Evaluation of a Horticultural Therapy Program for Care Home Residents with Mental Illness

Andrew M.H. Siu, PhD, MCounseling, MSc PDOT

Benson W.M. Lau, BSc (Hon), MMedSc, MPhil, PhD

Department of Health Sciences, Brunel University London

Department of Rehabilitation Sciences, The Hong Kong Polytechnic University

Abstract

Horticulture has long been used as a leisure or social activity in care homes, but there were few evaluation studies of Horticultural Therapy (HT) for care homes residents with mental illness. This study examined the process and outcomes of a standardized horticultural therapy program for care home residents with severe mental illness. Fifty participants were randomly assigned to an 8-session HT group and a comparison group (n = 25 for each group). The process and outcomes of the program, including stress and anxiety, mental well-being, and degree of engagement in meaningful activities were obtained through self-completed questionnaires and observational ratings of participants during the group sessions. The results supported that HT significantly promoted participants' mental well-being, engagement, and sense of meaningfulness and achievement. The evidence provides support on the effectiveness of HT for care home residents with long-term mental illnesses.

Introduction

Horticultural therapy is the design and use of plants and plant-based activities to achieve specific treatment and rehabilitation goals in the emotional, social, physical or intellectual domains (Capra et al., 2019). Horticultural therapy is a process of guiding participants to appreciate nature, develop interest in horticultural activities like gardening or farming, learn skills in taking care of plants, and develop self-efficacy and sense of achievement (Oh et al., 2018; Parkinson et al., 2011). Many studies showed that horticultural therapy could reduce stress and anxiety (Detweiler et al., 2015; Kam & Siu, 2010; Siu et al., 2020),increase attention and cognitive ability (Berman et al., 2008; Perrins-Margalis et al., 2000), improve engagement in meaningful activities and interests (Siu et al., 2020), increase quality of life (Tu 2022), and improving social interaction and sense of belonging (Diamant & Waterhouse, 2010; Sempik et al., 2014) among people with schizophrenia and severe mental illness.

While horticulture was used as therapeutic activity for care home residents (Clatworthy et al., 2013), many studies were conducted on people with dementia (Lu et al., 2020; Uwajeh et al., 2019). Care home residents with mental illness often had long history of illness and residual symptoms which impact on their daily functioning, although many could be partially or completely independent in activities of daily activities (ADL). Due to volitional or habituation issues, it is also often challenging to engage clients with severe mental illness to participate in instrumental ADL, social, productive, and leisure activities. It is a common objective for care homes to try to engage clients with long-term mental illness in meaningful activities, which could stimulate interest and participation in daily activities, enable re-learning of daily living and self-management skills, and enhance mental well-being and quality of life (Goldberg et al., 2002; Wu & Ma, 2016). Horticultural activities could be designed and graded with appropriate challenges to their cognitive and social skills, so that clients could participate and improve functional abilities through the activities. Through building meaningful connections with plants and nature, horticultural activities could promote relaxation and mindfulness, learning and practice of functional skills, and stimulate interests in activity participation. This study aims to address the research gap of examining the effects of horticultural therapy for care home residents with long-term mental illness.

Method

The study used a quasi-experimental design to evaluate the outcomes of a horticultural therapy programs for people with mental illness who resided in a care home. The study compared process and outcome measures of horticultural therapy group with a comparison group. The

outcome data was collected using self-report questionnaires and behavioral observations.

Participant

The participants of this study are people with severe mental illness from a residential care home (known as long-stay care home in Hong Kong). Participants should be able to follow instructions of horticulture activities (see Table 2). The exclusion criteria include those with intellectual disabilities or who have participated in horticulture activities in the past 6 months. Participants with challenging behavior are allowed to join if their behavior could be managed by HT group leader. The horticultural therapy activity and research were advertised through notices, leaflets, as well as announcement during community meeting of the care home. A total of 80 potential participants in the care home agreed to join the study. They were screened using the selection and exclusion criteria, and 50 met the selection criteria for the study. We obtained informed consent of 50 participants, who volunteered to join the program and the study. No incentives were provided for participating in the study, and participants were not required to pay to join the horticultural activities.

Sample size

A recent meta-analysis suggested that the effect size of horticultural therapy on mental health outcomes were in the medium range (Soga et al., 2017; Tu, 2022). The repeated-measures design used in this study had two groups (an intervention group and a control group), and there were two repeated measures over time. Using the G*Power software in power analysis, a sample size of 18 per group would be adequate to achieve a power of 0.80 if we assume a medium effect size (d) of 0.4, and α is .05 (Faul et al., 2007). To account for a potential attrition rate of 10%, we planned to recruit at least 44 subjects for random assignment to the two groups.

Procedures

We briefed the potential participants on the purpose, risks and benefits, and procedures of study. Among 80 potential participants who verbally agreed to join, fifty were suitable for participation in the horticultural therapy program. Those who agreed to join were requested to sign a consent form. The participants' basic demographic information, including gender, age, diagnosis, years of onset, was obtained from their case records.

The participants were randomly assigned to the horticultural therapy group and the comparison group using a random number generator application. The experimental group received both the weekly horticultural therapy program, while the comparison group joined parallel group activities, such as coloring pictures, reading newspaper and magazines. The study is single-blind, with only the assessors blinded to the participants' group membership. The therapist who conducted the horticulture therapy group and the participants were both aware of whether they were assigned to the intervention group or the control group.

Intervention Program

The standardized horticultural therapy program has a total of eight sessions, conducted by a qualified horticultural therapist. Each session lasts for one hour, which include introduction and instruction, activity time, and reflection and feedback. The HT sessions cover knowledge and skills in planting, arrangement of plants and flowers, care of indoor and outdoor plants, the use of herbs and aroma (Table 1). The key objectives of the HT program were to increase participation in meaningful activities, improve mental well-being, and build interests and leisure pursuits, and experience achievement and satisfaction.

Outcome Measures

Mental Well-being. We used the 7-item Chinese Short Warwick-Edinburgh Mental Well-being Scale (C-SWEMWBS) to measure the mental well-being of the participants. A validation study of the Chinese version showed that the instrument had acceptable

test-retest reliability of .67 ('Ng et al, 2014) It has a unidimensional factor structure and its score correlated in expected direction and strength with concurrent measures of well-being and quality of life (Fung, 2019).

Engagement and Meaningfulness. We used the 12-item Engagement in Meaningful Activities Survey (EMAS) to assess how far participants experience meaning in daily life (Goldberg et al., 2002). A validation study of the EMAS showed that its scores correlated in expected directions with the concurrent measures of well-being and life satisfaction (Eakman, 2013). The Chinese version of instrument was translated and validated in a previous study of horticultural therapy (Kam & Siu, 2010). We hypothesized that the horticultural therapy group would help participants to increase engagement in activities and add meaning to daily life experience.

Engagement in activity during HT Sessions. We hypothesized that HT could promote participants' engagement in activities. Using the observation and recording method developed by Gigliotti & Jarrott (Gigliotti & Jarrott, 2005), trained assessors rated the engagement of each participant using a behavioral sampling schedule. With consent from participants, we used a 360o camera to record the group activity process for analysis of engagement. Trained assessors watched the 360o videos and rated the engagement of each group participant. Assessors assigned one of four behavior codes reflecting participants' engagement for a minute in every five-minute segment of the video: 1) horticultural therapy (H); 2) productive behavior (P), 3) social behavior (S); and 4) non-engaged (N), and 5) disruptive behavior (D).

Perceived Benefits of Activity. This is a 7-item rating scale designed by the researchers to collect the perceived benefits from participants of HT program. The perceived benefits cover physical demands, relaxation, promote and leisure interest, relaxation, satisfaction, making good decisions, increase social skills, increase in competence. A high score indicates the individual perceived the intervention or control condition that they experienced as beneficial to them.

Results

There were 25 participants each in the control group and the experimental group. The mean age of participants (N = 50) was 63.64 (SD = 11.36), with a range from 40 to 90 years old. The majority (n = 40, 80%) of participants had a diagnosis of schizophrenia, while the rest of participants had paranoid schizophrenia or schizoaffective disorders (n = 10, 20%). There were no significant differences in age, gender proportions, or years of onset between groups (Table 2).

Using Repeated Measures Analysis of Variance (ANOVA), we compared the changes in outcome measures between the HT group and the control group (Table 3). The HT group also reported significantly higher mental well-being than the comparison group ($F = 4.31$, $p < .05$, Figure 1). The HT group also had significantly higher EMAS scores, in both the personal-competence ($F = 10.54$, $p < .001$; Figure 2) and social-experiential components of engagement ($F = 4.95$, $p < .05$; Figure 1).

The HT group perceived that the HT is significantly more beneficial to them than comparison group ($F = 5.28$, $p < .05$). The HT group reported their group experience is beneficial in the areas of having autonomy and opportunities for making decisions ($t = 3.00$, $p = .004$), social skills ($t = 3.45$, $p = .001$), and in developing competence in horticulture ($t = 3.10$, $p = .003$).

We analyzed the behavioral observation ratings from the 360-degrees video recording of three HT sessions (Table 4). The engagement in the HT activities was very high among 1st (84.2%¬), 4th (72.3%) and 8th (86.6%) sessions, with an average of 81.0% (SD = 7.6). This is followed by non-engaged behavior (M = 13.2, SD = 5.6), productive behavior (M = 2.9, SD = 1.3), social behavior (M = 2.2, SD = 1.1), and disruptive behavior (M = .5, SD = .6).

Disengaged behavior is low at 1st and 8th session but is significantly higher in the 4th session. Social behavior remained at a low level over the three sessions.

Discussion

The results showed that the participants reported an increase in mental well-being with small effect size. There is a significant increase in engagement in meaningful activities with moderate effect sizes. This is consistent with the observation of the group process from the video recording, which shows a high engagement in horticultural activity (72 to 87% among three sessions). These results are consistent with evaluation studies conducted with people with severe mental illness in other settings, like community mental health services or vocational rehabilitation programs (Ascencio, 2019; Kam & Siu, 2010; Liu et al., 2014). A closer look at the results of EMAS showed that there is a greater effect size in scores of the personal-competence component than the social-experiential component. This may suggest that the participants' positive engagement experience in horticulture therapy is more linked to the sense of competence from horticultural tasks rather than from social interactions in the group.

The participants perceived three aspects of HT as most helpful, including opportunity to make decisions (autonomy), social skills, and competence. While the key objectives of this HT group encourage participants to build horticultural skills and gain of sense of mastery, it did not expect the group would promote social skills or competence. The perceived benefit of improving social skills is not consistent with our previous study of people with severe mental illness in a rehabilitation setting (Siu et al., 2020), which showed no changes in social interaction and competence among participants. From the 360o video recording, we also noticed that social interaction played a small part in the group. Participants are mostly working on HT projects in parallel mode, except when they are guided to share about their horticultural projects. Further qualitative study using interviews may be needed to further understand why the participants consider social interaction and skills as an important benefit of the HT group.

There are several limitations of this study. First, we found that many care home residents have participated in horticulture activities in the past six months, and it is the key reason that many did not meet the selection criteria. In future studies, it may be better to examine the effects of HT in a care home in which horticulture activities are not yet a common activity. Second, we could only implement a comparison group instead of a control group. The comparison group participated in parallel activities like newspaper reading or coloring activity. These activities could have some beneficial effects on the participants even though they are parallel activities, which may decrease the power of statistical comparison with the intervention group. Third, all the data was obtained through self-report questionnaires, except for the observation of participation. While standardized questionnaires were used in outcome measurement, self-report questionnaires are subject to biases like social desirability, recall, self-representation, or acquiescence. Last, the results are obtained from residents of only one care home for people with severe mental illness. The study needs to be further replicated in multiple settings.

Conclusion

This study showed that participation in a horticultural therapy group could significantly increase the mental-welling, engagement in meaningful activity, and satisfaction of care home residents with severe mental illness. The effect sizes for changes in mental well-being is small, while the change in engagement is moderate. The positive changes are linked to cultivation of task competence in horticultural tasks and projects. Participants perceived the horticultural activities as beneficial to their autonomy, competence, and social skills.

References

Ascencio, J. (2019). Horticultural Therapy as an Intervention for Schizophrenia: A Review. Alternative and Complementary Therapies, 25(4), 194–200. https://doi.org/10.1089/ACT.2019.29231. JAS/ASSET/IMAGES/LARGE/FIGURE1.JPEG

Berman, M. G., Jonides, J., & Kaplan, S. (2008). The cognitive benefits of interacting with nature. Psychological Science, 19(12), 1207–1212. https://doi.org/10.1111/j.1467-9280.2008.02225.x

Capra, C. L., Haller, R. L., & Kennedy, K. L. (2019). Introduction to the profession of horticultural therapy. *The Profession and Practice of Horticultural Therapy, 3–22*. https://doi.org/10.1201/9781315143101-2/INTRODUCTION - PROFESSION - HORTICULTURAL - THERAPY-CHRISTINE - CAPRA-REBECCA-HALLER-KAREN-KENNEDY

Clatworthy, J., Hinds, J., & Camic, P. M. (2013). Gardening as a mental health intervention: A review. *Mental Health Review Journal, 18*(4), 214–225. https://doi.org/10.1108/MHRJ-02-2013-0007

Detweiler, M. B., Self, J. A., Lane, S., Spencer, L., Lutgens, B., Kim, D. Y., Halling, M. H., Rudder, T. F., & Lehmann, L. (2015). Horticultural therapy: A pilot study on modulating cortisol levels and indices of substance craving, posttraumatic stress disorder, depression, and quality of life in veterans. *Alternative Therapies in Health and Medicine, 21*(4), 36–41.

Diamant, E., & Waterhouse, A. (2010). Gardening and belonging: Reflections on how social and therapeutic horticulture may facilitate health, wellbeing and inclusion. *British Journal of Occupational Therapy, 73*(2), 84–88. https://doi.org/10.4276/030802210X12658062793924

Eakman, A. M. (2013). Relationships between meaningful activity, basic psychological needs, and meaning in life: Test of the meaningful activity and life meaning model. *OTJR Occupation, Participation and Health, 33*(2), 100–109. https://doi.org/10.3928/15394492-20130222-02

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191. https://doi.org/10.3758/BF03193146

Fung, S. F. (2019). Psychometric evaluation of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) with Chinese University Students. *Health and Quality of Life Outcomes, 17*(1). https://doi.org/10.1186/s12955-019-1113-1

Gigliotti, C. M., & Jarrott, S. E. (2005). Effects of Horticulture Therapy on Engagement and Affect. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement, 24*(4), 367–377. https://doi.org/10.1353/cja.2006.0008

Goldberg, B., Brintnell, E. S., & Goldberg, J. (2002). The relationship between engagement in meaningful activities and quality of life in persons disabled by mental illness. *Occupational Therapy in Mental Health, 18*(2), 17–44. https://doi.org/10.1300/J004v18n02_03

Kam, M. C. Y., & Siu, A. M. H. (2010). Evaluation of a horticultural activity programme for Persons with psychiatric illness. *Hong Kong Journal of Occupational Therapy, 20*(2), 80–86. https://doi.org/10.1016/S1569-1861(11)70007-9

Liu, Y., Bo, L., Sampson, S., Roberts, S., Zhang, G., & Wu, W. (2014). Horticultural therapy for schizophrenia. *Cochrane Database of Systematic Reviews, 2014*(5). https://doi.org/10.1002/14651858.CD009413.pub2

Lu, L.-C., Lan, S.-H., Hsieh, Y.-P., Yen, Y.-Y., Chen, J.-C., & Lan, S.-J. (2020). Horticultural therapy in patients With dementia: A systematic review and meta-analysis. *American Journal of Alzheimer's Disease & Other Dementias®, 35*, 153331751988349. https://doi.org/10.1177/1533317519883498

Ng, S. S. W., Lo, A. W. Y., Leung, T. K. S., Chan, F. S. M., Wong, A. T. Y., Lam, R. W. T., & Tsang, D. K. Y. (2014). Translation and validation of the Chinese version of the short Warwick-Edinburgh mental well-being scale for patients with mental illness in Hong Kong. *East Asian Archives of Psychiatry, 24*(1), 3–9. https://search.informit.com.au/

Oh, Y. A., Park, S. A., & Ahn, B. E. (2018). Assessment of the psychopathological effects of a horticultural therapy program in patients with schizophrenia. *Complementary Therapies in Medicine, 36*(October 2017), 54–58. https://doi.org/10.1016/j.ctim.2017.11.019

Parkinson, S., Lowe, C., & Vecsey, T. (2011). The therapeutic benefits of horticulture in a mental health service. *British Journal of Occupational Therapy, 74*(11), 525–534. https://doi.org/10.4276/030802211X13204135680901

Perrins-Margalis, N. M., Rugletic, J., Schepis, N. M., Stepanski, H. R., & Walsh, M. A. (2000). The immediate effects of a group-based horticulture experience on the quality of life of persons with chronic mental illness. *Occupational Therapy in Mental Health, 16*(1), 15–32. https://doi.org/10.1300/J004v16n01_02

Sempik, J., Rickhuss, C., & Beeston, A. (2014). The effects of social and therapeutic horticulture on aspects of social behaviour. *British Journal of Occupational Therapy, 77*(6), 313–319. https://doi.org/10.4276/030802214X14018723138110

Siu, A. M. H. H., Kam, M., & Mok, I. (2020). Horticultural therapy program for people with mental illness: A mixed-method evaluation. *International Journal of Environmental Research and Public Health, 17*(3), 711. https://doi.org/10.3390/ijerph17030711

Soga, M., Gaston, K. J., & Yamaura, Y. (2017). Gardening is beneficial for health: A meta-analysis. *Preventive Medicine Reports, 5*, 92–99. https://doi.org/10.1016/j.pmedr.2016.11.007

Tu, H. (2022). Effect of horticultural therapy on mental health: A meta-analysis of randomized controlled trials. *Journal of Psychiatric and Mental Health Nursing, 29*(4), 603–615. https://doi.org/10.1111/jpm.12818

Uwajeh, P. C., Iyendo, T. O., & Polay, M. (2019). Therapeutic gardens as a design approach for optimising the healing environment of patients with Alzheimer's disease and other dementias: A narrative review. *EXPLORE, 15*(5), 352–362. https://doi.org/10.1016/j.explore.2019.05.002

Wu, C., & Ma, S. C. (2016). *Occupational Therapy in Mental Health Facilitating Intrinsic Motivation in Clients with Mental Illness*. 3101(April 2014), 37–41. https://doi.org/10.1300/J004v16n01

Table 1

Objectives, and Activities of the Horticulture Therapy (HT) Sessions

Session Title	Session Objectives / Activities
1. Everything starts with the seeds.	▪ Introduction to the group. ▪ Establish expectations, ground rules, and boundaries for the group. ▪ Coach participants to planting shootings in pots and outdoor garden.
2. Get close to the earth.	▪ Learn horticulture activities of potting, digging, mixing soil, and watering ▪ Guide participants to make 'grass ball babies' (creative activity with plants) to enhances participants' interest and satisfaction.
3. Creative succulent plants design.	▪ Learn how to fertilize for planting. ▪ Guide participants to combine and arrange plants in pots or vase. ▪ Learn to be creative, to appreciate their own work and of each other.
4. Herbs and mood.	▪ Introduce herbs, their characteristics, their smell and use. ▪ Guide participants to make 'Gift Pots', for sending to their loved ones.
5. Trimming plants.	▪ Learn plant pruning. ▪ Help participants to learn to observe and appreciate plants and natural environment. ▪ Learn about organic farming.
6. A date with flowers.	▪ Using plants (mainly herbs) with different smell and aroma, guide participants to learn about soothing effects of plants. ▪ Origami activities to enhance participants self-appreciation.
7. Botannical rubbing.	▪ Learn skills of horticulture: how to keep soil fertile. ▪ Botanical (fruit) rubbing activity.
8. Enjoy Harvest & Party.	▪ Cook and share food made from farm produce, appreciate the process of horticulture. ▪ Craft activity using flowers and plants.

Table 2

Comparison of the Background Information of the Treatment and Comparison Groups

Variables	Group				x^2
	Treatment (n=25)		Control (n=25)		
	n	%	n	%	
Categorical Variables					
Sex					
Male	19	38.0	17	34.0	0.39
Female	6	12.0	8	16.0	
Diagnosis					
Schozophrenia	17	34.0	23	46.0	- - -
Paranoid Schizophrenia	8	16.0	1	2.0	
Schizoaffective Disorder	0	0	1	2.0	
Interval Variables	M	SD	M	SD	t
Age	61.92	8.60	66.08	13.76	1.29
Years from onset	37.92	10.93	35.54	13.85	0.67

Table 3

Comparison of the Outcomes of the Treatment and Comparison Groups

Measures	Measures	Post	F Group X Time	t	Effect Size
EMAS					
Personal-Competence Component					
Treatment	2.19(0.80)	2.50(0.67)	10.54***	- - -	.17[a]
Comparison	2.28(0.79)	2.07(0.63)			
Social-Experiential Components					
Treatment	2.26(0.70)	2.46(0.72)	4.95*	- - -	.10[a]
Comparison	2.32(0.78)	2.15(0.67)			
C-SWEMWBS					
Treatment	3.09(0.67)	3.37(0.54)	4.31*	- - -	.08[a]
Comparison	3.03(0.87)	2.94(0.65)			
Perceived Benefits					
Treatment	- - -	46.52 (7.35)	- - -	5.56*	.45[b]
Comparison	- - -	44.38 (10.60)			

Note. EMAS = Engagement in Meaningful Activities Survey; C-SWEMWBS = Chinese Version of the Short Warwick-Edinburgh Mental Well-Being Scale.

[a] effect size is ηp2, [b] effect size is Cohen's d

Table 4

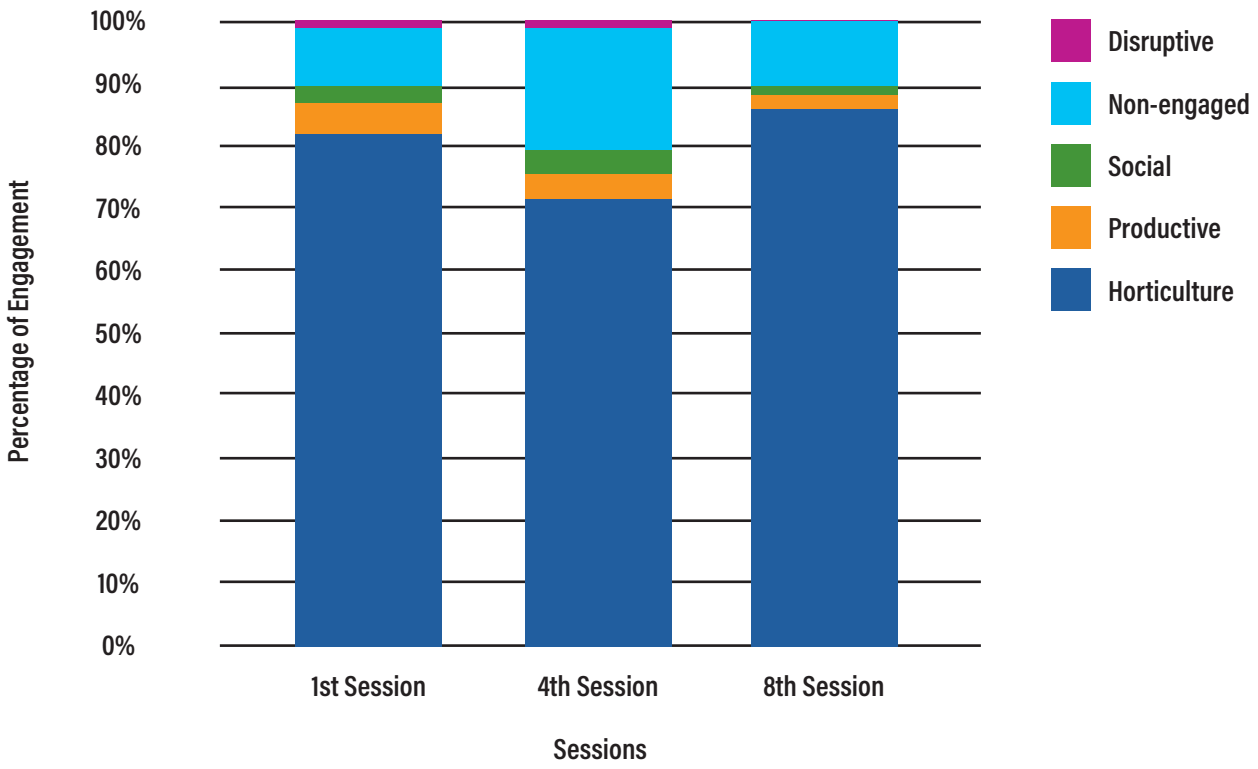
Perceived Benefits of Horticultural Therapy vs. Comparison Group.

Perceived benefits of activities	Group	M (SD)	t	P
1. Everything starts with the seeds.	Intervention	3.24 (.88)	2.067	.044
	Comparison	3.08 (1.08)		
2. Interests and leisure pursuits	Intervention	3.28 (1.06)	2.493	.016
	Comparison	3.00 (1.11)		
3. Relaxation	Intervention	3.52 (1.16)	1.900	.063
	Comparison	3.35 (1.13)		
4. Satisfaction	Intervention	3.40 (1.04)	1.096	.278
	Comparison	3.31 (1.12)		
5. Make decisions	Intervention	3.12 (1.24)	2.998	.004*
	Comparison	3.10 (1.24)		
6. Social skills	Intervention	3.04 (1.06)	3.446	.001*
	Comparison	13.04 (1.17)		
7. Competence	Intervention	2.56 (1.12)	3.100	.003*
	Comparison	2.51 (1.21)		

Note. With Bonferroni correction (0.05 / 7), results are marked significant if $p < 0.007$)

Figure 1

Participants' Engagement in Different Activities during Three Horticultural Therapy Sessions



Biographies

Dr. Andrew M.H. Siu is a mental health specialist in occupational therapy practice. He is Reader in Occupational Therapy at Brunel University London. His research interests are in the areas of nature-based therapy (horticulture, forest bath, healing garden), virtual reality interventions in mental health, and resilience in people with chronic illness and disabilities. He published over 105 research journal papers and reviews in mental health, developmental disabilities, and chronic illness.

Dr. Benson, W.M. Lau is Associate Professor at the Hong Kong Polytechnic University. His research interest is to elucidate the importance of neuroplasticity in emotions and behaviors. Using animal models which simulate emotional and behavioural symptoms including depression, anxiety, phobia and sexual dysfunction, his research explores the neurological basis of these symptoms and the mechanisms underlying the respective treatment methods, especially in use of rehabilitation treatment modalities for these conditions.