



# Impacts of therapeutic horticulture on happiness and loneliness in institutionalized clients with mental health conditions

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British Journal of Occupational Therapy  
2022, Vol. 85(2) 111–119  
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DOI: 10.1177/03080226211008719  
[journals.sagepub.com/home/bjot](https://journals.sagepub.com/home/bjot)  


## Abstract

**Introduction:** Therapeutic horticulture (TH) can be considered a non-pharmacological approach to support psychiatric treatments for the improvement of physical and mental health, but information is lacking on whether it has advantages as compared to more conventional occupational therapies (OTs).

**Method:** The study focused on institutionalized 25 clients attending TH among other OTs and 15 clients attending OT other than TH. The measures used were the 'Subjective Happiness Scale' (SHS) and the 'Social and Emotional Loneliness Scale for Adults' (SELSA-S), along with sociodemographic and clinical data. The study design was descriptive, observational and cross-sectional.

**Results:** Scores obtained from the SHS and SELSA-S were generally similar for both groups, although 40% of clients in the TH group perceived relaxation. These are in agreement with previous studies performed with chronic schizophrenia clients reporting that TH might effectively decrease depression/anxiety symptoms, but the feeling of hopelessness and quality of life did not change, probably due to long-term institutionalization and required medication that may limit other effects. Within the TH group, clients preferred specific horticultural tasks and more days/week attending activities decreased loneliness and increased happiness.

**Conclusion:** TH interventions as an integrative treatment option merits further study on both process and outcome evaluation, to maximize its effectiveness.

## Keywords

Therapeutic horticulture, health occupations, mental disorders, schizophrenia spectrum, subjective happiness, perception of loneliness

Received: 26 September 2020; accepted: 16 February 2021

## Introduction

Therapeutic horticulture (TH) as an occupational therapy can be considered a non-pharmacological approach that can assist other psychiatric treatments, consistent with the importance of occupation principle as a key dimension of mental health and recovery (Höhl et al., 2017).

Although numerous benefits of TH in individuals with mental health conditions can be found in the literature, information is scarce on whether TH activities have advantages when compared to more conventional occupational therapies (OTs), such as, for example, physical exercise, dance, music, theatre and handwork. Therefore, the main objective of this study was to analyse the advantages of therapeutic horticulture as compared to the more conventional occupational therapies.

## Literature review

Nature and man are linked in a unique network of life that is both mental and physical (Lewis, 1995), in addition to the recognition that man's survival depends on the food provided

by plants. There is an instinctive need for contact with nature that has driven the evolution of man as a species, and it is well acknowledged that human beings depend on nature for their psychological, emotional and spiritual needs, which are difficult to satisfy by other means (Maller et al., 2005). Connecting nature through interventions that include care of plants was associated with therapeutic and well-being processes since ancient societies which are still in use today (Maller et al., 2005). Evidence suggests that all people, both children and adults, benefit from contact with nature and that its conservation

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should form part of a public health strategy, in addition to environmental sustainability and socio-economic factors.

The use of plants in mental health therapies is established by therapeutic horticulture (Lewis, 1995), meaning the curative and therapeutic effects through plant-caring activities. Individual activities or groups of participants in a variety of contexts frequently experience benefits, such as improving mental health outcomes (Sempik, 2010; Sempik et al., 2014) and increased self-confidence and self-esteem (Lewis, 1995). Therapeutic horticulture programmes may include the propagation and cultivation of different plants, in outdoor or indoor situations; on the ground, in beds or pots; with ornamental plants, vegetable crops, aromatic and medicinal plants, edible flowers, small fruits and may also include ornamental or fruit trees and shrubs (Mourão et al., 2014).

Together with the concept of social horticulture, focussing on social interaction and horticulture activities, TH falls into different scopes such as urban gardening programmes, environmental education, support for the elderly, disabled or healthcare dependents, psychosocial rehabilitation and social inclusion. It provides opportunities for participation and socialization, sensory stimulation, concentration and creativity and further aims to contribute to well-being and the improvement of quality of life (Mourão et al., 2019; Sempik et al., 2014). The perceived TH benefits among vulnerable people include increased self-esteem and self-confidence, the development of knowledge in horticulture, the increased social and work relationships, greater literacy, increased mathematical knowledge, greater sense of general well-being and the opportunity for socialization and development of independency, particularly when used in a group-based setting (Hewitt et al., 2013; Mourão et al., 2014; Sempik, 2010). Therefore, TH is associated with a variety of benefits at the physical, emotional, cognitive and social levels. Likewise, the mutual relationship between person and plant constitutes a therapeutic pathway in mental health care in clients with depression, schizophrenia, dementia and other health conditions (Ascencio, 2019; Cipriani et al., 2017; Harvey et al., 2010; Hewitt et al., 2013; Kam and Siu, 2010; Kenmochi et al., 2019; Oh et al., 2018; Parvin et al., 2016). These authors described several measures to assess the effects of TH in the context of mental health conditions, which led us to conclude the suitability of the measures used in this study, namely the 'Subjective Happiness Scale' (SHS; Lyubomirsky and Lepper, 1999; Pais-Ribeiro, 2012) and the short form of the 'Social and Emotional Loneliness Scale for Adults' (SELSA-S; DiTommaso et al., 2004; Fernandes and Neto, 2009), both validated for the Portuguese population, easy to apply and with good psychometric properties. To the best of our knowledge, this is the first study that analyses the impact of the TH on happiness and loneliness in institutionalized clients with mental health conditions.

Happiness is an indicator of subjective well-being (Diener et al., 2004; Lyubomirsky and Lepper, 1999), and there are several similar measures used as synonyms, such as life satisfaction, quality of life or well-being (Veenhoven, 1997). Happiness, on the other hand, can also be interpreted as pleasure, satisfaction with life, positive emotions, full life or feeling of contentment (Diener et al., 2004). Similarly,

Veenhoven (1997) defined happiness as the degree to which a person globally evaluates the quality of their life positively, that is, how much they like the life they lead. Lyubomirsky and Lepper (1999) reported that 'subjective happiness' is a subjective assessment that a person makes whether they are happy or unhappy and they developed a global measure of subjective happiness, based on the respondent's perspective, when asked to make a global judgement on how happy or unhappy they are.

Loneliness is an aversive and distressing experience with potentially serious consequences, and it has been associated with a set of psychological and somatic problems (DiTommaso and Spinner, 1997). Loneliness is also often associated with a low level of satisfaction with life (Neto, 2015), alcoholism, suicide and physical illness (Ernst and Cacioppo, 1999). Social and emotional loneliness, that can coexist or occur independently, result from the lack of a network of social relationships with peers and the loss or lack of family and romantic connections (Neto, 2015).

## Method

### Sample

The mental health unit where the study was conducted ensures inpatient and outpatient care to psychiatric patients. The ambulatory services include psychiatry and psychology appointments, occupational therapies and a day centre for different dementia clients. The institutional stay is prepared for short- and long-term duration. Clients included in this study were long-term institutionalized, mainly with a psychiatric diagnosis of schizophrenia spectrum, neurocognitive and neurodevelopmental disorders (Table 1).

The mental health unit has TH facilities, including a nursery and a greenhouse, surrounded by an urban park, running organically since 2016. Clients were invited to attend the TH activities, which were performed with groups of about eight clients. Each client participated in the TH activities twice a week, for 2 hours. The study was performed after 53 weeks of TH activities, corresponding to about 106 h/patient. Those with impaired mobility performed activities such as identification of aromatic and ornamental plants, trees and seeds and preparation of different substrates. The more autonomous clients carried out composting, soil preparation with compost incorporation, sowing, planting, weeding, watering and harvesting. To allow comparisons of the benefits associated with different activities, the study focused on institutionalized 25 clients attending therapeutic horticulture activities amongst other conventional occupational therapies (TH group) (with only 22 valid responses for the measures) and 15 clients attending conventional occupational therapies other than TH (OT group), that included dance, physical exercise, swimming, theatre, binding, plastic expression, handwork and music.

### Measures

The measures used in the study consisted of two questionnaires designed with multiple-choice questions and two

**Table 1.** Socio-demographic and clinical characteristics for clients with therapeutic horticulture among other OT (TH) and clients with occupational therapies other than TH (OT).

Variable		Group TH (n=25)		Group OT (n=15)	
		Total	%	Total	%
Gender	Female	14	56.0	1	6.7
	Male	11	44.0	14	93.3
Age (years)	<25	0	0.0	0	0.0
	25-44	9	36.0	3	20.0
	45-64	12	48.0	10	66.7
	>65	4	16.0	2	13.3
Education	Illiterate	6	24.0	1	6.7
	Basic education (9 years)	18	72.0	11	73.3
	Secondary school (12 years)	1	4.0	2	13.3
	Higher education	0	0.0	1	6.7
Psychiatric diagnosis	Neurocognitive and neurodevelopmental disorders	5	20.0	2	13.3
	Schizophrenia spectrum	15	60.0	12	80.0
	Other	5	20.0	1	6.7
Dependency degree	Mild	3	12.0	2	13.3
	Moderate	14	56.0	7	46.7
	Severe	8	32.0	6	40.0
Institutional stay (no. of years)	<5	13	52.0	1	6.7
	5-14	6	24.0	6	40.0
	15-24	6	24.0	7	46.7
	>25	0	0.0	1	6.7
Number of different activities attended	1-2	4	16.0	4	26.7
	3-4	11	44.0	11	73.3
	5-8	10	40.0	0	0.0
Number of days/week attending activities	2-3	6	24.0	4	26.6
	4-5	19	76.0	11	73.3

SHS: Subjective Happiness Scale; TH: therapeutic horticulture; OTs: occupational therapies.

evaluation scales referred here as the ‘Subjective Happiness Scale’ (SHS; Lyubomirsky and Lepper, 1999; Pais-Ribeiro, 2012) and the short form of the ‘Social and Emotional Loneliness Scale for Adults’ (SELSA-S; DiTommaso et al., 2004; Fernandes and Neto, 2009), both validated for the Portuguese population.

Questionnaire 1 comprising sociodemographic and clinical data included gender, age, educational level, diagnosis, dependency degree evaluated through psychiatric diagnosis (mild, moderate and severe), number of years at the psychiatric hospital, medication intake, the existence of a guardian other than the patient, the frequency of visits by family or friends and the number and periodicity of the activities attended.

Questionnaire 2 consisted of four questions. The first question for both OT and TH groups was about activity clients’ preference and the other questions, for those attending TH, included the horticultural task clients’ preference and changes perceived by clients with TH attendance.

The SHS (SHS; Lyubomirsky and Lepper, 1999; Pais-Ribeiro, 2012) is a 4-item measure with a 7-point Likert scale. The first question evaluates the personal happiness perspective (SH1) and varies between the value 1 ‘a person who is not very happy’ and the value 7 ‘a very happy person’. The second question evaluates the perspective of personal happiness compared to peers (SH2) and varies between the value 1 ‘a less happy person’ and the value 7 ‘a happier person’. In the characterization of the personal perspective of optimism in relation to life (SH3) (‘Some people are generally very happy. They enjoy life despite what is going on around them,

getting the best of what is available’), the value 1 indicates that the respondent is not self-perceived in this characterization, ‘not at all’, and the value 7 indicates that this is their characterization, ‘in large part’. The same scale is used in the last question of the characterization of the personal perspective of pessimism in relation to life (SH4) (‘Some people are usually not very happy. Although they are not depressed, they never seem as happy as they could be. To what extent does this characterization describe you?’), where the value 1 denotes a happier person and the value 7 denotes a less happy person. The internal consistency of the SHS is high, with Cronbach  $\alpha = 0.76$ . In addition, this scale has shown convergent and discriminant validity with other measures such as satisfaction with life, personal well-being, distress and mental health, the perception of physical health and the quality of life (Pais-Ribeiro, 2012).

The SELSA-S (DiTommaso et al., 2004; Fernandes and Neto, 2009) assesses the level of loneliness experienced by individuals in three contexts: social, associated with lack of friends and of satisfactory social relationships that can meet the individual’s needs; family, associated with lack of a family environment where the individual feels supported and romantic, associated with the need for attachment and defined as a difficulty for some individuals to start a satisfactory love/affective relationship or to maintain the romantic relationship with desired levels of intimacy or emotional closeness (DiTommaso et al., 2004). The global loneliness is the sum of the three subscales. It consists of 15 items in the form of affirmations, which can be answered on a 7-point Likert scale ranging from ‘totally in disagreement’ to ‘totally

in agreement', with an 'indifferent' response option, corresponding to a neutral option. The higher the scale score, the higher the loneliness experienced by the individual, ranging between 15 to 105 points. The psychometric properties of the SELSA-S are satisfactory (DiTommaso et al., 2004), and, in the validation to the Portuguese population (Fernandes and Neto, 2009), the internal consistency was also acceptable: social loneliness  $\alpha = 0.71$ , family loneliness  $\alpha = 0.71$  and romantic loneliness  $\alpha = 0.80$ . Additionally, this scale showed convergent and discriminant validity with other measures such as attachment, self-esteem, social skills, coping style, liking for people, interpersonal trust, social intimacy, mental symptomatology and satisfaction with life, trust, health and well-being (DiTommaso et al., 2004).

### Procedure and statistical analyses

The study design was descriptive, observational and cross-sectional. Questionnaire 1 was responded by the hospital staff, and Questionnaire 2, as well as the SHS and SELSA-S, was answered by the participants, jointly with the occupational therapists that provided the necessary support to fill them. Before this single assessment, all participants or guardians signed informed consent that included the scope, purpose and confidentiality of the study. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (World Medical Association, 2013).

The analysis of variance was performed considering the following independent variables: (i) activity groups: TH – clients with therapeutic horticulture among other OTs and OT – clients with occupational therapies other than TH; (ii) clients' gender in the TH group; and for both groups: (iii) education level (lower, including illiterate and basic education, and secondary/higher education); (iv) dependency degree (mild, moderate and severe) and (v) visits to clients (with or without visits by family and/or friends, with different periodicities).

Statistical analyses of the results were performed with the SPSS programme, v25 (SPSS Inc.), including descriptive analysis, Student's *t*-tests, analysis of variance, correlations and regressions between the variables. For the correlation and regression analysis, only the significant results were presented.

## Results

### Sample

Both clients' groups – TH group and OT group – with 25 and 15 participants, respectively, were similar for most of the analysed independent variables regarding sociodemographic and clinical data (Table 1), although with gender differences. In the OT group, 93.3% of the clients were men, whereas in the TH group, they were 44.0%.

### Comparisons between groups

#### *Institutional stay and number of different activities attended.*

The average institutional stay was significantly lower ( $p < 0.05$ ) in the TH group (7.1 years) compared to the OT group (13.0 years) (Table 2). Particularly, long-term institutional stay for 15–24 years represented 24.0% and 46.7%, respectively, for both groups (Table 1). Clients with secondary/higher education and mild degree of dependency had longer institutional stay, with no significant differences in the remaining dependent variables (Table 2).

Clients in the TH group participated in a larger number ( $p < 0.05$ ) of different occupational therapy activities (4.3 activities) compared to clients in the OT group (2.9 activities) (Table 2). However, the number of weekdays with any OT including TH was similar within the two groups; clients with activities for 2–3 days/week were 24.0% and 26.6% and with 4–5 days/week were 76.0% and 73.3%, respectively, for TH and OT groups (Table 1).

**SHS.** The scale scores for the 'personal happiness perspective' (SH1) and 'happiness perspective compared to peers' (SH2) were identical for participants in both groups, on average, 4.8 and 4.6, respectively (Table 3). These are scores above the neutral value (4.0), but they are relatively low considering the maximum score of 7 in the Likert scale.

The 'optimism about life' (SH3) was lower for the TH group (3.1) compared to the OT group (4.0). This item scored higher for clients with secondary/higher education, mild dependency degree and without visits. In general, the scores were equal or below the neutral value (4.0), revealing a low perception of optimism about life for all patients in the study.

**Table 2.** Institutional stay and number of different activities attended for the independent variables: (i) activity groups: TH – clients with therapeutic horticulture among other OT and OT – clients with occupational therapies other than TH; (ii) clients' gender in the TH group; and for both groups: (iii) education level; (iv) dependency degree and (v) visits to clients. For each independent variable, means in each line followed by different letters are significantly different ( $p < 0.05$ ).

Variable	Activity groups		TH group		TH and OT groups						
	TH	OT	Gender		Education		Dependency degree			Visits	
			Female	Male	Lower	Secondary/higher	Mild	Moderate	Severe	No	Yes
Institutional stay (no. of years)	7.1b	13.0a	6.6a	7.8a	8.3b	18.0a	17.2a	6.8b	10.3b	11.3a	7.8a
<i>F value</i>	2.785		0.480		2.933		7.995			2.718	
No. of different activities	4.3a	2.9b	5.2a	3.3b	3.7a	4.0a	4.8a	3.9a	3.1a	3.8a	3.6a
<i>F value</i>	2.899		2.565		0.359		1.599			0.225	

TH: therapeutic horticulture; OTs: occupational therapies.

**Table 3.** SHS scores for the independent variables: (i) activity groups: TH – clients with therapeutic horticulture among other OT and OT – clients with occupational therapies others than TH; (ii) clients' gender in the TH group; and for both groups: (iii) education level; (iv) dependency degree and (v) visits to clients. For each independent variable, means in each line followed by different letters are significantly different ( $p < 0.05$ ).

Subjective Happiness Scale	Activity groups		TH group		TH and OT groups						
	TH	OT	Gender		Education		Dependency degree			Visits	
			Female	Male	Lower	Secondary/higher	Mild	Moderate	Severe	No	Yes
SH 1	4.9a	4.7a	4.8a	4.9a	4.8a	5.0a	5.6a	4.7a	4.6a	4.9a	4.7a
<i>F value</i>	0.268		0.130		0.272		1.658			0.137	
SH 2	4.2a	5.0a	4.1a	4.4a	4.4a	5.5a	5.6a	4.4a	4.4a	4.7a	4.4a
<i>F value</i>	1.547		0.503		1.349		1.885			0.168	
SH 3	3.1b	4.0a	3.2a	3.1a	3.3b	5.3a	5.0a	3.2b	3.4b	3.8a	3.2b
<i>F value</i>	2.083		0.326		3.740		17.361			4.068	
SH 4	3.0a	3.3a	3.3a	2.6b	3.1a	2.8a	2.6a	3.3a	3.1a	3.1a	3.2a
<i>F value</i>	0.796		2.544		0.672		1.101			0.500	

SHS: Subjective Happiness Scale; TH: therapeutic horticulture; OT: occupational therapies.

**Table 4.** SELSA-S scores for the independent variables: (i) activity groups: TH – clients with therapeutic horticulture among other OT and OT – clients with occupational therapies other than TH; (ii) clients' gender in the TH group; and for both groups: (iii) education level; (iv) dependency degree and (v) visits to clients. For each independent variable, means in each line followed by different letters are significantly different ( $p < 0.05$ ).

Loneliness scale	Activity groups		TH group		TH and OT groups						
	TH	OT	Gender		Education		Dependency degree			Visits	
			Female	Male	Lower	Secondary/higher	Mild	Moderate	Severe	No	Yes
Global	62.9a	64.2a	60.2a	66.2a	64.1a	58.3a	54.6b	61.8ab	68.6a	65.1a	61.9a
<i>F value</i>	0.892		1.175		0.886		3.133			1.002	
Social	18.3a	16.5a	17.3a	19.5a	17.8a	15.3a	14.6a	17.4a	18.8a	17.5a	17.6a
<i>F value</i>	0.625		0.761		0.790		0.801			0.037	
Family	17.9a	19.6a	18.9a	16.6a	18.7a	17.5a	13.6a	18.4a	20.6a	21.7a	15.6b
<i>F value</i>	0.552		0.656		1.426		1.153			7.228	
Romantic	26.7a	28.1a	23.9a	30.1a	27.5a	25.5a	26.4a	26.0a	29.3a	25.9a	28.6a
<i>F value</i>	0.308		1.830		0.500		1.059			0.797	

SELSA-S: Social and Emotional Loneliness Scale for Adults; TH: therapeutic horticulture; OTs: occupational therapies.

The two groups had an identical score for the 'pessimism in relation to life' (SH4) (average 3.2), and no differences were found for the education level, dependency degree and visits to clients (Table 3). The scores were always lower than the neutral value (4.0), revealing that the clients' perception was closer to a lower perception of pessimism concerning life (1.0).

Regression analysis for both groups showed that personal happiness compared to peers (SH2) depended on the age of the clients ( $F = 4.9, p < 0.05$ ). The simple linear regression model ( $y = 2.665 + 0.0357x$ ) between this dependent variable ( $y$ ) and the age of the clients ( $x$ ) was validated ( $R = 0.347, p < 0.05$ ), suggesting that older clients considered themselves happier. This model, with a coefficient of determination  $R^2 = 0.12$ , suggests that 12% of the variability in the perspective of personal happiness compared to peers was explained by the clients' age.

**SELSA-S.** The scores for global loneliness and the subscales of social loneliness, family emotional loneliness and romantic emotional loneliness were similar for both groups of clients (Table 4). However, for the total sample, global loneliness was greater for clients with severe compared to mild dependency degree, and family emotional loneliness increased

for clients without visits from family or friends, compared to clients who received visits (Table 4).

Regression analysis for both groups indicated that the happiness perspective compared to peers (SH2) depended on the global loneliness. The model ( $y = 7.423 - 0.0454x$ ), validated by the correlation coefficient ( $R = 0.369, p < 0.05$ ), revealed that happiness ( $y$ ) increases with decreasing loneliness ( $x$ ) ( $F = 5.5, p < 0.05$ ), with 14% of the variability in the happiness perspective compared to peers being explained by the global loneliness.

### Conventional occupational therapy group specifics

The Pearson correlation coefficients revealed that clients in the OT group with longer hospitalization were more optimistic about life (SH3) ( $R = 0.693, p = 0.004$ ) and that clients with less education had greater pessimism in relation to life (SH4) ( $R = -0.539, p = 0.038$ ).

Clients attending a larger number of different activities had lower social loneliness ( $R = -0.570, p = 0.027$ ). In this OT group, higher romantic emotional loneliness was found in clients with a greater severity of diagnosis ( $R = 0.744, p = 0.001$ ), with a higher dependency degree ( $R = 0.626, p =$

0.013) and with fewer years of hospitalization ( $R = -0.642, p = 0.01$ ). Clients with a higher dependency degree also showed greater global loneliness ( $R = -0.567, p = 0.028$ ). Additionally, clients with greater happiness compared to peers showed a lower global loneliness ( $R = -0.686, p = 0.005$ ) and a lower family emotional loneliness ( $R = -0.569, p = 0.027$ ).

### Therapeutic horticulture group specifics

For the TH group, the significant correlations showed that clients with activities in a greater number of days per week had greater happiness compared to peers (SH2) ( $R = 0.423, p = 0.045$ ), lower social loneliness ( $R = -0.425, p = 0.049$ ) and lower global loneliness ( $R = -0.485, p = 0.022$ ). Female clients participated in a greater number of different occupational therapies compared to male clients (Table 2) but showed greater pessimism in relation to life (Table 3). In this group, only the personal happiness perspective (SH1) depended significantly on the clients' age. The simple linear regression model ( $y = 3.019 + 0.0359x$ ) between this dependent variable and the clients' age showed a correlation coefficient that allows model validation ( $R = 0.52, p < 0.01$ ). The determination coefficient ( $R^2 = 0.27$ ) suggests that 27% of the variability in the perspective of personal happiness is explained by the age of clients who practice TH. As for the total sample, older clients considered themselves happier since the coefficient of the independent variable was positive.

For clients attending TH, 47.8% considered that the preferred activity was 'therapeutic horticulture', and of these, 73% were men, while for the remaining clients that preferred any conventional occupational therapy, 75% were women. However, this preference did not influence the dependent variables of the SHS and global loneliness since differences between means were not significant. Furthermore, no significant correlations were found when the variables of the SHS were associated with the variables of the SELSA-S.

The most important changes perceived by clients of the TH group included the perception of feeling more relaxed (40.0%) followed by increased contact with nature (24.0%), perception of feeling happier (20.0%) and practice of more physical exercise (12.0%). Amongst the different horticultural activities, the clients' preferences included planting/sowing (65.2%) and harvesting (56.5%), followed by irrigation and weeding activities (39.1%), while the soil preparation and composting were the least preferred activities, chosen by only one and two clients, respectively.

## Discussion and implications

### Effects of therapeutic horticulture on subjective happiness and perception of loneliness

The participant scores on personal happiness in both groups were similar, but lower than those from the general population. In addition, older participants tended to be happier than younger participants. The optimism about life was also lower for all clients although the TH group showed less optimism than OT group clients. Clients with secondary/higher education and mild dependency degree were more

optimistic about life. The two groups had an identical score for the pessimism in relation to life. The global loneliness and the three subscales social, family and romantic emotional loneliness scored similar for both OT and TH groups. Global loneliness was higher for clients with severe dependency degree, and family emotional loneliness was higher for clients without visits from family or friends. In addition, for all clients, global loneliness decreased with increasing happiness perspective compared to peers.

The larger number of different activities attended resulted in lower social loneliness for clients in the OT group. In addition, increased days/week attending activities resulted in greater happiness perspective compared to peers and lower global and social loneliness for clients in the TH group. In this last group, the perceived changes from attending TH activities included the perception of feeling more relaxed and happier.

The clients' conditions of both TH and OT groups led to a low level of subjective happiness, high level of loneliness perception and overall similar scores of the measure SHS and SELSA-S, which is supported by other studies reporting lower levels of happiness and life satisfaction in mental health conditions (Bergsma et al., 2011). In addition, long-term institutional stay and medication required by clients, as antipsychotic agents, may have limited the effect of any therapeutic activities including the TH intervention. Long-term institutional stay may contribute to weaken participants' psychosocial performance (Harvey et al., 2010), and sedative and other side effects of drugs might inhibit the change in the activeness of participants (Kenmochi et al., 2019). In addition, between 5% and 15% of people with schizophrenia continue to experience symptoms in spite of medication and may also develop undesirable adverse effects, including daytime fatigue, stressfulness, reduced creativity and restlessness (Salzmann-Erikson and Sjödin, 2018). For people with mental disorders, happiness might not be a useful indicator for the quality of life because their moods are distorted by psychopathological misapprehensions at affective, cognitive and reality levels, which tend to reflect altered psychological states and not the objective circumstances of their lives (Katschnig, 2006). Nevertheless, Oh et al. (2018) found a decrease of the psychopathological symptoms of chronic schizophrenia in clients attending TH activities for 2 hours once a week for 10 weeks, assessed by the measures Brief Psychiatric Rating Scale and Positive and Negative Syndrome Scale. Concurrently, in a 3-month TH programme, carried out by 26 clients with chronic schizophrenia, compared to 26 similar medical and routine care clients not attending TH, assessed at the beginning and at the end of the intervention through negative and positive symptoms, significant improvements were reported indicating the effectiveness of the TH programme for these clients (Parvin et al., 2016).

The perceived changes by some clients of the TH group included the perception of feeling more relaxed and happier, which may contribute to alleviate the common symptoms of depression and anxiety in schizophrenia spectrum disorders (Kam and Siu, 2010; Kenmochi et al., 2019). In clients with chronic schizophrenia and institutional stay for more than

10 years, a 3-month TH intervention, added to the routine intervention of other occupational therapies, could effectively decrease depression and/or anxiety, but the feeling of hopelessness and quality of life of the clients did not change (Kenmochi et al., 2019). Siu et al. (2020) also reported that TH is effective in increasing mental well-being and engagement in meaningful activities but did not result in significant affect changes during therapy with mental illness' clients. The effects of horticultural activities in clients with schizophrenia spectrum disorder, bipolar disorder and major depression, assessed before and after a programme of TH, using three measures (Chinese version of the Depression Anxiety Stress Scale – DASS21; Personal Well-being Index, PWI-C and Work Behaviour Assessment), revealed that the TH group also experienced a significant decrease in depression, anxiety and stress. However, there were no significant differences in the values of the Personal Well-being Index (PWI-C) between the two groups (Kam and Siu, 2010). Attending TH did not change clients' quality of life and personal well-being in the mentioned studies (Kam and Siu, 2010; Kenmochi et al., 2019) or the subjective happiness and perception of loneliness in our study. In addition, in our study, happiness compared to peers increased with decreasing loneliness, which supports previous findings that loneliness is significantly associated with subjective well-being indicators, in a study conducted with Portuguese adults (Neto, 2015).

Increased optimistic perception of life was associated with clients' higher level of education and mild dependency degree, compared to moderate and severe dependency. As expected, the absence of visits from family and friends was related to a higher level of family emotional loneliness, although clients without visits showed a more optimistic perception of life, compared to clients with visits, probably due to a more resigned feeling about their hospitalization situation.

Small sample size is frequently pointed out as a limitation in the studies of TH assessment in mental health conditions (Cipriani et al., 2017; Höhl et al., 2017). A systematic review of the literature on the effects of TH on people with mental health problems found that sample sizes of 15 or more clients resulted in significant positive effects in the TH groups, in about 78% of the comparisons made, while for studies with fewer than 15 clients, the percentage decreased to 55% (Cipriani et al., 2017). Therefore, results found here cannot be ascribed to sample size because it was based on a sample of 25 clients attending TH, representing the universe at the psychiatric hospital, which can be considered a reasonable sample for TH evaluation.

### **Sociodemographic and clinical data effects**

The clients' age in the TH group explained 27% of the variability in the happiness perspective compared to peers. Thus, age seems to contribute to increase the perception of happiness, but not to the clients' motivation for TH activities, as shown in a study with clients with mental health conditions aged 18–65 years (Parkinson et al., 2011). Similarly, Diener et al. (1985) suggested that older persons may be more

'mature' and less emotional, meaning that they are able to moderate both negative and positive feelings.

In the TH group, compared to the OT group, clients showed a lower optimistic perception of life, which could be related to a gender effect, as the majority of women in the total sample were in the TH group. Within this group, the women showed a greater pessimism concerning life, compared to men. Other reasons related to the lower optimism in the TH group may include the shorter institutional stay, the higher relative percentage of young adults (clients ageing between 25 and 34 years were 16.0% in the TH group and 6.7% in the OT group) and the higher percentage of illiterate clients (24.0% in the TH group and 6.7% in the OT group) (Table 1).

Larger numbers of days per week with activities in the TH group decreased the social loneliness and global loneliness and increased the happiness perspective compared to peers, probably because social interaction helps to tackle social isolation and increase social inclusion, contributing to the individual's recovery (Seixas et al., 2017; Sempik et al., 2014). The social value of horticulture in mental health projects may outweigh the perceived value of the physical environment or the demands of the occupation itself (Harris, 2017; Parkinson et al., 2011). The experience of fun when combined with other characteristics of occupations such as connecting one with other people or being physically engaging can specifically cause positive mood (Ikiugu et al., 2019).

In the TH group, female clients, compared to male clients, participated in a greater number of different occupational therapies. Usually, women expressed higher levels of motivation compared to men due to gender differences, regarding, for example, preferences related to social factors and competition (Parkinson et al., 2011).

Within clients attending TH amongst other OT, only less than half preferred TH and of these, 73% were men. Although Harris (2017) found that the social dimension of TH is a primary engagement factor and gardening interest was only attributed to motivation in a minority of cases, the benefits of horticulture can be linked to the interest of the clients, increasing their motivation. Parkinson et al. (2011) emphasized a predominance of male participants that placed a higher value on physical activity and using tools than women, while women valued the nurturing and sensory qualities of gardening more than men. Also, Crossley and Langdridge (2005) reported the importance of physical activity in male happiness. These findings suggest that horticulture has an important role to play in providing a male-oriented pursuit in therapeutic settings.

### **Therapeutic horticulture activities**

The clients' preferences included planting/sowing and harvesting tasks, followed by watering and weeding, while other tasks as soil preparation and composting were not appreciated by them. The efficacy of horticultural activities on clients' mood and motivation seems to be associated with the characteristics of the implemented tasks, which should be pleasant and performed at a moderate and enjoyable physical level (Parvin et al., 2016). In addition, the level of motivation

for TH activities increased when participants were growing vegetables, compared to general maintenance or growing flowers, because growing food has general cultural importance (Parkinson et al., 2011).

It is clear that participation in and/or interventions based on meaningful and psychologically rewarding occupations have a positive effect on perceived well-being (Hewitt et al., 2013; Ikiugu et al., 2019). While occupations that are meaningful primarily foster a sense of connectedness and mental stimulation, fun occupations are the ones that are likely to activate the dopaminergic reward pathways of the brain, further enhancing a sense of personal well-being (Ikiugu et al., 2019). However, there is a need to clarify how clients' meaningful occupations could be reliably identified in therapeutic decision-making.

Performing TH activities must always be carried out in accordance with the principles of organic farming, for clients' safety reasons (e.g. not handling synthetic chemicals), for lower environmental impact and to increase health through better food quality. The implementation of TH activities can be of low cost to health institutions (Ascencio, 2019) and can offer a financial reward for the produce it generates, which may facilitate the implementation of TH programmes.

### Limitations and challenges

The current research has certain limitations that should be addressed. The measures used in this study, although seemingly adequate, required the support of therapists to assist clients according to their autonomy degree. The study of other measures, as well as the inclusion of assessment by therapists and other health technicians, using different measures such as direct observation and questionnaires (Parkinson et al., 2011), may contribute to a better understanding of the effects of therapeutic horticulture and is recommended in future research. Neurological imaging and assessment could also be incorporated to identify changes in the functioning of clients with schizophrenia, in the short- and longer-term, and to better tailor TH interventions and improve their effectiveness (Ascencio, 2019). Scientific studies are important to establish the effectiveness of TH, but it can be difficult to isolate the impact of an occupational therapy approach, such as TH, which is generally multidimensional in nature and is included in a variety of different multidisciplinary treatment approaches (Höhl et al., 2017), as well as it depends on the characteristics of the health professionals. In addition, the therapeutic value of horticulture arises from a complex interplay of personal factors, including gender-based preferences, individual interests and social needs, meaning that research on evaluation methodologies is a permanent issue and needs further improvements (Ascencio, 2019; Cipriani et al., 2017; Parkinson et al., 2011; Parvin et al., 2016).

The benefits of TH as an integrative treatment for clients with mental health conditions as schizophrenia, dementia and depression are not straightforward, and future research also should emphasize improvements in planning the horticulture activities, better tailored to these clients.

### Conclusion

Overall scores of the SHS and of the SELSA-S were generally similar for the clients with or without therapeutic horticulture within their occupational therapies. Subjective happiness was generally low for both groups and was positively correlated with higher clients' age. Global loneliness was positively correlated with lower clients' education level, higher dependency degree and lower perspective of personal happiness compared to peers. Visits by family or friends had a positive effect as revealed by the lower level of family emotional loneliness, compared to clients without visits.

Among the activities attended, TH was preferred by 48% of the TH group clients, mainly men. Within this group, clients have a preference for planting/sowing and harvesting tasks and 40% stated the perception of feeling more relaxed by practicing horticultural activities. This may contribute to alleviate the common symptoms of depression and anxiety, usually associated with their mental health conditions. Also in this TH group, attending activities more days a week provided lower social loneliness, lower global loneliness and greater happiness perspective compared to peers, which support the social dimension importance of occupational therapies including the TH for these clients.

The literature shows more mental health clients with benefits of TH compared to unaffected clients. Despite the complexity of evaluation through the available measures, therapeutic horticulture can be an effective non-pharmacological integrative treatment option that should continue to be investigated on both process and outcome evaluation, to maximize its effectiveness.

#### Key findings

1. Subjective happiness and loneliness scores were generally similar for mental health conditions' clients, with or without therapeutic horticulture (TH).
2. More days/week attending occupational therapies decreased loneliness and increased happiness.

#### What the study has added

TH clients preferred specific horticultural tasks, 40% perceived relaxation and more days/week attending activities increased happiness and decreased loneliness, suggesting that future research on process and outcome evaluation will maximize TH effectiveness.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship and/or publication of this article.

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