

Wellbeing Outcomes of Therapeutic Horticulture in the Singapore Context: Two Case Studies - Rehabilitation Patients & Young Adults with Disabilities

text by

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Negative moods (tension, depression, fatigue, anger and confusion) are reduced as the garden environment offers a respite from urban settings.

Introduction

The benefits of therapeutic horticulture - active or passive engagement with plants and related activities to enhance wellbeing are well known. In particular, the American Horticultural Therapy Association has a comprehensive documentation on the subject (AHTA, 2021).

One key benefit is enhanced psycho-emotional wellbeing from connecting with nature. Negative moods (tension, depression, fatigue, anger and confusion) are reduced as the garden environment offers a respite from urban settings (Siu et al., 2018), and positive aspects of engagement, like vigour or energy, increase (Garcia et al, 2018). Therapeutic horticulture also enhances social wellbeing via the shared activity and sense of community, cognitive wellbeing from learning and practising various

skills, and physical wellbeing through garden work that can be targeted to improve fine motor skills, stamina / activity tolerance, and hand-eye coordination (Gerber, 2020). Furthermore, focused studies on older adults, a growing demographic of public health interest in many countries, have linked therapeutic horticulture to positive health outcomes (Han et al., 2018; Siu et al., 2020; Garcia et al., 2018). A study in Singapore has shown that participants of a 24-week therapeutic horticulture program maintained healthy sleep patterns and psychological health, as well as showed significant reduction in anxiety and improvement in cognitive functioning. In addition, they reported an increase in mean happiness score after each session (Sia et al., 2020). The paper reporting the findings was accorded the Charles Lewis Excellence in Research Award by the American Horticultural Therapy Association in 2021.

Edible Garden City, (EGC) is a social enterprise dedicated to creating social change through community-centric agriculture. It champions the “Grow Your Own Food” movement in Singapore, empowering home gardeners and promoting urban farming in our city. Its grounding philosophy is that growing our own food connects us with nature and cultivates a sense of community. Through edible landscaping, or foodscaping, EGC has activated more than 260 under-utilised areas in schools, homes and businesses into green community spaces. Across three farms, its closed-loop farming model produces fresh, tasty and nutritious microgreens, herbs, flowers and vegetables for both professional chefs and home cooks. Additionally, EGC teaches and supports fellow farmers and gardeners, hires from marginalised communities, and employs therapeutic horticulture. The social enterprise is committed to finding a sustainable solution to managing food waste and achieving greater food resilience in Singapore.

In this article, EGC has co-authored case studies with our partners in Tan Tock Seng Hospital Rehabilitation Centre (TTSH Rehab) and Rainbow Centre (RC) to reflect on the process of planning and executing two kinds of therapeutic horticulture programmes, examine the outcomes and benefits for participants, and highlight key learning points for other practitioners in the field.

CASE STUDY 1: TAN TOCK SENG HOSPITAL REHABILITATION CENTRE (TTSH REHAB)

Programme details

Background

Since 2017, therapists at TTSH Rehab have been exploring non-conventional activities like bingo and baking to increase inpatient physical activity levels and psychosocial well-being. Therapeutic horticulture soon emerged as another key avenue to explore.

Together, TTSH Rehab and EGC identified the following holistic goals for participants:

1. Promote low intensity physical activity
2. Improve motor skills
3. Leisure / recreational therapy
4. Expose to nature for psychosocial benefits
5. Increase self-empowerment and internal locus of control
6. Stimulate cognitive processes

We were keen to not just deliver the programmes but also track outcomes and plan for long-term continuity. Therefore, we decided on two components:

1. 5x 4-week programme for patients
2. 1x 4-week staff training programme

After extensive co-designing work, the collaboration between EGC and TTSH Rehab was launched on 20th November 2020, with sponsorship from Lam Soon Singapore.

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Growing our own food connects us with nature and cultivates a sense of community.

Programmes

The programme for patients was carried out as follows:

Programme	Themes	Participants	Location
Five 4-week cycles (Dec 2020 - May 2021) 1 hour/session	(1) Stem propagation and self-watering planter (2) Canvas bag printing (3) Wheatgrass seeding and garden maintenance (4) Tea making	5 participants per session + 3-4 staff (EGC facilitators & TTSH therapists and assistants) <u>Reasons</u> <ul style="list-style-type: none"> Participants' emotional comfort and bonding Small facilitator:participant ratio Small garden <u>Criteria</u> Inclusion: (i) >1 hour minimum seating tolerance; (ii) follow simple commands; (iii) keen to explore gardening Exclusion: (i) medically unwell; (ii) confusion/agitation	Beside TTSH Rehab Garden, Level 3a

To better understand patient needs, prior to the sessions:

- Therapists completed referral forms to identify specific aims for participants¹
- Participants completed forms stating their individual aims for the programme²
- Facilitators summarised physical/cognitive difficulties on participant nametags

Table 1.
Programmes for TTSH Rehab

Each session involved:

- Brief introduction and ice-breaker → Hands-on segment → Closing
- Open group structure to accommodate fast-moving admissions and discharges

Demographics

	Total number attended program	Total number attended >3 sessions
N	37	12
Age (yr) (min-max)	61.4±14.6 (33-82)	60.1±11.7 (45-80)
Patient type		
Stroke	14 (37.8%)	6 (50.0%)
Acquired Brain Injury	4 (10.8%)	1 (8.3%)
Orthopaedic & Trauma	13 (35.1%)	4 (33.3%)
Spinal Cord Injury	6 (16.2%)	1 (8.3%)

Table 2.
Demographics

Outcomes

Measurement

Outcome measures selected were:

- I. EQ-5D-5L, on quality of life states in adults - five health dimensions with five levels each³;
- II. Office of National Statistics four subjective well-being questions (ONS4), an 11-point scale, used across healthcare services in the UK to measure personal well-being; and
- III. Customised survey on the degree of change in:
(1) feelings of anxiety, (2) social connection, and (3) empowerment, each assessed on three levels.

Per-session satisfaction and participation were also tracked (via a self-response survey and clinician-rated instrument⁴).

Of the 37 total participants, 53% had prior experience with gardening.

In total, 12 participants attended 3 sessions or more. Due to missing data, results for 10 participants (N=10) were used in the overall analysis.

Survey Results

1. Session enjoyment

Feedback was very positive. All participants appreciated the chance to spend more time out of bed and outside the wards. The hands-on element with gardening tasks was the most critical enjoyment factor, followed by the opportunity to learn something new while spending leisure time. Heat and humidity were the main detracting factors.

2. Positive impact on participants attending 3-4 sessions

All 10 eligible participants reported being positively impacted in one or more ways during the sessions and/or after the entire programme completion: reduced anxiety (80%), improved connection to people (100%), and a greater sense of purpose and empowerment (90%).

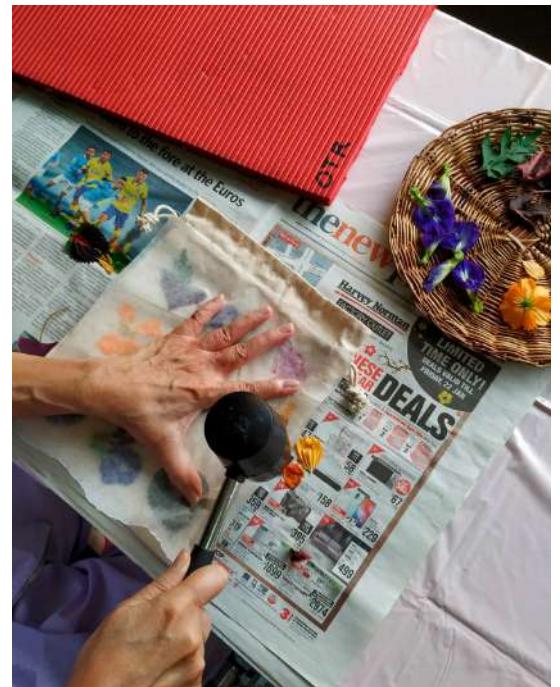


Fig 1.

After harvesting her choice of leaves and flowers from the garden, a participant at TTSH Rehab prepares to hammer her own plant print into a canvas bag.

The self-report ONS4 scores showed slight improvements in all four aspects of well-being (satisfaction, life/activities worthwhile, happiness, anxiety) on average.

In addition, all indicated that their personal aims for the programme were met⁵, commenting that the leisure helped time to pass quickly, they learnt many things, felt more confident, and that they liked being able to do gardening subsequently at home. One comment was that while participants did connect with one another, there was insufficient time to really interact and connect more deeply.

67% were keen to engage in gardening once discharged from the hospital.

Qualitative Descriptive Outcomes

Reflection from therapists and patients also revealed other positive impacts on the wellbeing of the community – patients, patients’ families, and hospital staff.

Firstly, observing natural processes in the garden helped evoke memories and led to positive emotions of joy and wonder. During a routine maintenance session, therapists and patients found many caterpillars on the lime plant and began reminiscing about primary school science classes. The caterpillars were housed in containers and everyone excitedly watched them transform into butterflies. The therapists had patients assist in releasing the butterflies to further engage them.

Secondly, the edible garden and activities created a space for social connections and interpersonal dynamics to play out. A slightly reticent middle-aged lady transformed over the course of her first session - initially quiet and somber, she shared a table with a very chatty elderly lady, and by session’s end both were engaged in animated conversation. Another participant brought chocolates to share on his very first session, as it was his birthday, bringing a smile to everyone’s faces.

The garden proved itself to be a space of peace and escape, with ripple effects throughout the community for patients, next-of-kin (NOK), and staff. Nurses regularly bring patients on a walk to the garden to water the plants or admire the greenery; on weekends, patients who are independently mobile help maintain the garden. Occupational therapists frequently engage patients to harvest plants, and a patient once harvested mugwort and prepared a lovely meal of egg mugwort in the pantry. Staff also regularly harvest the plants and donate them to staff and patients’ NOK. Colleagues who love to cook especially love our curry leaves.

Furthermore, the therapists and therapy assistants felt a genuine pride and joy, having helped the space transform from an empty patch into an edible garden flourishing with biodiversity in the form various edible flora, and fauna such as bees and butterflies. Patients who interacted with the garden likewise found fulfillment in nurturing and watching the plants thrive. Knowledge and excitement around the garden were also infectious, as patients and staff alike were exposed to new ways of using garden plants and learn from each other’s unique experiences. Gardens were often spaces of

escape from daily troubles, and visiting the edible garden became a space to take a breather from the stresses of a hospital life in a Covid-19 climate.

Limitations

The key limitations we encountered in gathering these results were (1) small sample size, (2) open group structure made it difficult to gather data, (3) the large variety of other factors present which could affect the scores measured - such as progression of other therapy modes, presence of depression, social issues, discharge issues, medical instability, etc.

These limitations could be addressed if increased resources made the programme available to: (1) a larger number of patients, and (2) a different target group of patients who reside longer-term in the hospital facility and/or could commit to attending a minimum number of sessions. In the context of the real-life variations present, confounding factors are difficult to eliminate completely, but attendance fluctuations can be averaged across using a larger sample size of participants.

Learnings, questions, and future directions

Benefits of Exploration

The entire initiative began from the ground up, initiated by therapists in TTSH Rehab. They realised the importance of taking ownership to initiate a programme that will benefit patients.

Flexibility

Flexibility and adaptation to unexpected events and changes were crucial:

(1) Hospital context: We had to adapt to group therapy sessions being postponed twice, as well as last-minute dropouts (due to infection, illness, and clashes with other medical appointments or groups).

(2) Covid-19 context: One session activity had to be rapidly modified following updated Covid-19 advisories (from making and drinking tea, to making dried tea leaf bags which participants brought back to their wards). Another session was carried out as individual sessions by therapists after a Covid cluster outbreak.

Intentional Therapeutic Horticulture Programme Design

Our findings demonstrated the importance of intentional programme design, as patients benefited greatly from experiencing a range of garden-supported opportunities and different aspects of engagement within each session.

Right / Fig 2.

A patient takes a mugwort cutting to propagate at the TTSH Rehab garden.



Bottom / Table 3.

Per session feedback from participants

This was reflected in the aspects enjoyed:

	Self-watering	Botanical printing	Growing wheatgrass	Tea making
	N = 18	N = 19	N= 22	N = 16
Aspects liked	Learn new skill: 5 Hands-on planting : 8 Pruning : 14	Printing of plants : 10 Empowerment (design & use of bag): 5	Social interaction 3 Learn new skill (mix soil / plant seeds) 7 Planting 6 Being around plants 2 Mixing the soil 5	Sharing of ideas 6 Harvesting 6

Collaboration and Long-Term Thinking for Successful Impact

The pilot project’s success depended on collaboration and resource pooling - Lam Soon’s financial support, EGC’s dedicated expertise, and TTSH Rehab’s intimate patient knowledge and dedication. The genuine interest to understand participants and design multiple iterations to best fit the group’s needs was crucial.

In the long run, successful impact is intertwined with cost-effectiveness. TTSH Rehab will endeavour to run the programme independently, so patients can continue experiencing beneficial holistic impacts on psychosocial and emotional wellbeing.

Further Improve Accessibility & Effectiveness

Two key areas to further improve are:

(1) Resource accessibility: Accessibility to gardening resources – such as soil, knowledge of recycled material options, and seed packets – can be improved to make independent continuity feasible (for instance, one patient who had greatly enjoyed the gardening programme was struggling to cope emotionally upon being discharged, but due to cost factors was unable to start gardening at home as self-care).

(2) Effectiveness: Singapore’s heat and humidity is a notable challenge for some and should be addressed to improve the therapeutic experience.

CASE STUDY 2: RAINBOW CENTRE (RC)

Programme details

Background

Rainbow Centre Young Adult Activities! (YAA!) is a social activity club that aims to enhance the quality of life for persons with moderate to severe disabilities, by reducing social isolation through various ability-appropriate activities that cater to members' interests. In 2020, they reached out to EGC to craft a therapeutic horticulture programme for their members.

Together, YAA! and EGC identified two key goals for the programmes:

1. Leisure / recreational therapy
2. Exposing patients to nature for psychosocial benefits

Programmes

Two programme series were carried out:

Programme	Themes	Participants	Location
Two concurrent 5-week cycles (Aug - Oct 2020) 1 hour/session	Multi-sensory showcase Gardening (2x) Nature art (1x) Farm-to-table (1x)	5 pax (all accompanied by caregivers) + 2 EGC facilitators Aim: Small facilitator:participant ratio for adequate support	Rainbow Centre classroom and kitchen
One 10-week cycle (Jan - Mar 2021) 1.5 hours/session	Gardening (3x) Nature and art (2x) Animal therapy (2x) Farm to table (3x)	16 pax (14 accompanied by caregivers) + 2 EGC facilitators Aim: Holistic therapeutic horticulture experience in a natural and outdoor environment	Edible Garden City Farm @ Penjara

Table 4.
Programmes for RC YAA!

To better understand members' needs prior to the sessions:

- YAA! staff shared members' selective profiles in line with privacy protection protocol, which covered fine and gross motor and communications skills.
- For new members, caregivers completed referral forms to describe relevant characteristics of participants (likes and dislikes, area of support needed, etc.) to facilitate interaction with programme facilitators.

Each session involved:

- A brief introduction → Hands-on segment → Closing
- Support from YAA! volunteers and caregivers of most participants Demographic

Participants were youths aged 16 and above with moderate to severe disabilities, including Autism Spectrum Disorder and multiple disabilities.

Outcomes

Measurement

To measure outcomes, a customised survey was completed upon programme conclusion, by caregivers who attended the session with participants (participants were unable to complete self-response surveys). Engagement and feedback surveys were conducted for the first 5-week programme, but targeted outcome surveys were conducted only for the second 10-week programme, following an internal EGC revision of data collection procedures.

In total, 11 outcome surveys were completed.

Survey Results

1. Individual session enjoyment

Each of the 11 participants enjoyed different unique aspects of the programme, the most common favourite activity being interacting with the chickens (3 participants)⁶.

2. Positive impact on participants

From the caregivers' perspective, all 11 participants experienced improved social connection through the programme - either slightly (4), at a medium level (5) or very much (2).

6 out of 9 participants experienced reduced stress/anxiety - either slightly (2) or at a medium level (4). Of those 3 who did not experience any change in stress/anxiety, one was "already calm and well-regulated", one was "scared of worms", and one "liked plants very much" - presumably this participant already worked with plants at home, or the question was incorrectly responded to. Two participants did not select a response for this question.

In addition, 6 out of 11 participants experienced a change in behaviour as the weeks passed. Comments included participants becoming more open to sensorial experiences (2) such as feeling, smelling and tasting plants or feeding the chicken, beginning to take care of and behaving more gently with plants at home (1), and having improved mood with sustained happy behaviours and excitement over seeing plants grow (1).

Fig 3.
EGC's lush and welcoming Penjara farm, where the 10-week RC programme took place.



Qualitative Descriptive Outcomes

Reflections shared during follow-up discussions further detailed the programme's benefits.

Over the course of 10 weeks, the edible garden and shared activities created a space for social connections to be formed. Some of the participants assisted others who needed more support - for example, one member would assist another wheelchair-using member with pushing the wheelchair and with activities requiring more fine motor skills, e.g. chopping vegetables.

For some participants, behaviours and openness to experiences shifted. One parent recounted how her son was previously rough with their house plants, but began watering the plants every morning and treating them very gently after going through the therapeutic horticulture programme. At the farm, participants who had been fearful around the chickens during the initial animal therapy sessions appeared more comfortable and calm as the sessions progressed. With participants' increased confidence in handling the animals, they were better able to reap the therapeutic benefits of these interactions.

From a broader perspective, parents also found the programme beneficial as it connected participants with special needs to nature and introduced novel activities and ideas to them. One parent described how it was "wonderful" for introducing "many new things" to both parents and children, and another found it especially valuable for giving "real exposure... to children who seldom get these types of opportunities outside". The facilitators' energy and compassion in supporting a conducive space was highlighted, with one parent sharing that "the best thing is... that people are so compassionate, so inclusive... and we feel at home."

Ripple effects also extended beyond the participants and their families. Facilitators from EGC experienced benefits from the therapeutic horticulture programme. Said Najib, "we often talk about the benefits of social and therapeutic horticulture... [for] beneficiaries and caregivers... To be honest, I benefited from that. It was somehow therapeutic for me." Rainbow Centre's accompanying staff were also able to benefit from the immersive, sensorial experiences which allowed them to slow down and enjoy the outdoors. In addition, they had the opportunity to expand their knowledge of horticulture to better support future programming.

Overall, the holistic nature of the programme allowed it to resonate uniquely with each participant, and was accompanied by positive ripple effects for the participants' caregivers and families, EGC facilitators, and RC staff.

Limitations

Across the board, the key limitations we encountered in gathering results were (1) the small sample size, and (2) difficulty of directly collecting results from the participant demographic.

Learnings, questions, and future directions

Intentional Programme Design

Our findings demonstrated the importance of intentional programme design. Our participants benefited greatly from experiencing a range of opportunities supported by the garden - through planning, a large variety of aspects of engaging with plants and people - from the joy of exploring a lush green space and the self-empowerment of creating and eating food dishes, to the social connection from joint activities and the therapeutic power of nurturing contact with animals - were emphasised within each session.

Feedback Collection

The survey highlighted areas which caregivers observed to be most useful and enjoyable for participants. It also allowed the team to identify areas (more information and more hands-on activities) which could be further improved in future programmes for a similar demographic. The collection of such data creates a compendium of strengths and gaps of each programme iteration, and can form a useful reference for those working in the field of therapeutic horticulture.

Long-Term Thinking

To ensure that more youths are able to experience the benefits of this programme, and for a longer period of time, access to resources must be sustainable in the long run. RC currently does not have the resources to run the programme independently or find alternative cost-effective solutions. Moving forward, this is one aspect that could be taken into account from the beginning, to seek long-term solutions early and enable more youths to continue benefiting from the programme.

Pre- and Post-Briefings

Organising a briefing before each session was beneficial in enabling facilitators to understand the programme and engage participants better during the session. Similarly, a debrief after each session was a good opportunity for the team to regroup, share challenges faced, and co-create solutions to improve future sessions.

Conclusion

The TTSH Rehab and RC case studies above highlight the range of holistic wellbeing outcomes experienced by two different intervention groups. The strongest outcome in both groups was enhanced social connection, followed by reduced stress/anxiety; in the TTSH Rehab group, a greater sense of purpose/empowerment was another strong outcome. Qualitative descriptions also demonstrated clearly the positive ripple effects felt by families, facilitators, and staff.

Our efforts provide evidence for the value of therapeutic horticulture as carried out in two very different contexts in urban Singapore - one the premises of TTSH Rehab, located inside Ang Mo Kio-Thye Hua Kwan Hospital, and the other an urban farm in the Queenstown district of Singapore. For this process of assessing the actual outcomes and value delivered by therapeutic horticulture programmes, the collection of feedback and outcomes via mini-interviews, surveys, and discussions was critical, and paid off as it provided further evidence of the benefits in specific local contexts, and threw light on limitations to address in future projects.

Together, these case studies grant us and others in the field further insight into the unique role edible gardens and urban farms can play in the healthcare space here.

ENDNOTES

- 1 These included upper limb training, social interaction, activity engagement / leisure, sitting or standing tolerance, cognitive training, and improving attention to the side of the body affected by brain damage.
- 2 Most commonly leisure and activity engagement, followed by purpose and empowerment, and social connection. Others raised were learning gardening skills and diverting negative thoughts.
- 3 The license for EQ-5D-5L was successfully approved, free of charge, for non-commercial use.
- 4 Pittsburg Level of Participation Scale
- 5 Range of personal aims: Improve anxiety; connect to people; purpose and empowerment; leisure exploration; engage in activity; health and wellness; optimise time spent in hospital
- 6 This was followed by making pizza and cookies (2), eating ice cream (2), walking around the farm (1), making tea bags (1), joining friends in activities (1), learning new things (1).

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