psychological, physical, social)	Work cooperatively in a group establishing garden bed borders to contain plants as metaphor for human boundaries	Client participates in group discussion about setting boundaries for plants & self
Increase physical activity to improve sleep for physical & psychological improvements (physical, cognitive, emotional)	Plan & undertake a schedule of garden work tasks (to be done during daylight hours to increase melatonin production), increasing physical requirements over a one-month period	Review work schedule & task completion with therapist, confirming increasing physical demands; keep sleep log over this period with comments re impact on mood & physical health

*These are recommended measurement tools; they have not been used with FSHT populations.

(FGM), early forced marriage (EFM), and child marriages. The latter is considered a form of human trafficking (Warria, 2019; UNGA, 2000). Facility and medical staff recognize the physical and emotional health harm these cultural traditions inflict and are familiar with villages where such practices are occurring. The facility and its staff do not identify or use the label FSHT.

A variety of programs and opportunities seek to empower girls by providing them with the skills and resources necessary to become self-sufficient. The therapeutic horticulture program was designed for the girls as part of vocational and skills development training. The TH program created a non-threatening space using plant-related daily activities, with 30 girls 15 years or older participating. It was delivered once, over a one week period with a follow-up session a month later. Each of the TH sessions lasted 2 hours and were followed by 30-40 minute after-session time for processing and reflecting on the plant activities. The program was developed and delivered by horticultural therapy practitioner, Zuzana Poláčková, structured so that once she departed, facility staff could implement the program, relying on the TH model and activities. This, and the staff's familiarity with the participants, were deemed essential for achieving positive outcomes given the short duration of the programming.

The goals of the TH program include identifying anxiety and stress and creating helpful coping mechanisms, recognizing anger and aggression as a healthy reaction to bodily harm, and learning different ways of expressing self-love, self-acceptance, and self-identity. The program maximizes sensory stimulation techniques, particularly effective in helping participants connect with reality, while creating positive memories and experiences. The program seeks to promote a sense of belonging and acceptance, delivering activities involving group tasks in support of working together. The TH activities include planting, harvesting, and cooking plants from the

garden, as well as painting, floral decoration, guided garden walks and story sharing.

Model: Community Gardens: UK

The UK community garden model was initiated as a simple gardening project for vulnerable members of the local community by faith based organization Kairos. Funding was provided by public health agencies, local grants and several fundraisers organized by the charity. The HT project was developed over a four year period by HT practitioner Zuzana Poláčková. It was set up in a specific geographical area known for its human trafficking population, particularly those subjugated to labor trafficking and forced criminal activities. Participants had vulnerabilities related to financial resources, generational poverty, mental health issues, substance, and sexual abuse. Labelling and defining of participants by type of trauma including FSHT was purposely not done by staff, relying instead on non-judgmental interactions and a philosophy of inclusion.

Set up with a green gardening space, the TH and HT programs for this mixed population focused on addressing common themes of isolation, loneliness, low self-esteem, anxiety, PTSD, suicide ideation and distorted views of themselves and the world. The program sought to create a safe and non-threatening environment where behavioral needs and effective interactions between participant, therapist and staff could occur in support of participant's self-discovery of their unhealthy behavior patterns, these developed over their lifetime in abusive, unhealthy situations, and as a path forward towards healthier living.

The HT and TH program integrated goals across health domains using plant and gardening hands-on activity. These included physical goals: improving mobility, endurance, coordination, joint and muscle development, and positive physical activity in support of a healthy lifestyle. Emotional goals focused on improving self-esteem, positive

thinking, mood and appropriate reactions, along with lowering stress and anxiety. Interpersonal/social skills included: sharing experiences and memories, increasing sense of belonging, learning to work in group settings, customer service skills with a focus on future job search, promoting acceptance of different opinions, cultures, races, and practice setting healthy boundaries in social interactions. Cognitive health goals involved: learning new skills, following instructions, problem-solving, staying on task, taking control and responsibility for tasks, and increasing creativity.

Therapeutic techniques including sensory stimulation (neuroscience-based self-regulation activation, kinetic, vestibular, proprioception), metanarrative stories, metaphors, analogies, and real-life examples were utilized in the HT/TH program. These services were delivered in conjunction with nursing and case worker staff, with clinical HT (including charting) occurring for some participants. Therapeutic plant programming was effective, cathartic and healing for participants based on their positive responses. The HT modality was able to address cognitive distortions, providing opportunities to re-direct perspectives and behaviors.

This program served more than 70 participants. The HT program ceased when the HT practitioner was no longer available. On-going garden-based programming continues, with a focus on food insecurity, deemed the primary need of the local community post COVID-19.

Model: Recovery Home: Canada

This model was established for women in a live-in recovery home providing a range of trauma-informed therapeutic and recovery services. Referrals to the facility were based on substance misuse, and participant's willingness to commit to the months-long program. No data on the type of trauma participants had been subjected to, or identification as female survivors of human

trafficking was formally gathered, however, staff felt many of the women were female victims or survivors of domestic violence, sex and gender-based violence, sex abuse, with most of them having lived in an abusive and/or addictive environment (using Palermo Protocol as reference). Several participants self-identified as having been living in human trafficking situations.

The participants were in various stages of personal and social recovery characterized by high risk of self-injury, suicidal thoughts, individual and collective mood swings, PTSD, anxiety, distorted self-worth, self-blame attitude, and narcissistic tendencies. The participants were isolated, unemployed, struggling with substance abuse, self-esteem, self-worth, and depression.

The facility's therapeutic interventions included The Twelve Steps, Building Healthy Relationships, Addressing Historical Family Trauma, and Developing Life and Problem-Solving Skills, along with Horticultural Therapy and Therapeutic Horticulture. The latter service was delivered by horticultural therapy practitioner Zuzana Poláčková. The HT/TH programming, like the other therapeutic services, was formally structured with extensive safety protocols, close supervision, and low staff: participant ratios. The HT programming sought to respect each participant, providing services for exploration and change, while simultaneously giving a sense of manageable freedom. Given the physical and emotional stages of the recovery process, and individual circumstances, the environment—sight and sound, temperature, lights, seating, and humidity were carefully monitored, these impactful on participants' medications and mood.

The HT/TH program was developed with a six month duration. Its overall goal of promoting recovery of individuals for healthier, productive lives where supportive relationships could be maintained, aligned with the other therapeutic services. The TH activities took place in several

working areas and were tailored to individual need. Services were delivered both in group settings and one-on-one. Careful consideration was given to plant toxicity and hallucinogenic properties, working tools and the working farm and greenhouse environments. Plant activities included building compost piles, planting and harvesting vegetables and flowers, floral decorations, making seed bombs, drying flowers for card making, construction of bird boxes and feeders, sawing wood in winter months, and participation in guided nature walks.

Therapeutic goals for the HT/TH program at the live-in recovery home spanned all health domains. Of note were emotional goals: expressing stress and tension in healthy ways, reducing anger and aggression using appropriate release/coping strategies, increasing self-awareness - identification of negative emotions, personal growth, in addition to promoting self-care, self-esteem, self-worth and positive thinking. Spiritual goals utilized metanarrative storytelling for connecting with nature and the natural environment, meditation, and grounding exercises for increasing spiritual (distinct from religion) awareness. Sensory stimulation techniques activated senses, memories, and experiences as mechanisms for connecting cognitive and emotional goals, and for stimulation of cognitive processes. Physical goals - improving standing, balance and endurance strength, fine and gross motor and coordination skills addressed physical deficits common in FSHT (and other participants). And interpersonal/social interactions, distorted by their life experiences, included goals addressing respect for others, cooperative skills for working in groups, building healthy boundaries and relationships, sharing experiences and memories, increasing sense of belonging and acceptance, and understanding motivation as a component of job success. The TH activities were able to support sense of renewal, personal growth, passage of time (healing is a process), and coping with life's unpredictability and unexpected outcomes.

This program is no longer operational due to the unavailability of an HT professional to deliver this type of therapeutic service.

University of California Irvine (UCI) CARE Therapeutic Horticulture Program

A therapeutic horticulture workshop *People & Plant Care*, a pilot session for UCI CARE, was available for those who identified as survivors of violence and who were seeking tools for personal growth and restoration. "UCI CARE provides free and confidential support services to members of the UCI community who have been impacted by sexual assault, relationship abuse, family violence and/or stalking" (UCI Care, 2015). No data on type of trauma or identification of female survivors of human trafficking was/is gathered. "Programs and services are available to people of all identities and regardless of status. UCI CARE aims to end these forms of power-based personal violence by engaging the campus community in education, programming, and transformative action".

The TH program was delivered as a safe place for participants to gain insight into how regular practice with horticulture can bring joy and balance to life. The program sought to provide new opportunities for coping skills and healing, with parallels between caring for plants and nurturing self, creative outlets for providing resiliency in times of stress and recovery, and insights into cognitive, physical, spiritual, and emotional health benefits. Delivered by horticultural therapy practitioner Joanna Brown as a contracted service, the hands-on activity of potting a plant has been effective in working towards the stated goals. The TH workshop involved 10 participants (adults, a mix of college students and mixed gender identities, ages ranging from 18-45) in a 60 minute session. Future collaborations with UCI CARE RE: GROW holistic healing resources are being explored.

This program model has been included due to the relevancy to FSHT of the program's therapeutic

goals and a possibility that some participants may be FSHT. This TH program model is unique given the setting within an academic institution, and for identifying terminology/description of sexual violence expressed as power-based violence.

Selah Freedom Therapeutic Horticulture for Survivors of Human Trafficking Residential and Outpatient Program

Selah Freedom, an anti-human trafficking non-profit organization 501(c)3 based in Florida and the Midwestern U.S.A., has as its mission to end sex trafficking bringing freedom to the exploited (survivors). It utilizes a multi-themed program involving Awareness, Prevention, Outreach, Residential habitation, and Consulting. The therapeutic program, *Horticulture For Healing's Plant Care is Self Care*, was funded through a grant and was delivered by contracted horticultural therapy practitioner Joanna Brown in support of participants/survivors. Both residential and transitional/reintegration care departments were involved in conjunction with Selah's established mentorship and advocacy program at their Florida location. Due to COVID-19, the workshops were delivered virtually, some in group residential setting (the facilitator was on zoom), and others, in collaboration with a Selah Freedom advocate/mentor, who took the workshop's care kit (with plant, soil etc.) to their homes.

Program goals included improving or strengthening spiritual and emotional health through connecting to nature and plant activities, channeling anger, and expressing strong emotions through creating seed bomb activity, discovering therapeutic horticulture as a form of self-care through the practice of plant care and how it mirrors personal self care, and practice nurturing a living organism while witnessing its growth. Using plant and plant-related activities as metaphors for these, and for advocating for their own creation of personal and sacred safe space, 12 program participants participated in 6 sessions once a month for a 6 month period.

Program facilitator Brown developed the program so that it could be delivered by other staff. (Brown also produced 5 videos on related topics). A total of 40 Plant Care is Self Care kits were distributed: 10 kits for residential participants and 10 for at home mentorship. The remainder of the kits (20) went to Selah Freedom outreach services in which the facilitator did not have direct participant contact. Selah Freedom's outreach program provides outreach on the streets and in the jails through their sex trade support group, case management and resources for survivors of sex trafficking and exploitation.

New Hanover County Extension and Arboretum North Carolina: Trauma Survivors Therapeutic Horticulture Program

A collaborative partnership with A Safe Place (ASP), North Carolina Master Gardeners, and the Therapeutic Horticulture Agent of New Hanover County Cooperative Extension, developed a program called, "Building a Personal Connection with Nature" which is offered for female survivors of human trafficking. The non-profit organization, A Safe Place, focuses "on prevention, advocacy, and restoration to assist victims of commercial sexual exploitation and sex trafficking". Their staff accompany the women to the program delivered at the NHC Arboretum (North Carolina) and are responsible for addressing issues related to the individual's treatment plan that may arise during therapeutic horticulture (TH) sessions. Clinical issues are not discussed in TH sessions at the NHC Arboretum. The New Hanover County Therapeutic Horticulture Program has been in place since 1999, with trauma forced programming beginning in 2020.

The program focuses on two goals: to help the women feel safe in a public space, in this case, a public garden, and to foster a sense of resiliency through nature-based activities. While activities are facilitated by trained program leaders, the concept is to teach the women independent skills to use as

they navigate their healing process and the rest of their lives. Learning to feel safe in a public area is an important component of their self-resiliency, making the grounds of the NHC Arboretum an integral component of their work to strengthen personal connections through engaging with nature.

The program is offered twice a year, April/May and September/October, with weekly, one and half hour-long sessions, eight or nine weeks, depending on the calendar. Attendance is capped at six women per seasonal program, with the same women attending each week. It is facilitated by two trained Extension Master Gardener Volunteers (EMGVs) who developed the curriculum with support from the New Hanover County Therapeutic Horticulture Agent. The EMGVs facilitate TH activities using all five senses to develop a life-long relationship with nature. Each weekly session follows the same structure: welcome (centering and recognition of place), introduction of the day's activities, passive activity (meditation, relaxation, centering exercises), active activity (planting, flower arranging, harvesting), session evaluation (with participants identifying what was useful, what was not useful, their personal interests), homework (individual practice of observing nature), closing (summary of the session), and check out (addressing any questions or needs). All activities focus on the (healing) process, not the horticulture product (flower arrangement) in accordance with AHTA standards of practice, with the expressed goal of working to build positive experiences for the women who attend.

Specific activities that are employed include: dividing aloe vera and learning about aloe's healing properties, sensory awareness by focusing on one sense while working through breathing exercises, walking the garden's labyrinth, potting fragrant herbs, creating nature mandalas, sensory awareness through ecology of trees, planting seeds, nature journaling and dried flower wreaths. The curriculum is adapted as the EMGVs get to know

female participants and receive feedback from ASP staff so that a dynamic program which can best address each individual woman is delivered.

The comments made by women attending the program and their accompanying staff have been overwhelmingly positive and an evaluation tool is being designed where health outcomes can be captured, to be used as data for program improvement.

Healing Garden for Children and Families: Chamchamal, Iraq

The Jiyan Foundation for Human Rights, in partnership with international organizations, have built the Healing Garden as a sanctuary and delivery site for a range of programs and therapeutic services using a holistic approach to healing and recovery for women, children and families who have experienced violence, trauma and trafficking. On-going violence in the city of Chamchamal and the surrounding northern Iraqi region of Kurdistan has persisted since the 1980s begun under the Saddam Hussein regime. Since 2014, ISIS has systematically gone into Yezidi villages killing the men and selling the women into sexual slavery (International Federation for Human Rights & Kinyat, 2018).

The documentation of atrocities includes trafficking. Survivors including FSHT have acute trauma, social and psychological issues, physical injury and loss of livelihoods. The Jiyan Foundation does not use the term female survivors of human trafficking. Individual and group therapy utilize the Healing Garden for therapeutic services. Prominent among these is horticultural therapy for survivors of trauma and other health concerns with a focus on psychological trauma care, stress reduction, improvements in motor function and muscle memory, and skill development. Since 2020 "in cooperation with the German institute Garten Helfen Leben, Jiyan therapists from Chamchamal have been trained in horticultural therapy"

providing HT interventions with clients from Chamchamal's treatment center and women's clinic (Jiyan Foundation for Human Rights, n.d.).

Discussion

Horticultural therapy as a component of trauma care with implications for services with FSHT

The field of trauma care is evolving, with standards of practice being discussed and developed worldwide including the 6 guiding principles previously mentioned (American Hospital Association, 2019). These developments have direct impact on FSHT including implementing trauma-informed care in primary medical settings (Hamberger et al. 2019), greater awareness of vicarious trauma, women's health issues (Harvard Medical School, n.d.), state and non-state torture, the latter emerging as an important issue and component of trauma and trafficking being discussed at anti-trafficking conferences and online forums (Canadian Sexual Exploitation Summit 2023, Persons Against Non-State Torture website) (Acharya, 2019; Sarson & MacDonald, 2021). As the field develops, additional services and health interventions will emerge. Horticultural therapy appears to be on the cusp of this with a few programs for victims of trafficking available, and specifically for FSHT as identified in this paper. Horticultural therapy is a lesser-known treatment modality, which has a few obstacles to its greater use in trauma-care including not being 3rd party reimbursable by U.S. health insurance (making program funding more challenging), the small number of HT credentialed practitioners, limited number of HT/TH programs for FSHT, and consequently few HT professionals experienced with this population. It does however offer health benefits and outcomes validated with other populations in hospital programs, and other settings.

Validation of HT programming for FSHT

Given the limited number of HT programs for FSHT, additional programs and research will be needed to validate this type of health intervention. There is demand for health services addressing and improving the health of human trafficking victims, not just women. And as noted previously, HT/TH interventions within the larger field of trauma-informed care will also provide important data and protocols. Practitioner Poláčková comments that the HT/TH modality has the capacity to quickly adapt, and when used within interdisciplinary treatment teams, can for example, treat individuals across disciplines when physical manifestations relating to understanding their reality and aftermath occurs at the point when their full stories happens. As more HT practitioners and health professionals become aware of HT interventions for trauma informed care it is probable that more programs will be available.

Identifying victims of human trafficking

Identifying victims of human trafficking is challenging, not just for HT/TH programming, but globally for many institutions and for many reasons. The UN's Office on Drugs and Crime's Global Report on Trafficking in Persons 2022 stated that "institutions are too often failing to detect (and protect) trafficking victims". Countries with patriarchal societies and cultures have higher incidences of violence against women (in 18 countries husbands have legal authority to prevent their wives from working, and 49 countries lack laws to protect women from domestic violence) (UN Women, n.d.; The World Bank Group, 2017).

Internationally recognized definitions of human trafficking are guided by the United Nations Convention Against Transnational Organized Crime and its Palermo Protocol (2000) within the anti-trafficking sector. The label "disordered"

for people and women impacted by torture and trafficking is now regarded as unethical and intellectually inaccurate when behavior has been survival adaptations, these being complex survival responses to atrocities they have endured (Sarson & MacDonald, 2021). There is need for a distinction between identifying trafficked persons for the purposes of health services separate from crime prevention.

Research undertaken for this paper revealed two distinct approaches to identifying FSHT. Some programs specifically identified and delivered programs for FSHT as a distinct and separate population (New Hanover County Extension and Arboretum (in NC) Trauma Survivors Therapeutic Horticulture Program). Other programs did not identify FSHT (intentionally or not), where FSHT were included in programs described as vulnerable population programming (UK Community Gardens).

Horticultural therapy programming is using both approaches, sometimes choosing to be very specific regarding program participants and their specific needs as is the case of the Kenya model with young females and early child marriages. Other programming includes FSHT in programs for vulnerable populations with a focus on health goals pertinent across this broader population which may include FSHT though not specifically identified. As noted previously, some people prefer or do not recognize themselves as survivors of human trafficking. This is yet another component of human trafficking that health professionals need to be sensitive to - legitimate need for identifying an individual as a victim or survivor of trafficking, as well as American health HIPPA confidentiality regulations, and the individual's preference for being identified or not identified as a FSHT.

Metanarrative-storytelling technique used in HT/TH programs with female survivors of human trafficking

Mindfulness, guided visualization, and metanarrative-storytelling techniques were incorporated into HT sessions delivered to FSHT (Z. Poláčková, personal communication, Jan. 2023). These were informed by Kaplans' attention restoration theory (Kaplan & Kaplan, 1989). Storytelling is considered a therapeutic intervention that is proven to help participants cope with a physical disease (Chelf et al., 2000) and can help a person understand their emotions and reframe the traumatic experiences (Brockington et al., 2021; Sarson & MacDonald, 2021). "A metanarrative technique was particularly effective with FSHT. This technique discussed fictional figures like Don Quixote and four historical and anecdotal garden settings that provided situations where allegories and metaphors for real-life experiences of participants were explored in a safe environment. This technique/activity re-enforced an overarching account or interpretation of events FSHT had experienced providing a pattern and structure for participant's beliefs, giving meaning to their experiences. Metanarratives helped connect individuals to other group participants, each with their own personal journey but with a shared violent situation. This therapeutic technique was the basis for developing coping tools where their own reality could be interpreted in a new (healthier) way within the HT modality because often the healing and recovery starts by accepting their own stories, expressing, and sharing them with others" (Poláčková, 2023). "Silence is a tool of the perpetrators to keep people isolated in their gruelling ordeals of getting by each day" (Sarson & MacDonald, 2021).

Applications of HT programs for other survivors of human trafficking

Based on programs delivered to FSHT, the modality appears capable of addressing goals related

to human trafficking. Though each individual who has survived human trafficking has their own experience, many of the health challenges including trauma, physical and psychological harm are present across trafficked populations. Horticultural therapy and therapeutic horticulture lend themselves to flexible and individualized treatment interventions. Attention to the specific needs, challenges, and type of trauma experienced by individuals, and populations of child, male and LGBTQ trafficked groups should be considered when developing HT programs (UNODC, 2022).

Summary

Seven programs have been identified where HT/TH has been used with female survivors of human trafficking. The programs can function as models, replicable for other FSHT and individuals trafficked and experiencing trauma and co-occurring health harm. Each of the programs is unique, with distinctive characteristics, communities, host facilities, and circumstances where FSHT were brought together for this specific health intervention. Developed and delivered in several countries and continents, the HT/TH models were used in diverse settings—academic institution, botanical or healing garden, residential housing for trafficked women, substance misuse treatment

center, community garden, and a rescue center in Africa. Each program's defining characteristic was also unique—young girls vulnerable to forced child marriages, Iraqi violence targeting ethnic/religious communities including women, substance misuse, sexual assault experienced by university-aged women, geographical concentration of trafficked individuals, and formalized services delivered in community partnerships with anti-trafficking agencies. The common thread of violence and exploitation of women sheds light on human trafficking, a global issue with criminal and health impacts.

The seven programs with FSHT reflect the breadth and scope of applications HT/TH programming can provide. Recent articles and presentations on HT/TH interventions with FSHT have expanded awareness in Canada, Dominican Republic, U.S., Germany, the UK and other countries. Foundational elements of horticultural therapy including connections to plants, nature and garden settings, and health services delivered in non-threatening contexts provide alternative treatment options for FSHT, and potentially to other human trafficking survivors. As such, further use, research, and review of horticultural therapy for FSHT may yield effective health outcomes and expand health services across this population.

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Horticultural Therapy Activities for Transplant Patients

Monica C. Moscovici, BS



Abstract

With the consistently increasing number of transplant patients in hospital and medical settings, providing clinically relevant, engaging Horticultural Therapy activities for this growing population has become necessary. An increase in literature and analysis of such activities would be beneficial and timely for the creation of clinical practice guidelines in this specified subfield

of the profession. Here is one such analysis of a sleep pouch activity along with specific alternate variations for interest, ability and clinical goals respectively. Special considerations, knowledge and experience pertaining to materials, instructions, budgeting and contraindications (along with participation encouragement tips) are included based on initial trials with this activity.

Introduction

The prevalence of life saving organ transplants has been steadily increasing for the past 12 years. In 2022, 42,887 organ transplants were performed in the United States, an increase of 3.7 percent over 2021 and a new annual record for the third year in a row, according to preliminary data from United Network for Organ Sharing (unos.org, 2023). With this increasing population of patients in rehabilitation units and medical settings, therapeutic intervention for transplant patients will soon become part of the future in many clinical fields, including Horticultural Therapy. This is because “transplantation does not offer a cure. Transplant patients still face many challenges related to physical functioning, mental health/psychological well-being, and social functioning” (Engle, 2001).

Lundmark et al (2016) developed a new framework of post transplant recovery. According to this, the first three weeks, in post operative, inpatient care, constitute the first turning point in recovery, setting the stage for future outcomes. Interventions at this point can be highly beneficial.

At this stage, physical recovery involves regaining control over reflexes, motor activities and normalization to regular or near regular functioning (Dunn et al., 2020). It can also include adjusting to

new physical restraints and symptom management. Psychological and social recovery at this point involves avoiding the negative factors of depression and isolation (Lundmark et al., 2016). “Predictors of a diagnosis of depression [and/or anxiety include]... a lower sense of mastery in the initial two months post transplant” (Engle, 2001). So reinstating integrity in one’s personal and cognitive ability while making the emotional transition and reorientation to a new situation (see mindfulness research in “Discussion & Considerations” section below) are important landmarks for psychological recovery. Not to be underestimated, social recovery is also an important factor in this framework, shown by social re-adaptation post transplantation (Lundmark et al., 2016).

Horticultural Therapy (HT) has been proven to help meet all of the goals above in a recovery setting. It can offer an enjoyable opportunity to improve both fine and gross motor skills and eye-hand coordination (Moore, 1989), physical and psychological normalization, diversion from or help with pain management (Irish & Young, 2019), improve personal satisfaction and self esteem (Pothukuchi & Bickes, 2001), help reduce anxiety (Mooney & Milstein, 1994)/depression (Cooper Marcus & Barnes, 1999) and improve social integration (Kweon, Sullivan & Wiley, 1998) or increase social interaction

(Perrins-Margalis, Rugletic, Schepis, Stepanski, & Walsh 2000). Plus, group activities that hold appeal for recipients [such as horticultural therapy] may provide the positive incentive needed for the monumental change from the often sedentary pretransplant state to the sustained effort it will take to regain post transplant health, physically, psychologically and socially (Dunn et. al., 2020).

But such an increase in post transplant patient populations brings with it an increase in very specific medical needs and therapeutic interventions. This does not come without several distinct challenges, especially in the delivery of HT services.

Special Considerations

Soil and water used for plants, flowers, and even fountains can contain microorganisms. A small number of these microorganisms may be pathogenic and could present a risk to immunocompromised patients, making their use prohibited in many rooms and even units in a hospital or medical setting (NYU HOSPITALS CENTER INFECTION PREVENTION AND CONTROL, 2014).

Therefore, based on the CDC recommendations, certain materials used in the HT profession are restricted, not only for this group of patients but also for patients that share a room with non solid organ (such as lung and bone marrow) transplant patients. This additional part of the standard protocol further limits participation for patients whom standard HT activities can not be applied. Hence the current need for a more diversified set of activities for the growing number of transplant patients as well as patients sharing the room. However, this challenge can be overcome with a minor set of adjustments in activities for such an expanding population. This author proposes an increased set of diversified HT activities for this population in order to begin forming best practices methods in this unique and specified subfield of the profession. Therefore, this is one such analysis of a

sleep pouch activity and the different variations that can stem from it.

Methods

Materials

- discount store drawstring mesh/organza bags or cotton/muslin/paper tea bags
- dried herbs in individual containers
 - lavender
 - rose or rose scented geranium
 - mugwort
 - lemon balm
 - lemon grass
 - chamomile
 - catmint
 - rosemary
 - hops
 - peppermint
 - sweet marjoram
 - juniper or white pine
 - any other desired herb
 - fresh ground coffee(optional)
- note card with information on each herb (optional but helpful)
- dried rice (optional, as an added filler, weight and aroma dispenser)
- mixing bowl (a big plastic liquid measuring cup with handle works quite well)
- tablespoon & teaspoon for measuring & mixing funnel
- empty note card label & pen

Directions

Have participant

- 1) Smell each herb, one at a time
- 2) Observe how crushing the herb between the fingers releases the essential oil, as opposed to just smelling the whole herb
- 3) Verbalize anything the smell reminds them of or makes them feel and converse about any memories or benefits it may evoke
- 4) Smell fresh ground coffee between each herb to clean the scent palate (if needed)

- 5) Choose one herb to form the base of the pouch
- 6) Choose up to three supplementary herbs and their corresponding ratios
- 7) Take out pointy stems or anything that can poke
- 8) Mix the herb preparation in bowl
- 9) Add dried rice (optional)
- 10) Add herb mix into pouch (double bag if needed) using funnel
- 11) Knot drawstring
- 12) Place sleep pouch under pillow to release therapeutic scent under pressure of pillow movement at night
- 13) Write note card label to remember ingredients and effects of each

Clinical Goals

Physical

- Fine motor skills
- Range of motion
- Activity tolerance
- Endurance
- Hand eye coordination

Cognitive

- Readjusting and orienting to the present through using sense of touch and smell
- Multi step task sequencing
- Memory/Learning (about plant material)

Emotional

- Diversion from pain and/or current situation
- Stress reduction
- Normalizing

Social

- Opportunities for socialization
- Offers potential for reminiscing and sharing nice memories
- Empathic support

Budget

Using materials from a discount store and dried herbs from a reputable company, depending on the number and type of herbs, this activity will cost about \$2.88 per person initially with an average of

\$1.61 per person in future herb refills (once all other standard/reusable materials have been attained). See Appendices C & D for further reference.

Discussion & Considerations

Once the initial cost is covered, the foundational materials can be reused and the individual dried herbs chosen according to individual pricing, times when they are on sale or based on demand from participants. As one continues with this activity, options for cutting costs can be found, especially for the dried herbs themselves. Choosing a dried herb company due to its excellent standing and highly professional standards for organic growers and drying processes is highly recommended. It is important to note that if the drying process is not done properly, it renders the materials susceptible to microorganism growth such as mold, defeating the purpose of this activity.

A larger, more professional herb company may also provide the best pricing per quantity, even outcompeting standard big box stores, both online and brick & mortar. If one's budget is especially restrictive, however, herbs can be more creatively chosen according to their pricing (such as avoiding rose buds and hops and getting the cheaper French lavender instead of the less mentholated and sweeter smelling English Lavender). A smaller amount of the moderately expensive herbs can also be considered to relieve budgetary restraints. See Appendix C for more information on pricing and explanations for each herb.

Another consideration is the patient's willingness for participation. Not all patients are in a position to have the patience or ability to go through all the herbs or enjoy the thought of keeping an herbal sachet under their pillow. For those with different interests and/or patience levels. Many of the dried herbs can be used to make interesting herbal tea combinations that can be placed in paper tea bags or coffee filters tied at the top with a little cotton string.

For those that have even less patience and interest, a spice mix can easily and quickly be put together (with the addition of a few organic grocery store bought herbs) and placed in a paper tea bag, pouch, seed envelope or coffee filter, also tied at the top with a string. Pending individual patient diet restrictions, one could even make an herbed salt rub placed in half pint mason jars (if allowed). Alternately, for those that specifically enjoy the aromatherapy aspect of the activity and would like to continue with that theme, one can present essential oil infused hand cream, herbal sugar or salt scrub, smudge stick gift, herbal (rice or buckwheat weighted) eye pillow or room/aerosol spray in travel size spray bottles as activity options (See Tables B1 & 2).

Providing information or a small fact sheet about the idea of aromatherapy and some of its science based studies will add an extra layer of understanding and knowledge while offering a good introduction to the ways one could benefit from participation in this activity. Similarly, providing note cards containing information on origin, growing tips, fun facts and especially the possible therapeutic qualities of each herb enumerates the added future benefits of the activity. So does having a picture or actual specimen of a stem of each herb in its fresh form, where possible. This will not only enhance the experience of the activity but also allow for conversational points, socialization and possible reminiscing.

As shown above, this activity has the ability to be easily structured and graded in order to fit many different interest and ability levels. Likewise, it can also be used to easily fit many different types of clinical goals. This author chose to encourage use of the senses as the main concentration of this activity. Especially the use of touch and smell. Sound could be experienced by listening to how each herb crinkles when rubbed between the fingers and the different color variations can be used to stimulate discrimination in vision. Reflection on how experiencing these senses makes the participant

feel, for each consequent herb, was a strong secondary goal while encouragement towards future planting or other ways to interact with the given information and knowledge can be tertiary. To that effect, it was proven to be most potent to provide and encourage manipulation of a finished example of the sleep pouch (or tea or spice blend) in the very beginning of the session in order to set the stage for an experience of the senses.

There are many ways we experience nature and plants besides planting. The slightly more passive experience of establishing a connection to plants through the use of our different senses, a practice which is often overlooked (consciously speaking at least) but which has long standing and well studied proven beneficial potential. Buddhists have long been generating such benefits through a mindfulness practice that encourages an unabashed awareness of what one is sensing or feeling in the moment, without judgment; Something that is surprisingly harder to do in actual reality than in theory. That's why this activity allows for a perfect introduction and beginning into such practices, by providing engaging sensory stimulation to bring one back to the present moment rather than being lost in their thoughts and worries.

Such a practice is not only limited to mental benefits however. Reibel et al. (2001) demonstrated that mindfulness training, in this case, meditation, "significantly enhanced health-related quality of life" including functional status and well-being, while reducing "physical symptoms and psychological distress in a heterogeneous patient population and that the intervention may have long-term beneficial effects". This was especially significant "given that the study patients reported a high degree of comorbidity and scored well below the general population norm on all standardized health outcome instruments before the MBSR [mindfulness based stress reduction] intervention". This is in accordance with Kabat-Zinn et al. (1983) who originally found "statistically significant

reductions... in measures of present-moment pain, negative body image, inhibition of activity by pain, symptoms, mood disturbance, and psychological symptomatology... independent of gender, source of referral, and type of pain." Likewise, the Mayo Clinic reports the effectiveness of mindfulness exercises on a myriad of conditions including pain, depression, insomnia and hypertension while helping to improve attention, burnout, sleep and even diabetes control (Mayo Clinic Consumer Health, 2022).

Despite the aforementioned benefits, a conventional 8-10 week mindfulness based intervention concentrated around meditation practice may not be easily tolerated by all patients. Therefore "harnessing the elements of nature as guides and motivators" may serve as a "promising alternative for [those] who would be less likely to complete a more effortful conventional mindfulness training." In fact, results comparing nature based mindfulness training to conventional mindfulness training showed that the nature based training required "less need to specifically instruct participants on how to deal with difficult thoughts, emotions and physical sensations" while engendering "a more open, accepting and unattached relationship to self." (Loewe, 2022) These more recent explanations of the benefits of nature show how it can bring balance to "the nervous system's control over bodily functions and organs, including the heart. Studies showing that simply touching wood or viewing an image of roses for just three minutes can induce beneficial physiological responses." (Jo et al., 2019)

If exercising physical skills is more of a goal for a certain participant, this activity also lends itself well to the various forms of motor skills necessary in order to pick, mix and complete a finished product. Therefore, a larger focus can be placed on those steps in order to work on practices which improve motion, tolerance and fine motor skill. Nonetheless, this author stresses the power of smell and touch to initiate reminiscing and orienting to the moment

and experience, whenever easily achievable.

Another appealing benefit of this activity is its possible future use to help provide better sleep or better flavor to hospital food or the normalization and possible comfort found in a cup of tea, all things that most longer term hospital patients could use. In fact, a great and easy way to advertise this particular activity to prospective participants is to ask how they have been sleeping. Most patients have experienced some level of sleep difficulty (Worthington & Melia, 2006). That may be a good starting point when first approaching a patient, if they respond suitably. "Oh I'm sorry to hear you have been having some trouble sleeping. Aromatherapy has been proven to help with certain sleep issues. Would you like to test it out and see if it will work? There's nothing to lose and only good to gain."

A few last things to consider is the appropriateness of your chosen activity material. For example the use of especially finely ground herbs, like marjoram, could prove problematic in marjoram dust inhalation while smelling. Therefore, it is suggested to stay away from anything that is finely ground and highly encouraged to use whole leaf, flower or bud forms whenever possible. This will also help with the use of fine motor skills since the participant will be breaking it apart between their fingers and/or pounding and mixing it down with the measuring spoon. It is also worth mentioning that lemongrass is a great herb to add to a spice blend but must be soaked prior to use or powdered first, if ingested. The former can be achieved in a therapeutic medical setting by using a mortar and pestle, if available. This will add an extra component of motor skill. Yet another important note is allergies, especially to the ragweed family which includes chamomile and mugwort. Similarly, lemon balm may reduce thyroid function (WebMD, 2020) and therefore should not be used in tea blends.

Another issue that can be brought up is the use of such an activity with patients on oxygen.

This activity has been successfully trialed and completed with such a patient without any issue. In fact, it may even help encourage breath/lung capacity by encouraging the participant to take deep consecutive breaths, in a fun way, in order to sample the smells of multiple herbs, even in the case of the herbal tea or spice blend activity variations.

Finally, it is worth discussing one more consideration for this activity; The functional use of space management on the HT activity cart or in the supply room, if applicable. Because a total of 16 herbs was originally planned for this activity, available space became a commodity. Ultimately (due to budgetary constraints rather than spacial ones, as well as herb availability) ten herbs were used to start with. However, ten 4 oz bags of herbs still had to be stored. Plus there had to be enough room for 10 separate herb containers on the activity cart that could be easily reached and organized depending on activity variation preference and ability/stamina of prospective participants.

In its first few trials, only 6 of the ten herbs were presented to participants, with the rest within view, should the participant's eye wander and find interest in the idea of sampling more herbs. Also, in terms of easy organization for activity variations, labeling and/or color coding each herb container in accordance with its activity use is recommended.

For example, in this case, a label maker was used to label the name of the herb (something that is highly encouraged as most of the herbs have a way of eventually looking and smelling alike, especially after a long day) and a hole punch was used to cut blue, yellow and green paper circles to offer a quick and easy activity reference. Blue was used for sleep pouch activity herbs, yellow for herbal tea activity herbs and green for spice blend activity herbs (see Figure A1). Then, six herb containers were placed on a tray with the labeled side facing the participant. Three herbs were arranged on one side of the tray and once finished sampling those, the

tray was turned so that the remaining three herbs, with their labels, were now facing the participant (see Figures A2-3). Corresponding notecards can be placed on top of or under each herb container, depending on whether one would like to have the participant smell the herb first and then see or guess its therapeutic benefits or vice versa.

However, the last thing one would want is to have the herb containers falling all over the room or worse yet, the hallway, while trying to arrange the activity. Therefore, use of the cart space in creative ways is a must. This author has started experimenting with the use of plastic window plant box containers to house the herbs in order to allow for easy access and in the moment organization of different herb containers while keeping the garden theme (see Figure A4).

Conclusion

More and more people in the medical profession are seeing consistent increases in transplant patients and their need for a unique set of medical and therapeutic interventions. On first glance, this can seem especially restrictive for Horticultural Therapy interventions in particular. It is a hope that this article has provided some insight into alternate avenues of thinking and an encouraging set of activities and tools from which to draw. In that regard, hopefully more articles such as this, reviewing the specific benefits, considerations and alterations to a more diversified set of HT activities may be pursued. That way, more specified clinical practice guidelines for transplant patients and those that share a room with them, who are restricted from the standard HT activities can be developed.

It is also worth mentioning that all patients, not just transplant patients could participate in and benefit from such activities. While medical issues must come first in determining appropriate HT activities, a patient centered approach allows activities such as this to be utilized in many different ways to meet many different goals, based on many

differing patient interest and ability levels. All manner of patients containing all types of medical complications may gravitate to activities such as the ones mentioned here, not just transplant patients and it can be advantageous to all involved to use such pre-existing proclivities. In addition, this activity has great implications for workplace wellness, especially for clinical staff and can even be further extended to many other populations.

Activities such as these can be used in many different ways for many different populations that may not have access or ability to engage in the more standard practices. Therefore, developing literature such as this, while refining activities, can help build more complete clinical guidelines to move the profession into the future for uniquely non-standardized patient and non patient populations alike.

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Biographies

Monica started her horticultural journey with her Master Gardener's Certification and work at the Bergen Regional Medical Center Greenhouse in 2010. After specializing in Living Soil Microbiology at MUM, she developed and ran several community and institutional composting programs including programming at Blue Cliff Monastery in NY where she lived and worked for a year. After COVID, she went back to her Horticultural Therapy roots in medical settings. She is currently doing work in Psych, Complex Care Acute Rehab, Skilled Nursing/Subacute Rehab and Memory Care.

Appendix A - Activity Photo Examples



Figure A1
Herb Labels with Activity Indicators



Figure A2
Activity Set Up on Cart Before Entering Patient Room



Figure A3
Activity Set Up for Patient

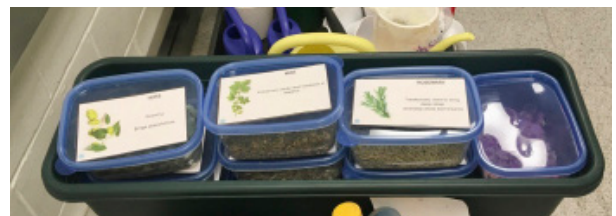


Figure A4
Cart Set Up

Appendix B - Activity Variations

Table B1

Sleep Pouch Activity Variations

Variation	Directions	Benefit
Herbal Tea	Choose and combine herbs to be placed in paper tea bags or coffee filters tied at the top with a little cotton string	Offers simple home comfort and is more recognizable than a sleep pouch idea
Spice Blend	Can easily and quickly be put together (with the addition of a few organic grocery store bought herbs) and placed in a paper tea bag, pouch, seed envelope or coffee filter, also tied at the top with a string	Is a fast project that can enhance the taste and flavor of hospital food, especially for people with low appetite.
Herbal Salt (pending dietary restrictions) or Rub	Mix chosen herbal/spice ingredients and place in ½ pint mason jars	Makes a good present or offers more flavor to hospital food or future food at home

Table B2

Aromatherapy Activity Variations

Variation	Material	Benefit
Essential oil infused hand cream (check for sensitivities first)	essential oils, hospital hand cream, travel sized bottle, container or jar	May help mood and skin
Herbal Sugar or Salt Scrub	dried herbs such as lavender or rose etc. salt or sugar, oil	May help sooth face or hands from rough hospital environment
Smudge Stick	whole dried herbs such as sage, mugwort, rosemary, thyme, white pine/ juniper may also add floral accents for color and scent	May feel helpful to be able to give gifts to loved ones, especially those that have trouble with hospital smells
Herbal (rice or buckwheat weighted) eye pillow	sleep pouch herbs, rice or buckwheat, long rectangular fabric pouch with velcro or other secure closure like super glue.	May help with sleep
Room/Aerosol spray	essential oils, water, travel size spray bottle	May help those with olfactory sensitivities, especially to strong cleaning solutions

Appendix C - Herb & Budget Reference Chart

Table B1

Sleep Pouch Activity Variations

Activity	Herb	Cost From reputable herb company as of Spring 2023	Alternative Cost Options From local store(s)	Possible Therapeutic Characteristics
Sleep Pouch	Lemongrass	\$4.50/4oz \$13.50/lb		Uplifting
	Rosemary	\$4.75/4oz \$14.50/lb		Traditionally used to bring deep sleep and keep away bad dreams
	Sweet Marjoram ^a	\$4.75/4oz \$14.50/lb		Calms restlessness and nervousness
	Mint Peppermint	\$8.00/4oz \$24.00/lb		Enhances clarity and vividness in dreams
	Spearmint	\$8.25/4oz \$25 or \$12.50 if on sale/lb		
	Lavender	\$8.75/4oz \$26.50/lb		Soothing Relaxing Eases headaches
	White Pine	free to collect, highly antibacterial		Promotes deep sleep and relaxation
	Juniper Berry	\$9.25/4oz \$28.00/lb		Engenders a protective quality to your sleep
	Chamomile ^a	\$9.75/4oz \$29.50/lb		Calming Relaxing Said to keep bad dreams away
	Mugwort ^a	\$9.75/4oz \$30.00/lb	\$9.00/30g (but is wild foraged)	Gently enhances meditative dreaming
Clove	\$5.25/1.4oz bottle \$10.25/4oz \$31.50/lb	\$9.00/30g (but is wild foraged)	Adds a warm and exotic quality to sleep	
Catmint	\$11.00/4oz \$33.50/lb	\$9.00/30g	Relaxing Helps bring deep, restful sleep	
Lemon Balm ^a	\$12.00/4oz	\$9.00/30g	Relieves stress Helps anxious/nervous thoughts & feelings, insomnia and headaches	

Table B1*Sleep Pouch Activity Variations*

Variation	Herb	Cost From reputable herb company as of Spring 2023	Alternative Cost Options From local store(s)	Possible Therapeutic Characteristics
Sleep Pouch	Lemon Verbena	\$12.25/4oz \$375 or \$18.75 on sale/lb	\$9.00/30g	Adds a happy lightness to dreams
	Hops	\$21.00/4oz \$64.50/lb	\$9.00/30g	Relaxing Brings peacefulness
	Rose Petals	\$20.00/4oz \$61.00/lb		Brings warmth and love
	Rose Buds	\$21.50/4oz \$65.50/lb		Especially calming for women and for the body
Total	\$116.50/4oz			
Herb Blend/ Rub/ Salt	Lemongrass ^a	\$4.50/4oz \$13.50/lb		Imparts subtle citrus notes to culinary dishes
	Rosemary	\$3.00/1.1oz bottle \$5.25/4oz \$15.50/lb (\$1.00 cheaper for whole leaf)		A classic spice for chicken, roasted vegetables, bread & Italian food
	Sweet Marjoram ^a	\$2.25/0.7oz bottle \$5.25/4oz \$17.00/lb		Provides a gentler flavor than oregano
	Mint Peppermint	\$8.00/4oz \$24.00/lb		Adds a fresh boost to veggies & meats
	Spearmint	\$8.25/4oz \$25 or \$12.50 on sale/lb		Perfect for recipes needing a delicate herbal spice
	Lavender	\$8.75/4oz \$26.50/lb		Gives a delightful, floral flavor to desserts, meats, and breads

Table B1*Sleep Pouch Activity Variations*

Activity	Herb	Cost From reputable herb company as of Spring 2023	Alternative Cost Options From local store(s)	Possible Therapeutic Characteristics
Sleep Pouch	Lemon Verbena	\$12.25/4oz \$37.5 or \$18.75 on sale/lb	\$9.00/30g	Adds a happy lightness to dreams
	Hops	\$21.00/4oz \$64.50/lb	\$9.00/30g	Relaxing Brings peacefulness
	Rose Petals	\$20.00/4oz \$61.00/lb		Brings warmth and love
	Rose Buds	\$21.50/4oz \$65.50/lb		Especially calming for women and for the body
Total	\$116.50/4oz			
Herb Blend/ Rub/ Salt	Lemongrass ^a	\$4.50/4oz \$13.50/lb		Imparts subtle citrus notes to culinary dishes
	Rosemary	\$3.00/1.1oz bottle \$5.25/4oz \$15.50/lb (\$1.00 cheaper for whole leaf)		A classic spice for chicken, roasted vegetables, bread & Italian food
	Sweet Marjoram ^a	\$2.25/0.7oz bottle \$5.25/4oz \$17.00/lb		Provides a gentler flavor than oregano
				Perfect for recipes needing a delicate herbal spice
	Mint Peppermint	\$8.00/4oz \$24.00/lb		Adds a fresh boost to veggies & meats
	Spearmint	\$8.25/4oz \$25 or \$12.50 on sale/lb		Perfect for recipes needing a delicate herbal spice
	Lavender	\$8.75/4oz \$26.50/lb		Gives a delightful, floral flavor to desserts, meats, and breads

Table B1*Sleep Pouch Activity Variations*

Activity	Herb	Cost From reputable herb company as of Spring 2023	Alternative Cost Options From local store(s)	Possible Therapeutic Characteristics
Herbs that are also used in the sleep pouch variation are found above, while new spice blend herbs can be found below.				
Herb Blend/ Rub/ Salt	Oregano	\$2.25/0.5oz bottle \$6.00/4oz \$18.00/lb		Pairs well with tomatoes and in sauces and pizza Used in tangy vinaigrettes Spices up veggies and meats Good source of vitamin E & iron
	Sage	\$6.50/4oz \$20.00/lb		A common spice in soups & omelets Sage teas & oil may lower inflammation
	Sweet/Italian Basil	\$2.75/0.6oz bottle \$7.25/4oz \$22 or \$11.00 on sale/lb		Most notably used in Italian cuisine and pairs especially well with anything tomato or olive oil related
	Thyme	\$3.00/0.7oz \$8.50/4oz \$26.00/lb		Makes a great spice for roasted veggies Good source of many vitamins & minerals
	Lemon Thyme	\$24.00/lb		
	Chives	\$24.00/4oz		Provide an onion flavor and are good prebiotics
	Black Pepper	Regular grocery or store		Provide an onion flavor and are good prebiotics
	Chili Pepper ^a	Regular grocery or store		Adds some spice for those can handle it and can be anti inflammatory
	Coarse Kosher Salt	Regular grocery or store		Best used sparingly or for the herbal salt or rub *check dietary restrictions first
	Sea Salt			

Table B1*Sleep Pouch Activity Variations*

Activity	Herb	Cost From reputable herb company as of Spring 2023	Alternative Cost Options From local store(s)	Possible Therapeutic Characteristics
Tea	Lemongrass	\$4.50/4oz \$13.50/lb		Contains an uplifting scent and healthful properties
	Sweet Marjoram ^a	\$2.25/0.7oz bottle \$5.25/4oz \$17.00/lb		Traditionally steeped as tea for its general wellness supporting properties
	Mint Peppermint	\$8.00/4oz \$24.00/lb		Chewing or drinking it can help with nausea & bad breath
	Spearmint	\$8.25/4oz \$25 or \$12.50 on sale/lb		
	Lavender	\$8.75/4oz \$26.50/lb		Imparts a relaxing aroma
	Pine	Free		Can be a grounding, antioxidant, source of vitamin C
	Juniper Berry	\$9.25/4oz \$28.00/lb		Often used as a gentle tea for calming purposes and to soothe the digestive tract Also has a softening and soothing effect on the skin
Chamomile	\$9.75/4oz \$29.50/lb			

Herbs that are also used in the sleep pouch variation are found above, while tea blend herbs can be found below.

Sage	\$6.50/4oz \$20.00/lb		Sage teas & oil may lower inflammation
Basil	\$2.75/0.6oz \$7.25/4oz \$22 or \$11.00 on sale/lb		Known to help with headaches, stress and even that pesky night time "doom scrolling" pattern one may develop while down an internet rabbit hole.

Herbs that are also used for both the Sleep Pouch and Herb Blend Variations can be found above while the remaining Tea Blend Variation herbs can be found below.

Activity	Herb	Cost From reputable herb company as of Spring 2023	Alternative Cost Options From local store(s)	Possible Therapeutic Characteristics
	Holy Basil	\$5.25/4oz \$17.50/lb		Often used as adaptogenic tea for general wellness
	Lemon Verbena	\$12.25/4oz \$37.50 or \$18.75 on sale/lb		Calming for both the mind and body (including stomach) while adding an uplifting aroma and sweet flavor
	Anise Hyssop	\$46.00/4oz	\$9.00/30g	May help with digestion, respiratory issues and heart opening while providing a sweetly light licorice flavor
Total	\$5.25 (w/o costs of previous Sleep and Spice Blend Herbs)			
Extras + Budget Totals	discount store organza gift bag sachets \$0.21 ea	large liquid measuring cup with handle and spout to mix herbs in \$1.25 ea (2) = \$2.50 + funnel & regular measuring cup \$1.25 ea (2) = \$5.00 Total	tupperware storage containers for herbs - 4 to a package \$1.25 ea (4) = \$5.00 Total	dried herb total \$150.00 (16x4oz)

Note

Herbs are ordered by price (lowest to highest) and separated by activity. Highlighted herbs were proposed as a good beginner collection.

^aMay be slightly problematic due to fineness of ground material, allergies or ingestion issues.

Appendix D - Budgetary Calculations

Table D1

Budget Estimation for Herb Refills per Person

16 herbs total at 4 oz each	average cost per herb: \$9.37 per 4 oz	
<hr/>		
4 oz = 20 tbsp (9.37 / 20)	average cost per tbsp: \$0.46	
<hr/>		
3 tbsp per pouch (3 X \$0.46)	= \$1.40 herbs per pouch + \$0.21 per organza sachet bag	= \$1.61 per person

Table D2

Initial Investment

16 Herbs Total X 4oz each (20 tbsp each)	= 320 tbsp herbs total	
(20 tbsp each)		
<hr/>		
	320 tbsp herbs total / 3 tbsp per pouch	= 60 Pouches Total
<hr/>		
60 pouches total X \$0.21 per bag	= \$12.60	
<hr/>		
	+ \$5.00 for measuring cups & funnel	= \$17.60
<hr/>		
	+ \$5.00 for tupperware storage containers	= \$22.60
<hr/>		
	+ \$150.00 for herbs	= \$172.60
<hr/>		
	· \$172.60 / 60 pouches =	\$2.88 per person

\$2.88 per person to start with (Table D2) + average of **\$1.61 per person** in future refills (Table D1)

Case Study: Maxine

Yin-Yan Yeung PhD

Li-Jung Lin PhD



Abstract

The case study is a Taiwanese elderly female with low motivation due to frontal lobe damage who participated in six sessions of horticultural therapy that addressed her low motivation, low self-efficacy, reluctance to drink water, and passivity in social interaction.

Evaluations one week pre and one week post by both the client and staff reflect the client's enhanced self-efficacy in daily life coping and motivation. The client expressed

subjective increased connectedness with others and connectedness with nature. The case study discusses the mixed approach of individual and group treatment that has fit the needs of the client in developing independence in tasks while also achieving improved social integration.

Client Information

Maxine is an 83-year-old Taiwanese woman who has attended the Day Care Centre since August 2021. Written records from the Centre note that when Maxine was young, she ran a grocery store and was particularly skilled at bookkeeping. After her husband died, Maxine lived with her children, and a positive family relationship has been reported. No complications have been noted regarding grieving over the death of her husband. She has always been cheerful but somewhat reserved.

History of Case

Maxine experienced a fall that resulted in damage to her frontal lobe, and lowered motivation ensued. She underwent operations for joint replacements, which resulted in a lack of confidence in walking. This, in turn, led to her becoming reliant on assistance for mobility, bathing, cooking, changing clothes, and shopping. Professionals evaluated her risk of falling as high. Maxine was assessed cognitively as a 3/10 in The Short Portable Mental Status Questionnaire (Pfeiffer, 1975), deeming Maxine as mildly cognitively impaired. Her comprehension, expressive language, immediate recall, and short-term memory were noted as uneventful. Though slow in her response time, Maxine managed to provide brief, relevant answers. Maxine's gentle character and emotional composure resulted in satisfactory relationships with staff and other participants at the Centre.

Symptoms and Diagnosis

Maxine suffered from an unspecified cognitive issue arising from frontal lobe damage.

Maxine experienced low self-efficacy and a lack of motivation. She would remain passive when asked to perform a task, often not taking action until the staff repeated prompts or soft reminders. When asked why she would not perform a given task, Maxine would say she was not competent in performing it, and this was an emanation of her low self-efficacy and her outward excuse for her low motivation. Her low motivation resulted in her lacking drive in nearly every task, including physical exercise at the Centre. Additionally, Maxine hesitated to drink water. When advised to drink water, Maxine always retained the water in her mouth and delayed swallowing it. Her low motivation hindered her participation in physical exercise and her reluctance to drink water affected her hydration, and these both could increase her risk of falling. Her passivity in social interactions further increased her disconnect from the group and prevented integration into the rehabilitative programs of the Centre. Her low motivation and social disconnection were beginning to create a vicious cycle.

Prognosis and Potential

Maxine's children are supportive of her and are eager to spend time with her. The Day Care Centre offers many impactful activities (ex. laughing

therapy led by volunteers and a variety of interest classes). If Maxine was more motivated, more socially engaged, and in better health, she could increase her participation in the Centre's activities, as well as engage in more outdoor activities with her family. This of course would result in a positive effect on Maxine's general well-being.

Treatment Plan

The treatment goals of Maxine's case are as follows:

1. Addressing Maxine's low motivation and low self-efficacy, the horticultural interest program will increase Maxine's drive and create positive experiences for her in accomplishing tasks.
2. Addressing Maxine's low water intake, the horticultural interest program will increase her awareness. Such awareness and insight will potentially enhance Maxine's motivation to drink water in the long term.
3. Regarding her passivity in social interaction, the horticultural interest program will connect Maxine socially via nature as a mediator.

Assessment

A brief interview was conducted to assess Maxine's interest in joining the horticultural interest group, as well as her gross and fine motor functioning in performing the horticultural tasks. She said she had very little experience in gardening and hence could not evaluate whether she would enjoy it. She did not expect herself to have active participation in the group.

There were evaluations one week pre and one week post by the participants of the horticultural interest group and five staff. The scales employed are "Inclusion of other in the self scale" (Aron et al., 1992), "Inclusion of nature in self scale" (Schultz, 2002), Single item self-efficacy question (Williams & Smith, 2016), and a single item self-constructed motivation question that references Fishman et al.'s (2020) measures of intention. After each

session two self-constructed questions were asked, one addressing self-efficacy and one addressing subjective enjoyment of the program.

Table 1 lists the pre- and post-test evaluations. In the one week pre-program evaluation, Maxine perceived her self-efficacy and motivation as average, which generally was consistent with observations by the staff. The scores on motivation provided by the staff reflected higher estimations than their general comments and impressions that regarded Maxine as low in motivation. She reported herself to be average in connectedness with nature and above average in connectedness with people.

Treatment Procedure

The program consisted of six sessions and was packaged as one of the interest classes at the Centre. The class recruited five members in total but each member did not participate in every session due to pandemic-related factors and individual medical treatment schedules. Content of the program includes growing and caring work for Perilla (by seedlings), Vinca (by seeds), Chili (by seedling), Mint (growing of cutting in soil and water) and Copper Coin Grass (water transplanting). The gardening tasks were sometimes completed individually to enhance self-efficacy; other times, the tasks were completed with a partner to strengthen social connections amongst the participants and to reduce difficulty of the tasks so as to increase the motivation of the participants. Discussions were held following the horticultural tasks. Table 1 lists the horticultural tasks and therapeutic messages of each session, clinical observations of Maxine, and Maxine's evaluation provided immediately after each session.

Results and Prognosis

Table 2 displays the average scores of Maxine's self-rated enjoyment and self-efficacy across the six sessions, which were 6.16 and 5.67, respectively, indicating her above average satisfaction in both domains. The comparison of one week pre and one week post scores indicate that Maxine an

increase of one to three points in the post test score for all domains (self-efficacy in daily life coping, motivation, connectedness with others, connectedness with nature). This trend was consistent with the observations of staff at one week pre and one week post that indicated improvement in Maxine's self-efficacy and motivation. The horticultural therapy provided Maxine a positive experience and enhanced her motivation and self-efficacy in daily life coping. As for her water drinking problem, awareness and insight were stimulated through metaphor and corresponding discussion. Nevertheless, an objective evaluation of her progress in this domain was not conducted due to limited staffing. Maxine exhibited an increased score in connectedness with others and became more active in caring for other members in the group. This case study found Maxine responsive to horticultural therapy that was comprised of both individual and group work. The program fostered both her independence and her connectedness with others. It is recommended that Maxine continuously participate in this or a similar program.

There were limitations of this case study. It is important to note that Maxine's improvement cannot be attributed solely to the horticultural interest program. While participating in the horticultural interest program, Maxine was participating in other programs at the Centre that could also have been responsible for changes in her attitude and behavior. The horticultural interest program originally was designed to last two months but ultimately lasted for 2.5+ months because the program was suspended in response to the COVID pandemic. The dropout rate of the program (originally there were five members but only two finished the program) due to the pandemic and personal lives of participants resulted in fewer social interaction opportunities in the group. Each of these factors affected the program experience for Maxine. Lastly, each scale being a single item measurement results in psychometric concerns, so the results should be interpreted with caution.

The program, if run in the future for other elderlies with similar mental health issues, should have a higher number of sessions to intensify the therapeutic work and consolidate the therapeutic effect. This is particularly true for the sessions on resilience and a balanced life because there is so much to address during those sessions. Clinical inventories with better psychometric properties should be identified to increase the reliability of the clinical information collected. If possible, it would be ideal to have each session include both individual and group tasks so that independent performance and collaboration skills could be fostered in parallel.

Conclusion

Maxine, a widow living with her adult children, has received rehabilitation training at the Day Care Centre since 2021. She experiences mild cognitive impairment but this did not preclude her from participating in a horticultural therapy program. She was recruited to a horticultural interest program that consisted of six sessions. The target of the intervention was her motivation, self-efficacy, reluctance to drink water, and connectedness with others via nature as a mediator. During the 2.5+ month intervention, Maxine displayed improvement in each of the objectives, as indicated by her subjective ratings and observations by five staff. Though the horticultural interest program was not the only contributor to Maxine's progress, Maxine responded well to the treatment, particularly in individual (non-group) sessions which she seemed to enjoy more because of her independence in performing the horticultural tasks. Continuous intervention of similar modalities have been recommended to Maxine. The program format and themes are suitable for other elderly people experiencing comparable physical and mental problems.

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Table 1

Each session's horticultural tasks, therapeutic message, clinical observation of Maxine, and Maxine's evaluation provided immediately after the session.

Session	Number of Participants	Horticultural Tasks	Therapeutic Work after the Horticultural Tasks	Clinical Observation of Maxine	Evaluation Immediately After Each Session
1	5	Orientation and transplant of Perilla and chili	Use storytelling of plants to stimulate interest towards nature	<ul style="list-style-type: none"> • Pleasant • Self reliant as no partner assigned to her • Some reluctance due to fear of getting contaminated by soil. Attempted to perform the task by herself with encouragement • Gave effort in planting the Perilla (e.g. to check whether the Perilla was in the right position in the soil, her concern about the amount of water to be given to the Perilla), which is a good indicator of her motivation for the activity 	Enjoyment (6), Self efficacy (6)
2	4	Care work for Perilla and planting the seeds of Catharanthus Roseus (Vinca)	Use overcoming challenges in planting to discuss stress coping in daily life	<ul style="list-style-type: none"> • Passive in the planting tasks • Tendency to lean on others appeared in the shared planting activity 	Enjoyment (5), Self efficacy (5)
3	3	Care work for Perilla and Vinca	Using transplanting to normalize adjustment and discuss coping	<ul style="list-style-type: none"> • Expressed her ignorance of plant care • Dependent • Required encouragement in performing every plant care task 	Enjoyment (5), Self efficacy (4)

Table 1

Each session's horticultural tasks, therapeutic message, clinical observation of Maxine, and Maxine's evaluation provided immediately after the session.

Session	Number of Participants	Horticultural Tasks	Therapeutic Work after the Horticultural Tasks	Clinical Observation of Maxine	Evaluation Immediately After Each Session
4	1	Care work of Perilla and observation of the growth of Vinca	Observing the resilience of plants to gain insight of the importance of overcoming ones own weaknesses, cutting off bad habits and improving personal strengths	<ul style="list-style-type: none"> • Despite suffering from a sore arm and shoulders, Maxine gradually increased attention during the session • Aware of her limited water intake and being too sensitive to her bowel • For bathroom usage she had a belief that "never wait until you feel an urge to go to toilet" and hence she used to go to toilet when bladder was only 60% full. How this thinking made her anxious and affected her general functioning was discussed. Mindful observation of the urge without overreacting to it was suggested. Spacing out the toileting time was another measure highlighted • For her drinking problem, Maxine was helped to see the importance of water to human health just like it is to the growth of plant . She was encouraged not to hold the water in her mouth but to directly swallow it to establish the somewhat reflex response 	Enjoyment (7), Self efficacy (6)

Table 1

Each session's horticultural tasks, therapeutic message, clinical observation of Maxine, and Maxine's evaluation provided immediately after the session.

Session	Number of Participants	Horticultural Tasks	Therapeutic Work after the Horticultural Tasks	Clinical Observation of Maxine	Evaluation Immediately After Each Session
5	2	Care work for Perilla, Vinca, and Chili. Grow cuttings of mint	Observing the over-fertilized Perilla to discuss the importance of a balanced life. Using the proper number of branches to aid the growth of Vinca to encourage independency	<ul style="list-style-type: none"> • Appeared to have interest in plants. Forgot some of the plant names and the horticultural tasks performed by her in prior sessions. Asked why vinegar can kill pests and why we grew the Mint by soil and water separately. Such curiosity is an improvement for Maxine who used to be apathetic to things • Admitting her low activity level might affect her health. Maxine regards her fair motor functioning as hindering her performing physical exercise. Helped her to see the vicious cycle and encouraged her to participate more in the physical exercise in the Centre • Said she welcomed support as she always has felt inadequate. When directed to talk about what she could do for others, Maxine expressed sense of meaningfulness and agreed that she could do more 	Enjoyment (7), Self efficacy (6)

Table 1

Each session's horticultural tasks, therapeutic message, clinical observation of Maxine, and Maxine's evaluation provided immediately after the session.

Session	Number of Participants	Horticultural Tasks	Therapeutic Work after the Horticultural Tasks	Clinical Observation of Maxine	Evaluation Immediately After Each Session
6	2	Care work for Perilla, Vinca, and Chili. Grow cuttings of mint	Observing the over-fertilized Perilla to discuss the importance of a balanced life. Using the proper number of branches to aid the growth of Vinca to encourage independency	<ul style="list-style-type: none"> • More confident about where the fertilizer should be added and which leaves should be trimmed • Continuously showed interest towards plants like why the Copper Coin Grass is named such and why Vinca failed to germinate • Self-initiated showing care and giving advice to another member in the group who was recently of ill health • Noticed life was a cycle that plants generate their offspring or decompose to foster new life. Though unable to appreciate her contribution to her own life or other people's lives, Maxine was gratified in her present life which was stress free. Consolidated her motivation to make her life even healthier and happier 	Enjoyment (7), Self efficacy (7)

Table 2

Summary on the one week pre and one week post evaluation and average score across the six sessions.

	One Week Pre-Program	One Week Post-Program	Average Score Across the Six Sessions
Self Rating			
* Self efficacy in daily life coping	5	8	
Motivation	4	7	-
Connectedness with others	6	7	-
Connectedness with nature	4	6	-
Enjoyment of the sessions	-	-	6.16
Self efficacy in the sessions	-	-	5.67
Staff rating			
* Self efficacy in daily life coping	4	6.8	-
Motivation	4.2	5.4	-

The scale are all of 7 points Likert Scale except for scales with * which are of 10 point Likert Scale

Biographies

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