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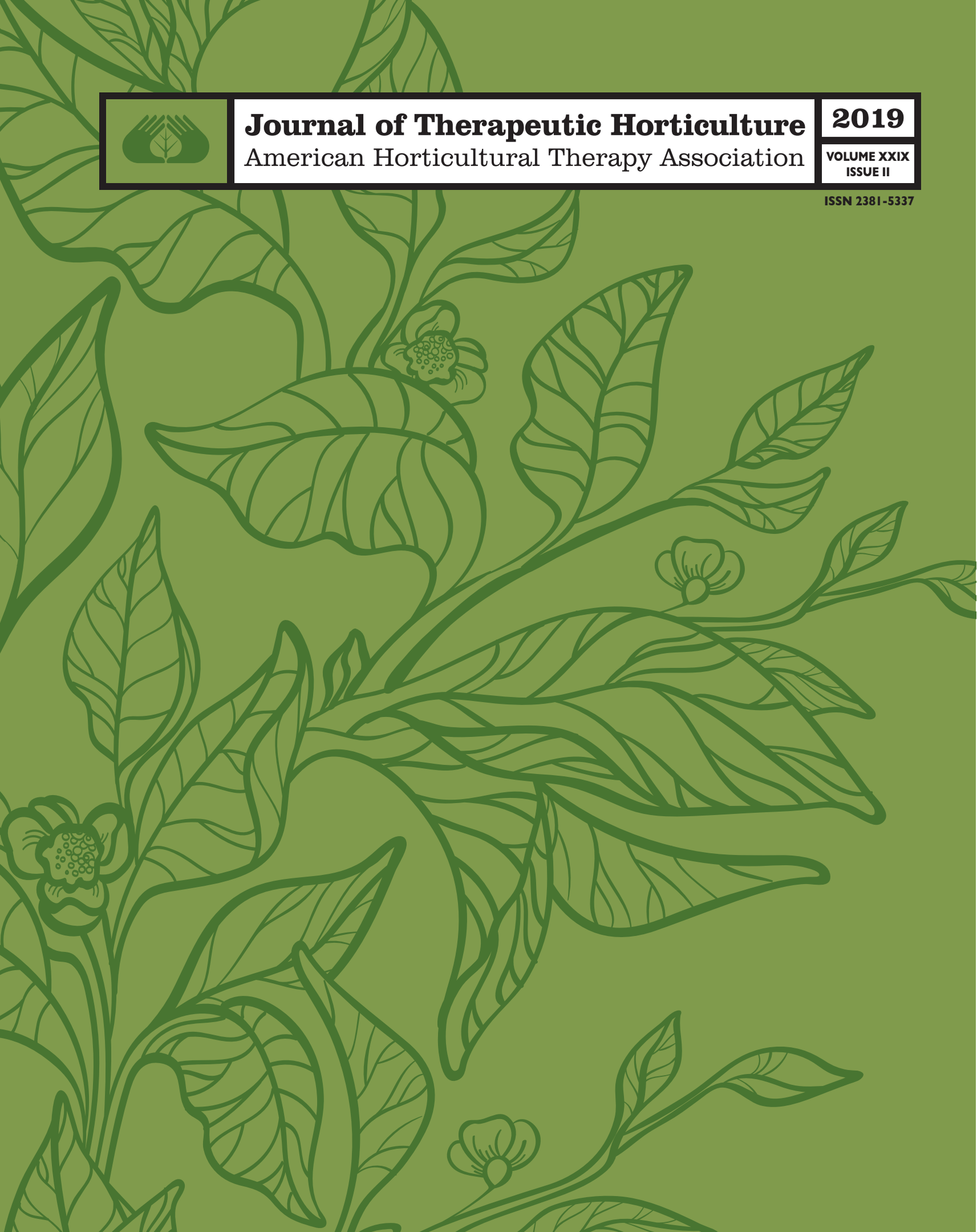

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Therapeutic Horticulture as a Quality of Life Intervention in Chronic Hemodialysis Patients

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This two-year study explored the effect of a structured therapeutic horticulture program on quality of life for individuals with end-stage kidney disease. Dialysis patients participated in a 14-16 week program led by a horticultural therapist in an accessible greenhouse. The Kidney Disease Quality of Life (KDQOL-SFTM v1.3) short form was administered to patients at baseline, halfway through programming, at the end of programming, and two months after programming ended. Significant differences in the scores for Burden of Kidney Disease were found between baseline and the halfway point, suggesting a decrease in the patients' frustration caused by interference of kidney disease in daily life. A significant improvement in Physical Functioning between baseline and halfway through programming was also reported. Both improvements were sustained through the end of programming. There was a significant drop-out of patients over the course of the study due to complications with the disease and hemodialysis.

Introduction

Repetitive hemodialysis therapy for the treatment of end-stage kidney disease (ESKD) became a reality in 1960 with the introduction of the Teflon external shunt devised by Scribner, Quinton, and Dillard (Scribner, 1990). This device facilitated repeated vascular access, a necessity for maintenance hemodialysis, and represented a breakthrough in the treatment of ESKD. According to the United States Renal Data System's (2017) annual report that provides data through 2015, there are over 700,000 prevalent cases of ESKD in the United States and this number is expected to increase by 20,000 cases annually. Today, 65% of the approximately 700,000 ESKD patients in the United States are treated with hemodialysis, the vast majority receiving in-center therapy (USRDS, 2017). Most in-center patients receive three treatments of 3-4 hours duration each week; therefore, the treatment regimen itself represents a substantial weekly time investment by patients.

As underscored by Miles and Friedman (2007), the quality of life during the extra years afforded by hemodialysis therapy varies significantly among patients depending on age, renal diagnosis, comorbid conditions such as diabetes mellitus and cardiovascular disease, nutritional status, presence of anemia, and dialysis dose (Evans, Radev, & Manninen, 1990; Keane & Collins, 1994; Palmer et al., 2013). Recently, it has been reported that patients over 66 years of age on hemodialysis are at substantial risk of developing dementia or Alzheimer's disease and that carrying these diagnoses is associated with a two-fold higher mortality (Bugnicourt, Godefroy, Chillon, Choukron, & Massey, 2013; McAdams-DeMarco et al., 2018; Murray, 2008).

The psychosocial problems exhibited by chronic hemodialysis patients are legion and play a major role in the quality of life experienced in this population. Approximately 25% of patients experience depressive symptoms at one time or another, largely due to concerns over compliance with dietary and fluid intake restrictions, the side effects of medication, and dissatisfaction with sexual dysfunction (Cukor, Peterson, Cohen, & Kimmel, 2006; Finkelstein & Finkelstein, 2000; King-Wing Ma & Kam-Tao Li, 2016; Palmer et al., 2013). Over 70% of patients with ESKD become unemployed within 6 months of dialysis initiation, and there is a decreased likelihood of maintaining employment for individuals with certain comorbidities common to the disease (Muehrer et al., 2011). Because

of the negative impact of a significant reduction in their quality of life, an uncertain future, and the difficulties and resulting stress that often accompanies the treatment regimen, many patients voluntarily withdraw from dialysis and the rate has increased (Charnow, 2015; Miles & Friedman, 2007). The mortality rate in patients receiving hemodialysis in the U.S. is 20-25% after one year of treatment with a five-year survival rate of 35% (USRDS, 2018).

There is evidence to support the role of nature interactions, restorative natural environments, and rehabilitative greenhouses in the treatment of individuals with various medical disorders including depression (Clatworthy, Hinds, & Camic, 2013; Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2009; Han et al., 2016; Wichrowski, Whiteson, Haas, Mola, & Rey, 2005; Wilson & Christensen, 2011), chronic pain (Han et al., 2016; Ulrich, 1984; Walch et al., 2005), acute and chronic anxiety (Clatworthy, Hinds, & Camic, 2013; Kam & Siu, 2010; Sahlin, Ahlborg, Tenenbaum, & Grahn, 2015), and several forms of dementia (Reynolds, 2002). Restorative natural settings provide a nature-dominated environment of pleasant colors, shapes, sounds, and fragrances (Wilson & Christensen, 2011) that many believe exert positive effects by countering excessive sympathetic nervous system arousal and stress (Pretty, Peacock, Sellens, & Griffin, 2005). Measurable physiological effects include lowered blood pressure and heart rate (Detweiler et al., 2010; Wichrowski et al., 2005), reduced muscle tension, and lower skin conductance and cortisol level (Ulrich et al., 1991). Further, attention deficits have been shown to occur with depression (Kooji et al., 2012). The attention restoration theory of Kaplan and Kaplan (1995) hypothesizes that natural settings engage involuntary attention, thus relieving directed attention fatigue and permitting a restorative response to occur (Kaplan, 1995). Studies performed in hospitalized and ambulatory patients have demonstrated improved mood and concentration after only a brief exposure to various restorative natural settings (Hartig & Cooper Marcus, 2006).

As defined by the American Horticultural Therapy Association (2007), therapeutic horticulture is:

> participation in horticultural activities facilitated by a registered horticultural therapist or other professional with training in the use of horticulture as a therapeutic modality to support program goals. Therapeutic horticulture is the process through which participants enhance their well-being through active or passive involvement in plant and plant-related activities. (p. 1)

Therapeutic horticulture programming encourages participants to build skills and work toward personal and group goals through a variety of horticulture activities. The therapeutic horticulture program at Wilmot Botanical Gardens, the site of this pilot study, is based on the belief that an active connection with plants and nature can be a restorative experience and have a profound effect on quality of life. The program seeks to decrease stress and mental fatigue, boost self-esteem and self-efficacy, and provide community, creativity, and optimism. Each activity incorporates specific therapeutic benefits such as social cohesion, stress reduction, sensory stimulation, increased confidence, restoration from mental fatigue, and improvement of coping skills, among others. Therefore, this study was conducted to determine whether the introduction of a structured therapeutic horticulture program into the lives of patients receiving chronic hemodialysis treatments could reduce depression and symptom burden and enhance the overall quality of life. To the authors' knowledge, no other study on the effects of therapeutic horticulture with this patient population has been conducted.

Materials and Methods

The University of Florida Institutional Review Board issued approval for the study. All participants executed the informed consent form prior to beginning study participation. Within the consent language, patients were informed of study length, and weekly attendance of 2-3 hours per visit, at the gardens and greenhouse. Further, the program was described as learning to "grow, maintain, and harvest plants including vegetables, herbs, houseplants and annuals. The questionnaire frequence was also described in the document. The study was conducted in a new, state-of-the art greenhouse facility located on the University of Florida Health Science Center campus. The overall study comprised four semesters of 14-16 weekly sessions during a 24-month period. Semester timeframes were designed in advance to avoid the hottest months of the year (May through August). Because patients receiving dialysis adhere to a thrice weekly schedule of treatment days that include either Monday, Wednesday, and Friday or Tuesday, Thursday, and Saturday, a choice of day was offered (Tuesday or Wednesday) so that the program could be attended on an "off" day from dialysis treatment.

Inclusionary criteria
Patients aged 18 and over were required only to have the ability to participate in all aspects of therapeutic horticulture activities such as working with plants, seeds, and soil by themselves or with assistance. To be included in the data analysis, patients must have attended a minimum of 75% of the offered sessions.

Recruitment
Recruitment efforts were initially focused on two outpatient hemodialysis units associated with the Division of Nephrology, Hypertension and Renal Transplantation at the University of Florida (UF), located in Gainesville, FL. The UF Health unit had a dialysis population of 95-100 patients at the time of the study. The Dialysis Clinic Incorporated (DCI) unit, also associated with UF, cared for approximately 55 patients. Medical directors at both locations agreed to assist in the identification and recruitment of study participants, and to serve as consultants to the study. After initial recruitment efforts at these locations, the director of a third treatment center, Fresenius Kidney Care, agreed to allow participant recruitment as well. Fresenius, not associated with UF, provided treatment at two locations within Gainesville that were within a reasonable distance from the study location, and recruitment at those two locations commenced prior to the beginning of session three.

The recruitment process was mainly conducted by the research study coordinator (DM). Weekly, in-person attendance at dialysis centers during a one-hour period, prior to the start of early afternoon dialysis treatment times were the focus of recruitment efforts. With director and IRB approval, patients were made aware of the program through an informational flyer that supplied a brief description of the study, and by referrals from dialysis treatment center clinicians to the patients to speak with the study coordinator at the centers. Most patients were approached directly by the study coordinator as they arrived for dialysis treatment. The timing of attendance at the clinic also allowed for reaching out to the patients who were exiting early-morning dialysis treatment as they often awaited transportation services to return home.

Patient recruitment within medically complex patient populations such as this carries its own level of difficulty. Dialysis patients often suffer from multiple comorbidities, and treatment is known to result in lower quality of life, higher depression levels, low energy, and lack of strength (Erickson et al., 2018; Hays et al., 1994). It is necessary to understand why patients might be hesitant to consider becoming involved in a program that necessarily involves activities that would take them out of their home environments on days when rest would be the preferred option. For this reason, recruitment was conducted as an ongoing process not only temporally over weeks at various locations, but also with respect to individual patients.

A "soft" approach to recruitment was chosen, which involved providing information without asking for an immediate decision, thereby allowing participants to consider involvement over time. While this did necessitate beginning recruitment efforts for 8 weeks prior to each scheduled program start, it also gave patients the opportunity to approach the study team on more than one occasion to ask questions. Patients were provided with a study flyer that included a contact phone number, and where they agreed, patient contact information was collected in order to discuss the programming over the phone at another time. All of these approaches proved necessary in attaining the level of participation that was eventually acquired.

Participant travel reimbursement. Program participants were transported either by a county-based medical transportation company or drove their own vehicle to attend the program. Study funding received from Dialysis Clinics Incorporated (DCI) and supplemented by the Wilmot Botanical Gardens made possible a small travel reimbursement of $6.00 per person, per session, or alternatively, a round-trip transportation voucher to cover the expense of the medical transport service. For those who drove their own vehicle to the program, a voucher was provided that covered the cost of parking on campus.

Procedures
The two years of programming for participants in the therapeutic horticulture program included 14 (in two fall semesters) to 16 (two spring semesters) weekly sessions of approximately two hours duration in a fully accessible greenhouse led by an American Horticultural Therapy Association (AHTA)-registered, master-level horticultural therapist who was assisted by specially trained volunteers, many of whom were also master gardeners.

Study participants took part in plant propagation, cultivation, maintenance, and distribution, as well as

Table 1.
KDQOL Subscale descriptions (Hays et al., 1992)

KDQOL-36 Domains	Included items
Physical and mental components (SF-12)	Measures physical and mental functioning with items about general health, activity limits, ability to accomplish tasks, depression, anxiety, energy level, and social activities.
Burden of kidney disease (4 items)	Measures the degree to which kidney disease interferes with daily life, takes up time, causes frustration, or makes the respondent feel like a burden.
Symptoms and problems (12 items)	Measures physical symptoms including muscle soreness, chest pains, cramps, itchy or dry skin, dizziness, lack of appetite, shortness of breath, extremity numbness, or access site problems.
Effects of kidney disease on daily life (8 items)	Measures the degree to which patients are bothered by fluid intake limits, dietary restrictions, dependence on medical treatment/personnel, personal appearance, and limitations around the ability to complete household chores or travel away from home.

in extensions of those activities such as plant tasting, horticulture education, and plant crafts. Many activities built on each other to provide session continuity and to help participants experience various stages and uses of diverse plant material. For example, in one session participants could choose herb and vegetable seeds to plant. In a subsequent session once the seedlings had emerged, participants learned about the importance and techniques of thinning seedlings and practiced with their tray of seedlings. In later sessions participants transplanted their young plants to peat pots, and eventually to the garden. These plants were later harvested for participants' use. These linked sessions helped participants to understand and experience the various stages of growth and the requirements at each stage. In addition, the linked activities encouraged ownership and created anticipation and excitement about changes to come. Those experiences help to deepen the participant's engagement and lead to self-confidence, which ultimately contributes to their feelings of self-efficacy and self-esteem.

All activities included information on how participants could use their new horticulture knowledge and skills in their home settings where that was possible (raised beds, garden plots, windowsill gardening, and plant-based crafts). All participants were invited and encouraged to take their plants and projects home with them to keep or to share with others. Participants were informed in advance that many of the plants they were growing would be displayed in the surrounding gardens and/or sold at greenhouse sales.

Outcome Measures

Kidney Disease Quality of Life (KDQOL-SFTM v1.3). The KDQOL short form (Hays, Kallich, Mapes, Coons, & Carter (1994), a 36-item self-administered questionnaire, includes questions from the SF-12 quality of life measure and is accompanied by questions specific to the burden, symptoms, and effects of living with kidney disease. This gold-standard measure was adopted by the Centers for Medicare and Medicaid Services (CMS) for use in adult dialysis patients in 2008 (www.cms.gov). Administration of the measure to a sample of 165 patients from eight different outpatient dialysis centers resulted in strong support for the reliability and validity of the measure. Internal consistency reliability estimates using Chronbach's alpha exceeded 0.75 for each of the multi-item subscales (except quality of social interaction 0.68) including for the two significantly changed subscale results reported herein (Hays et al., 1994). The KDQoL does not provide clinical cut-off scales for interpretation of scoring. A slightly modified version of this patient-reported measure was utilized for this study that did not include the singular question focusing on the impact of kidney disease on patients' sex life. Scores on this measure are grouped into subscales that include: 1) physical and mental health; 2) burden of kidney disease; 3) physical symptoms and problems; and 4) the effects of kidney disease on daily life. Further details are included in Table 1.

Data Collection

At the start of each semester, the study team collected baseline data from each participant prior to the initial

Table 2.
Number of patient participants attending program and completing assessments

Data Collection Time Point	Patients
Baseline (Time 1)	n=31
Midpoint (Time 2)	n=21
Discharge (Time 3)	n=18
3-month follow-up (Time 4)	n=13

therapeutic horticulture session (Time 1). Repeated, identical data collection occurred midway through the sessions (after eight weeks of participation; Time 2), at the last therapeutic horticulture session (after 14 or 16 weeks of participation depending on the semester; Time 3), and two months after the final session (Time 4) for those who could be located. The latter were obtained to determine whether there were any lasting effects of the intervention. Table 2 shows the total number of all patient participants that completed each stage of the data collection process, and attended at least 75% of the programming. All assessment surveys were conducted in the presence of a study team member. Assistance in reading the assessment tool and/or marking answers was necessary with some participants.

Statistical Analysis. SPSS v25 was used to compare participant outcomes at the stated time points utilizing paired samples t-tests. Because of low sample sizes an analysis of change (Cohen's *d*) was also conducted between assessment times to depict the size of the change.

RESULTS

Thirty-one (31) patient participants comprising 16 males (51.6%) and 15 females (48.4%) and representing various ages and races completed the Time 1 assessment and began attending therapeutic horticulture programming. Seventy-seven percent of participants continued program attendance and completed data collection at Time 2, but three of those participants did not ultimately attend at least 75% of the sessions, so only a subset (68%) of patient data is included in the analysis. That sixty-eight percent of patients (n=21) including eight males (38.1%) and 13 females (61.9%) continued program attendance and subsequently completed repeated data collection at Time 2. Fifty-eight percent of patients (n=18) comprising 5 males (27.8%) and 13 females (72.2%) completed programming and data collection at Time 3. Forty-two percent of patients (n=13) comprising 4 males (30.8%), and 9 females (69.3%) completed data collection at Time 4 (Table 2).

Paired samples t-tests and effect size calculations (Cohen, 1988) were conducted to compare the results of the KDQOL subscales at Time 1 (n=31) and Time 2 (n=21). There was a significant difference in the scores for the subscale of *Burden of Kidney Disease* at Time 1 (M = 47.91, SD = 25.41) and Time 2 (M = 58.33, SD = 25.33); t (20) = -2.63, p = .016, d = 0.41. The Time 1 results of the "burden" subscale fell very closely in line with the results obtained during development of the KDQOL (M=49.62, SD = 30.27). This patient-reported result, accompanied by the moderate effect size, suggests a decrease in participant's perception of feelings of frustration caused by the time it takes to be treated for kidney disease, the interference in daily life caused by treatment and side effects, and/or feeling like a burden on family, caregivers, or society in general. Results of the same analysis process resulted in significant improvement in *Physical Functioning* between Time 1 (M = 44.52, SD = 27.01) and Time 2 (M = 51.42, SD = 26.27); t (20) = -6.90, p = .036, d = 0.26. This subscale of the SF-12 includes ten items in which the patient responds to questions about physical limitations experienced during typical daily activities as a result of physical health. When comparing Time 1 results of this subscale to the initial validation measure results, we found that the study population fell significantly lower on the physical functioning scale, as measured in a dialysis-receiving population during the extensive measure development and validation (Hays et al., 1994). In fact, Time 2 data collection results show that cohort results at follow-up were more in line with the general dialysis population mean at an initial collection point in a general dialysis population (M = 51.83, SD = 29.73). Effectively, what these baseline results suggest is that this particular cohort of patients entered the study with *lower* physical functioning levels than general populations of persons receiving dialysis treatment during validation of the measure. This fact may represent a bias in the typology of persons who agreed to participate in the study in the first place. This counterintuitive result (that persons presenting with less perceived physical functioning were the ones willing to make an extra effort to attend programming) begs for

a future study that includes a control group of non-participating dialysis patients.

These effects were sustained when comparing the results of the assessment between Time 1 and Time 3 (n=18), the latter taking place on the final day of the programming. Significance in results indicated the improvement was maintained from the baseline measurement for the subscale of *Burden of Kidney Disease* at Time 1 (M = 49.65, SD = 23.62) and Time 3 (M = 60.06, SD = 29.56); t (20) = -2.51, p = .022, d = 0.39. Significant results indicated improvement was maintained in the domain of *Physical Functioning* between Time 1 (M = 42.77, SD = 26.13) and Time 3 (M = 51.66, SD = 27.11; t (20) = -2.19, p = .043, d = 0.33.

There were no significant results shown between Time 1 and Time 4 assessments (n=13), the latter taking place two months after completion of programming. This suggests that the previous significant results, derived from patient-reported outcomes measures seen between Time 1 and Time 2 and Time 1 and Time 3, were not sustained and that the end of active programming had a negative impact in domain areas that had previously enjoyed important gains. In fact, in brief exit surveys some patients reported that they wished the programming could have continued longer.

DISCUSSION

The results of this study provide evidence that individuals with a chronic illness who participate in a structured therapeutic horticulture program can experience an improvement in their well-being and overall quality of life. More specifically, the patents in this study who were receiving thrice-weekly hemodialysis for ESKD self-reported a significant decrease of symptoms in the domains of physical functioning and the overall burden of chronic disease when attending at least 75% of the weekly sessions over an 8-week period. As will be discussed in the limitations section later, we are unable to make direct causal inferences regarding patient improvement as a direct result of the intervention due to the lack of data collection from a similar control group not attending the program.

It is known that the level of physical exercise among hemodialysis patients is often diminished due to factors such as exhaustion, pain, fear of injury, and depressive mood (Kang, Do, Jeong, Lee, & Kim, 2017). A 2010 study reported that hemodialysis patients who regularly exercised had higher health-related quality of life and physical functioning scores and were less bothered by bodily pain (Tentori et al., 2010). Even mild exercise has been reported to have a positive impact on health-related quality of life (Girija & Radha, 2013). Therapeutic horticulture sessions provide many opportunities for mild exercise as the participants move about the greenhouse to retrieve and carry plants and other materials. Walking in the nearby garden, as well as walking to and from the greenhouse at the start and end of each session provides additional opportunities for mild exercise, potentially contributing to the reported improvement in physical function. Because this exercise is related to meaningful activities beyond one's health, it may be more motivating and easier to tolerate.

In a second domain, a significant decrease was seen in the overall burden associated with chronic kidney disease and its treatment. The loss of independence, which can be related to loss of gainful employment that affects a majority of dialysis patients, is known to be associated with loss of self-esteem and lowered self-appraisal (Pettersson, 2012; Sheeran & Abraham, 1994). The extensive treatment demands of dialysis and long-term ill health resulting from ESKD prevent patients from maintaining employment. A study looking at data from 1996-2013 found that only 23-24% of patients were unemployed at the start of dialysis, and 38% of patients who had been employed in the six months prior to their diagnosis terminated employment at the start of dialysis treatments (Erickson, Zhao, Ho, & Winkelmayer, 2018).

In the current program, participants were made aware that many of the plants they were growing would either be sold to support future programming or planted in the surrounding public gardens for visitors to enjoy. Perhaps the experience of growing, nurturing, and distributing these plants throughout the program duration contributed to the participants' sense of self-worth and self-esteem, as their actions were valued by others who bought or viewed the plants.

Furthermore, engagement in the prosocial behavior of contributing to the product-base sold at plant sales to support future therapeutic horticulture programming may have provided an altruistic opportunity to participants. Altruism is a motivational concept that, when applied, results in reciprocal benefit for the giver and receiver. Psychological research around social-interest behaviors indicates that giving support to others may provide more reward to the giver than to the

recipient (Post, 2007). In addition, research has found that engaging in altruistic behaviors enhance subjective well-being for both healthy and chronically ill patients (Post, 2007). Studies have also reported that exposure to nature and gardens can increase the desire to help others (Guéguen & Stefan, 2014).

The therapeutic horticulture program at the Wilmot Botanical Gardens has served many people with varying chronic illnesses over the years. Creating a supportive environment that is shared and enjoyed by all participants is important to the success of the program. Patients who have the same disease or disorder often find comfort in sharing time with others who have the same or similar diagnosis. More pointedly, having the opportunity to share social experiences that are not directly related to the treatment of the disease can be burden-lifting, empowering, and renewing (McDaniel, Hepworth, & McDaniel, 2009). Patients who come to the greenhouse have often experienced limited social interactions as a result of their illness, and the negative impact of social isolation is well documented. For this reason, creating the opportunity for social interaction, specifically for individuals who may share a common diagnosis, is a primary aim of the program.

An interesting facet of social exposure for persons with ESKD receiving in-center dialysis is the fact that they must sit with other people for several hours at a time, three days per week while receiving treatments. While improvements were expected within the quality of social interaction subscale of the SF-12, this lack of change may well be because they are not isolated individuals. It is feasible that this could also be a result of the lower level of measured internal consistency for this particular subscale of the overall measure (quality of social interaction; 0.68). The therapeutic horticulture sessions may, however, provide a setting for the formation of new social relationships and support with others sharing a common illness.

Finally, as was discussed in the methods/recruitment section herein, recruitment of patients with complex and serious health concerns requires an approach that allows for consideration over time, especially where completing informed consent is necessary. As mentioned above, we have consistently offered therapeutic horticulture program to groups of individuals with various diseases, some of which include cancers and spinal cord injuries. The necessity to identify a start and end-date for programming (within the parameters of longitudinal data collection in relation to attendance) does remove the flexibility of offering an ongoing, participate-when-able structure that we have offered individuals in other groups. Special consideration and planning, including increased recruitment periods seem therefore to be necessary. In itself, this approach also then results in the need to phone the early-agreeing participants to remind them of the start of programming at least once before they are expected to appear.

Study Limitations

This study has major and minor limitations. The single-group design does not include a control group, and so does not provide support for causal inference as provided by a randomized controlled trial. Without a control group, we cannot be certain that the changes reported herein are due solely to the TH intervention. Additionally, the age and race of persons involved were not acquired. Anecdotally, we are aware of serving patients that ranged in age from their mid-20's to late 70's. The majority of patients were African American, and the patient group included Caucasian and Hispanic Americans. There was no request made to access medical records as part of this study, and comorbid illness information was not collected from patients.

Recruitment and program initiation. During the study, a total of 45 participants signed an informed consent prior to the start of programming with the intention of participating in the therapeutic horticulture classes. Of the 45 consented participants, 14 (31%) did not begin the programming. Despite phone calls made to these individuals two days in advance of the start of weekly sessions, four indicated they would not be able to attend as planned. Intercurrent illness or lack of energy was among the most frequent reasons given for the change of mind. Three people indicated that after more thought, they did not want to give up a day in which they were not scheduled for dialysis to travel to campus to participate in the study. Some stated that their health would be best served by remaining at home and resting prior to the next treatment that would occur on the day following class attendance. Three participants who started the study did not return to programming and either did not provide a reason or could not be contacted. Four participants could not be contacted at all and did not return phone calls between signing the informed consent and the start of the therapeutic horticulture sessions. The ratio of intention or desire to participate in programming to the number of individuals beginning programming underscores the difficulty of

recruiting patients for research who live with chronic and complex health issues. While ESKD patients may benefit greatly from this type of programming as shown in these results, their compromised health status makes it challenging to involve them in research.

Attendance and study completion. Participant drop out was significant throughout the two years of the study. In the first semester, 13 participants were recruited and consented, but only six completed the Time 1 assessment and began the therapeutic horticulture program. Of those six participants, four completed Time 2 assessments, and just three participants completed the entire program and the Time 3 and Time 4 assessments. Of the seven consented participants who did not participate at all, one was too sick to begin the program, and attempts to contact the remaining six were unsuccessful.

In the second semester, 15 participants were recruited and consented. Seven completed the Time 1 assessment and began the therapeutic horticulture program. Of those seven participants, all completed the Time 2 assessment but only five completed programming and the Time 3 assessment. The remaining two were hospitalized during this time and were unable to return to the study. Four participants completed the Time 4 assessment. Of the eight consented participants who did not participate at all, four reported being too sick to begin the study and the remaining could not be reached by phone.

At this point in the study, the team decided to modify the timing of the informed consent process. Prior to the start of programming for semesters 1 and 2, the informed consent was completed with patients well before the beginning of the intervention. Because consenting took place anywhere from one to four weeks before the start of the therapeutic horticulture sessions, the number of patients that followed through with attending any sessions at all was significantly lower than expected. With the goal of minimizing the study drop-out rate occurring prior to the start of the intervention (15 total patients did not appear for the programming start date in the first two semesters), it was decided to consent only those patients who came to the first weekly session. This decreased the drop-out rate by eliminating those patients who could not participate due to illness or death, or who lost interest in program participation in the interval between the consent and programming phases.

In the third semester, eight participants were recruited and consented and all completed the Time 1 assessment and began the therapeutic horticulture program. Of those eight, one had surgery because of complications of dialysis and was unable to return. Seven participants completed the Time 2 and Time 3 assessments and four participants were located to complete the Time 4 assessment.

In the fourth semester, ten participants were recruited and consented, and all completed the Time 1 assessment and began the study. Six completed the Time 2 assessment; however, because three of those participants did not ultimately attend 75% of the sessions due to illness or death, their data was not included in the Time 2 analysis. Of the four who did not complete the Time 2 assessment, one male participant expired and two others were hospitalized and could not return to the study. The fourth participant stopped coming to the sessions without an explanation. The remaining three participants whose data was included in the Time 2 analysis completed the Time 3 assessment. Two of the three remaining participants completed the Time 4 assessment while the third, a female, expired before the Time 4 assessment.

The ability to attend all classes was interrupted at least once for almost every participant in the study. Because the protocol stipulated that participants must attend a minimum of 75% of sessions, it became clear that make-up sessions would need to be scheduled. These sessions were held during the last four weeks of each semester and were arranged on the "off day" from dialysis treatment. For example, if a patient attended dialysis on Monday, Wednesday, and Friday and they attended therapeutic horticulture programming on Tuesday, a Thursday make-up class was scheduled. Thus, if a participant was well enough to attend two sessions in one or more weeks, then the participant and the study would benefit. Most participants responded positively to this offering.

While the attendance limitations detailed above did result in a smaller sample size than expected, the study results nonetheless show beneficial improvement in quality of life for those participants who continued their involvement in the therapeutic horticulture intervention. In addition, the large number of dialysis patients who initially expressed a willingness to join the study indicates that this type of intervention was found to be conceptually desirable.

Conclusion

Both chronic kidney disease and ESKD are substantial in the United States and growing worldwide (Bugnicourt et al., 2013; Hamer & El Nahas, 2006). In the U.S., rates of ESKD requiring hemodialysis or kidney transplantation are the highest in the world and continue to rise while deaths due to dialysis are occurring at the lowest annual rate in history (USRDS, 2017). Recently, in a clinical epidemiological study, McCullough, Morgenstern, Saran, Herman, and Robinson (2019) predicted that in the U.S. alone, the burden of ESKD will increase to an estimated 1,259,000 individuals compared to 971,000 in 2015. Contributing to this increase are factors such as population changes in age, race distribution, obesity, and diabetes prevalence along with enhanced ESKD survival rate. Taken together, these data should provide an impetus to identify ways in which the long-term quality of life for this growing segment of the population can be improved.

The findings in this study suggest that therapeutic horticulture programming is a beneficial option for hemodialysis patients, especially in the domains of physical function, frustration of living with kidney disease, and feeling like a burden to caregivers or society. To begin, it seems important to structure programs to provide opportunities for mild and moderate exercise. These opportunities are abundant in a therapeutic horticulture setting and can be graded up or down to require more or less effort based on individual needs. In addition, the myriad activities available in a greenhouse and/or garden setting can facilitate different types of exercise that focus on upper body strength, lower body strength, or some combination. Because horticultural work is inherently meaningful, participants may be more motivated to exercise or may not even consider it as such.

As mentioned previously, lessons learned from this study include the importance of including a control group of persons willing to complete data collection without attending programming. In retrospect, it may have been possible to ask patients to complete questionnaires either while they waited for treatment, or during treatment periods. Special thought and consideration must be given to overall recruitment methods, and providing patients with the opportunity to see and interact on a weekly basis with study team members proved important to the degree to which we were finally able to recruit even the minimal number of patients reported on herein.

Therapeutic horticulture programs should be structured to provide opportunities to build self-esteem and self-efficacy as these are important in counterbalancing the psychological effects of chronic, debilitating disease, often associated with unemployment (Erickson et al., 2018). Providing meaningful activities that result in plants and plant products that can be sold, displayed, or taken home can help participants recognize their value, not only in the program, but in the greater community as well. Teaching activities such as plant propagation, seed-starting, and container gardening may encourage some patients to garden at home, thereby continuing benefits gained during formal learning sessions.

The current study revealed that the positive changes in the domains of physical function, frustration of living with kidney disease, and feeling like a burden to caregivers were lost between Time 3 and Time 4 assessments. In other words, the benefits gained during programming were not maintained in the two months after programming ended. This suggests that opportunities for continued therapeutic horticulture programming are important for a sustained positive effect. However, it is recognized that the difficulty in attending programming due to serious illness makes sustained efforts more challenging.

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BIOGRAPHY

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Horticultural Therapy Support Group for Older Adult Caregivers: Examining Intervention Effectiveness Using Psychometrically Validated Measures

Jaime Ascencio, MS, Mallory Wojtaszek B.S. and Deana Davalos Ph.D.

Caregivers in the United States are often under supported and are at higher risk for mental and physical health issues including chronic stress, depression, and hypertension. The current study provided a horticultural therapy support group for a small group of caregivers and assessed its efficacy using many psychometric measures including those measuring gratitude, loneliness, mindfulness of mind and body, subjective vitality, burden, depression, anxiety, and stress. We found that the support group had large effects on subjective vitality and loneliness and medium effects on gratitude, depression, and burden. All of these effects were in such a direction that indicated an improved quality of life. These findings, while promising, must be taken in consideration of some limitations such as the small sample size and some clients' concurrent participation in individual therapy. Future research should aim to replicate these findings using control groups such as a wait-list group or a group of individuals not in individual therapy. Future studies should continue using psychometrically sound instruments to assess the impact of interventions.

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Introduction

According to a 2015 publication from the National Alliance for Caregivers (NAC) and the American Association of Retired Persons (AARP), there are an estimated 39.8 million Americans caring for an adult and an estimated 34.2 million Americans providing unpaid care to an adult 50 years or older. Caregivers are defined as persons who provide unpaid care to help with tasks like doing chores, aiding with personal needs, managing finances, and arranging for outside services for someone who cannot take care of themselves (National Alliance for Caregivers & American Association of Retired Persons, 2015). Caregivers put in a substantial amount of work for those they care for, and they often suffer from this extra workload. Caregivers are likely to experience psychosocial issues like depression, isolation, stress, extra burden, and low well-being (Smith & McCallion, 1997; Wennberg, Dye, Streetman-Loy & Pham, 2015). Caregivers are at risk for detrimental effects on their finances, health, and quality-of-life (Wennberg, Dye, Streetman-Loy & Pham, 2015).

It is important that caregivers are given proper support because without it, they are at higher risk for depression, sleep disturbance, mood disorders, cardiovascular disease, hypertension, kidney disease, obesity, medication use, and institutionalization (Wennberg, Dye, Streetman-Loy & Pham, 2015). Past research also suggests that spousal caregivers have a 600% increased risk to develop dementia (Wennberg, Dye, Streetman-Loy & Pham, 2015). One particularly relevant consequence of caregiving is isolation. Uquillas and colleagues (2018) found that cognitively normal older adults (M = 76 years of age) with higher scores of loneliness on the 3-Item UCLA Loneliness scale were more likely to have tau protein buildup in certain areas, which is a marker of Alzheimer's. Since caregivers disproportionately experience loneliness, it important for interventions to mitigate this negative outcome of caregiving.

Many kinds of interventions have been made to benefit caregivers due to the heightened risk of physical and psychological issues found to be linked to caregiving. For example, one type of intervention is counseling and behavioral management which has been shown to target and reduce depressive symptoms, behavioral problems, burden, and reactivity in caregivers (Wennberg, Dye, Streetman-Loy & Pham, 2015). Another intervention type for aiding caregivers is tailored, multicomponent

interventions (Wennberg, Dye, Streetman-Loy & Pham, 2015). These interventions take the needs and desires of each family and pieces together different therapeutic strategies to improve the lives of both the caregiver and the care receiver. Education-based interventions have also shown to reduce stress and distress in caregivers of people with dementia (Javadpour, Ahmadzadeh, & Bahredar, 2008).

The current study implemented a support group. These groups help to normalize experiences of caregivers, give social support, foster social connection, to educate caregivers, and resolve problems (Wennberg, Dye, Streetman-Loy, & Pham, 2015). The intervention of the current study also incorporated horticultural therapy techniques. Horticultural therapy is defined as "the engagement of a person in gardening-related activities, facilitated by a trained therapist, to achieve specific treatment goals" (AHTA, 2017). This therapy method has been demonstrated to improve psychological and physical functioning including cognitive abilities, socialization, and coordination (AHTA, 2019).

A small, two-phase horticultural therapy program which utilized short- and long-term projects and two follow-up phone calls resulted in two cases with an improvement in the quality of life for the caregivers (Smith & McCallion, 1997). This result shows that horticultural therapy has the potential to impact an individual's life enough to increase their well-being. In a different one-day workshop involving 19 Taiwanese volunteers from the Institute of Life and Death Education Counseling and the National Taipei University of Nursing and Health Science, researchers found through self-report measures that the program improved appreciation, feelings of security, and social support, increased self-value, relaxation, revival, sense of control (Lin, Lin, & Li, 2014). This study also found that horticultural therapy allowed for the expression of grief, leading to a sense of relief, as well as a common sense of personal growth and well-being. Horticultural therapy shows promise in improving many different aspects of a caregivers' life.

The current study implemented a small horticultural therapy support group intervention for caregivers in Colorado. Although much of the past research on the effectiveness of horticultural therapy does not meet rigorous scientific standards, the preliminary evidence shows potential for reducing some of the psychological negative effects of caregiving. The current study aims to apply validated psychological measures to better capture the outcomes (including burden, loneliness, vitality, mindfulness, and gratitude) of this therapeutic modality.

Methods

Participants

The group described in this manual was comprised of 5 college-educated, retired women, ages 60-79 (M = 70), all of whom self-identified as non-Hispanic White. None endorsed any physical or mental disabilities. They each provided care for a male loved one, including partners, spouses, and siblings. They had provided care for their loved ones between 6 months and 18 years with a minimum of 25 hours per week of direct care provided. Three of the women had their loved one live in their home, one had a loved one in a nursing home, and one supported a loved one living in his own home. All of their caregiving demands included activities of daily living (e.g., providing transportation, administering medication, shopping, managing money, doing all housework) and basic activities (e.g., walking, eating, bathing).

Four clients were referred to the group by their individual therapist (who was also the co-therapist for this group, described below) or by seeing a community flyer (one participant). The therapists within the organization knew about the group and were encouraged to ask each of their clients at their next appointment whether they would like to participate. If clients expressed interest, the group therapist scheduled them a brief screening appointment to ensure fit and answer questions before the client joined. When asked why they were interested in participating, they most commonly stated the desire to socialize and decrease isolation, learn about gardening, connect with the earth, and become more mindful. No incentive was provided for participating in the study. Participants received access to the therapy group at no cost to them regardless of whether they participated in the study or not. Limitations of this sample included not having random sampling and, as it was a small size, not fully capturing the diversity of caregivers receiving services within the institution.

Therapist Information

The primary therapist who planned and led the groups held a Master of Science degree in Counseling Psychology and was finalizing her requirements for becoming a registered Horticultural Therapist via the AHTA. The co-therapist who attended most groups and assisted with prompting conversation had a Master of

Table 1.
Summary of Session Themes and Activities

Session	Summary
1	New Beginnings: introduction to the group and to each other, basil seed meditation, plant herbs in window boxes
2	Gratitude: gratitude meditation, tend herbs (water, check for pests, take off dead leaves), arrange flowers, share bouquets
3	Connection: tend herbs, build a life story river outside, share river stories, discuss
4	Mindfulness: tend herbs, pick herb leaves to dry, succulent meditation, find succulents that represent you and share, pot up a succulent mindfulness garden
5	Vitality: tend herbs, sensory meditation with dried herb leaf, make tea bags, drink tea and talk
6	Growing Love: loving-kindness meditation, tend herbs, make "seed bombs," discuss when it is easiest/hardest to show love

Science degree in Counseling Psychology. Both were supervised weekly by a Licensed Psychologist with fourteen years experience with older adults.

Group Information

Location. The group described in this manual was conducted in a large room with easily movable chairs and tables, a tile floor, and a small sink and counter area. Session 3 was conducted in a large meadow with a tree-lined creek and bike trail cutting through that was a 5-minute walk from the main facility. See Appendix A for images of the location.

Session Description. The group was six sessions in duration, each one lasting 1½ hours. The groups were always on Monday afternoons, occurring on weeks 1, 2, 3, 5, 7, and 14. Week 4 was the Monday before Thanksgiving, and several weeks were taken off between the fifth and sixth session for the winter holidays and to allow for the sixth to be a follow-up or "booster" session. Each session had a theme with a related guided meditation lasting approximately ten minutes and an activity. They all included tending the herbs planted in the first session (see Table 1 for more details). See Appendix B for example images of the horticulture activities.

Measures

There were six self-report measures given to the clients before the first session (Week 1), after the fifth session (Week 7), and after the sixth session (Week 14). When multiple measures of the same construct were available, measures with strong psychometrics, available for free, and with the fewest number of questions were selected.

Gratitude Questionnaire-Six Item Form (GQ-6). The GQ-6 (McCullough, Tsang, & Emmons, 2004) was created to assess the level of gratitude experienced. It is comprised of 6 questions on a 7-point Likert scale (strongly disagree to strongly agree), two of which are reversed scored. It has a total score ranging from 6 to 42 with a higher number indicating higher levels of gratitude. The scale's reliability is good (α=.76-.87) and it correlated moderately with measures of positive emotions, life satisfaction, vitality, optimism, and hope (r=.30-.50). We hypothesized that the intervention would increase levels of gratitude.

3-Item University of California Los Angeles (UCLA) Loneliness Scale. The 3-Item UCLA Loneliness scale (Hughes, Waite, Hawkley, & Cacioppo, 2004) is a shortened version of the UCLA Loneliness Scale. It is made of 3 questions scored on a 3-point Likert scale (from 1 = "hardly ever" to 3 = "often") with no reverse scores. The responses are summed and scores can range from 3 to 9, with higher scores indicating higher levels of loneliness. The scale has good internal consistency (α=.72). We hypothesized that the intervention would decrease levels of loneliness.

State Mindfulness Scale (SMS). The SMS (Tanay & Bernstein, 2013) is a 21-question Likert scale measure for state dependent mindfulness. Participants rate how aware they were of experiences like "Different emotions that arose in me" and "Physical sensations come and go" on a 5-point Likert scale that ranges from 1 (not at all) to 5 (very well). The scale has a mind (14 items) and a body (7 items) subscale. The overall SMS has

good reliability (α = .95) as do the mind (α = .90) and body (α = .95) subscales (Tanay & Bernstein, 2013). We hypothesized that the intervention would increase levels of mindfulness.

Subjective Vitality Scale (SVS). The SVS (Ryan & Frederick, 1997) is a 6-question, 7-point Likert scale in which participants rated statements like "I feel alive and vital" from 1 (not true at all) to 7 (very true). No items are reverse scored, and scores range from 6 to 36. The scale is reliable (α = 0.84) and has been found to be positively correlated to measures of self-actualization, self-esteem, and life satisfaction (*r*=.42-.76) (Bostic, Rubio, & Hood, 2000). This scale has moderate correlations to the Mindful Attention Awareness Scale (r = .48, p < .001). We hypothesized that the intervention would increase levels of subjective vitality.

Zarit Burden Interview Short Version (ZBI). The ZBI (Bédard, 2001) is a 12-item, 4-point Likert scale measure of caregiver burden. Participants answer questions about how often they feel emotions indicative of burden such as feeling that their "health has suffered because of [their] involvement with [their] relative" (Béard, 2001). This measure has good reliability (α = 0.88) (Béard, 2001). We hypothesized that the intervention would decrease levels of burden.

Depression Anxiety and Stress Scales (DASS-21). The DASS-21 (Lovibond & Lovibond, 1995) is a 21-item scale in which statements (like "I found it hard to wind down") are rated as to how often they were true in the past week. The scale ranges from 0 (never) to 3 (almost always) (Lovibond & Lovibond, 1995). This measure contains three different subscales comprised of seven items each for evaluating depression, anxiety, and stress separately (Lovibond & Lovibond, 1995). The all three subscales of this measure are reliable with the depression (α = .94) and stress (α = .91) subscales excellently reliable and the anxiety subscale (α = .87) acceptably reliable (Antony, Beiling, Enns, & Swinsom, 1998). This scale is also correlated to the Mood and Anxiety Symptom Questionnaire (r = .73, p < .001), the Beck Depression Inventory-II (r = .80, p<.001), and the Beck Anxiety Inventory (r = .69, p < .001) (Osman, Wong, Bagge, Freedenthal, & Losano, 2012). We hypothesized that the intervention would decrease levels of depression, anxiety, and stress.

Data Analyses

To test the study's hypotheses, statistics specifically designed to work with small sample sizes were used. Unbiased Cohen's d for a repeated measure design was calculated to assess the within-subjects effect size of the intervention (Cumming, 2012). Standardized Individual Difference (SID) was calculated to determine whether there was meaningful change for each individual between the first, second, and third timepoints. A cutoff of ±1.645 was used, per the recommendations of Estrada, Ferrer, and Pardo (2019) for single-group pre-post designs. Pairwise deletion was used with the data, meaning that only participants who completed both the pretest and posttest for a specific measure were used in calculating the effect size of that measure.

Results

Three of the clients completed the measures during the first session (Week 1) and fifth session (Week 7), and two of those three also completed the measures at the follow-up session (Week 14).

Subjective Vitality Scale (SVS)

The effect size of the intervention on subjective vitality was large (d = 0.83) (pretest: N = 3, M = 22.33, SD = 8.08; posttest: N = 3, M = 32.00, SD = 4.58). One (33%) client showed a meaningful increase in subjective vitality over the course of the intervention. Another client (N = 2, 50%) showed an increase in vitality between the first session and the 7-week follow-up session (M = 32.50, SD = 3.54).

UCLA Loneliness Scale

The intervention resulted in a large effect size on loneliness (d=-0.81) (pretest: N = 3, M = 7.00, SD = 1.73; posttest: N = 3, M = 4.67, SD = 1.53). Two (66%) clients showed meaningful decreases in loneliness over the course of the intervention. None of the clients who gave follow-up data maintained this change at the 7-week follow-up session (N = 2, M = 5.00, SD = 1.41).

Gratitude Questionnaire-Six Item Form (GQ-6)

The effect size of the intervention on gratitude was medium (d = 0.72) (pretest: N = 3, M = 30.33, SD= 5.69; posttest: N = 3, M = 37.67, SD = 5.86). All three (100%) of the clients showed a meaningful increase in their experience of gratitude during the course of the intervention. One client (N = 2, 50%) maintained this change at the 7-week follow-up session (N = 2, M = 32.00, SD = 9.90), one did not maintain the change, and one did not provide follow-up data.

Zarit Burden Interview Short Version (ZBI)
The intervention had a medium effect size on burden (*d* = -0.50) (pretest: *N* = 3, *M* = 24.67, *SD* = 10.07; posttest: *N* = 3, *M* = 17.00, *SD* = 7.00). Two (66%) clients showed a meaningful decrease in perceived caregiving burden over the course of the intervention. For the clients that provided follow-up data, change was not maintained at the follow-up session (*N* = 2, *M* = 15.00, *SD* = 14.14).

Depression Anxiety and Stress Scales-Depression Subscale (DASS-Depression)
The intervention had a medium effect size on depression (d = -0.55) (pretest: N = 3, *M* = 7.33, *SD* = 7.09; posttest: N = 3, *M* = 2.33, *SD* = 1.15). One client (33%) showed a meaningful decrease in depression over the course of the intervention, but none of the clients who provided follow-up data showed maintained decreases at the 7-week follow-up session (N = 2, *M* = 2.00, *SD* = 1.14).

State Mindfulness Scale-Body Subscale (SMS-Body)
The intervention had a small effect size on mindfulness of body (*d* = 0.27) (pretest: *N* = 3, *M* = 21.67, *SD* = 6.81; posttest: *N* = 3, *M* = 24.67, *SD* = 5.86). One (33%) client showed a meaningful increase in mindfulness of the body over the course of the intervention. One client (*N* = 2, 50%) showed a maintained increase of mindfulness of the body at the 7-week follow-up (*M* = 28.00, *SD* = 5.66), one did not maintain change, and one did not provide data.

State Mindfulness Scale-Mind Subscale (SMS-Mind)
The effect size of the intervention on mindfulness of the mind was small (*d* = 0.27) (pretest: *N* = 3, *M* = 46.33, *SD* = 11.93; posttest: *N* = 3, *M* = 51.33, *SD* = 8.74). One (33%) client showed a meaningful increase in mindfulness of the mind over the course of the intervention. At the 7-week follow-up another client (50%) showed maintained change (*N* = 2, *M* = 55.50, *SD* = 10.61), one did not maintain the change, and one did not provide follow-up data.

Depression Anxiety and Stress Scales-Stress Subscale (DASS-Stress)
The effect size of the intervention on stress was small (*d* = -0.21) (pretest: *N* = 3, *M* = 5.67, *SD* = 5.03; posttest: *N* = 3, *M* = 4.33, *SD* = 1.15). None of the clients who gave follow-up data showed a meaningful decrease in stress over the intervention and none showed a change at the 7-week follow-up (*M* = 3.00, *SD* = 2.28).

Depression Anxiety and Stress Scales-Anxiety Subscale (DASS-Anxiety)
The intervention showed no effect on anxiety (d = 0.00) (pretest: *N* = 3, *M* = 0.67, *SD* = 0.58; posttest: *N* = 3, *M* = 0.67, *SD* = 0.58). There were no clients who showed a meaningful decrease of anxiety over the course of the intervention or at the 7-week follow-up (*N*=2, *M* = 0.50, *SD* = 0.70).

Discussion

The aim of the current study was to analyze the efficacy of a horticultural therapy support group using validated psychometric measures. We found that the intervention had large effects on improving subjective vitality and decreasing loneliness as well as a medium effect on improving levels of gratitude, depression, and burden. One client over the course of the intervention went from endorsing moderate levels of depression to not meeting the scale cut-off for depression by the end of the group. Smaller effects were seen in improved mindfulness of both mind and body as well as lowered stress.

Standardized individual difference analyses show that all participants who gave data showed a meaningful increase in gratitude at the post test. At the 7-week follow up session, one of the two clients that gave data showed a meaningful increase in gratitude. The GQ-6 had the highest percentage of meaningful difference at the post test and 7-week follow-up. The UCLA loneliness scale and the ZBI both showed that two clients showed a meaningful decrease in scores, but of the participants that gave data at the 7-week follow-up, none showed a meaningful decrease in scores. SMS-mind and SMS-body scales showed that one of three clients at the post-test showed a meaningful difference and one of two clients showed a meaningful difference at the 7-week follow-up.

The SVS showed that one of three clients had a meaningful increase in vitality at the post-test, and that a different client showed a meaningful increase at the 7-week follow-up. This could be interpreted in a few ways. One possibility is that the client engaged in activities that increased vitality throughout the course of the intervention. It could also mean that it may take a longer time for subjective vitality to increase. Scores on the DASS-depression subscale showed that one of three participants had a meaningful decrease in score. This client did not give data for the 7-week follow-up session

at which the two other clients' scores did not show a meaningful decrease. There was no meaningful decrease in DASS-anxiety scores at both post-test and the 7-week follow up. This was the only measure that did not show any significant change during the intervention or at the follow-up session due to all members rating themselves as not experiencing anxiety symptoms (scores of 0-1, non-clinical levels) at both pre- and post-tests.

These results point to the possibility of horticultural therapy support groups being a viable option for improving the lives of caregivers, particularly in areas of vitality, loneliness, gratitude, depression, and caregiver burden. These results also demonstrate that the efficacy of horticultural therapy can be measured using psychometric scales. The current study adds to the small research literature about the under-supported group of caregivers and to the small body of literature on horticultural therapy. Finally, this study demonstrates the applicability of research-based scales in a horticultural therapy setting and uses statistics that are appropriate for studies with small numbers of participants. Selecting validated and reliable scales and analyzing results quantitatively will allow studies of horticultural therapy to be more easily compared, replicated, and aligned with scientific methodology recommendations. therapy.

One limitation of the current study is the small sample size which makes the results difficult to generalize to all caregivers. Another limitation is that some of the clients in the sample were also concurrently in individual therapy making it difficult to determine if the effects seen are due to the horticultural therapy intervention, individual therapy, or an interaction of both. Another confounding variable could be the meditation used in the intervention. Studies have shown meditation to positively affect anxiety, depression (Blanck et al., 2018), loneliness (Creswell et al., 2012), caregiver stress (Kor, Chien, Liu, & Lai, 2017), daily mindfulness, and subjective vitality (Canby, Cameron, Calhoun, & Buchanan, 2014). However, many of these studies focus on mindfulness practices lasting longer than 10 minutes and occurring more often than once per week, so the extent of the impact of a brief mindfulness activity is unclear. Future projects will include a control group to discern these effects from one another.

Future research investigating the efficacy of horticultural therapy on caregivers should attempt to replicate these findings using a larger, more representative sample size. Future research should also include control groups such as participants in individual psychotherapy, another comparable intervention (e.g., education- or exercise-based), or a wait-list control group (for examples of what this looks like, see Chan et al., 2017 or Makizako et al., 2015). Horticultural therapy interventions in the future could also examine different dosages, such as meeting more than once per week or for longer than six weeks, as this may lead to larger, longer-lasting results. Perhaps meeting more than once a week for eight to twelve weeks could lead to greater impacts, as more exposure to nature is generally better than smaller exposure levels (Kuo, 2013). Because tailored, multicomponent interventions have shown to be beneficial to caregivers, researchers could look at the impact of such interventions when delivered in a manner consistent with horticultural therapy practices (Wennberg, Dye, Streetman-Loy & Pham, 2015). Future studies could also consider testing if the intervention is more effective if the care receiver is also included.

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BIOGRAPHY

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Appendix A: Location of Group

Houseplants and supply storage

Window boxes

Room used for HT, with sink and counter just outside of the image

Appendix B: Completed Horticulture Products

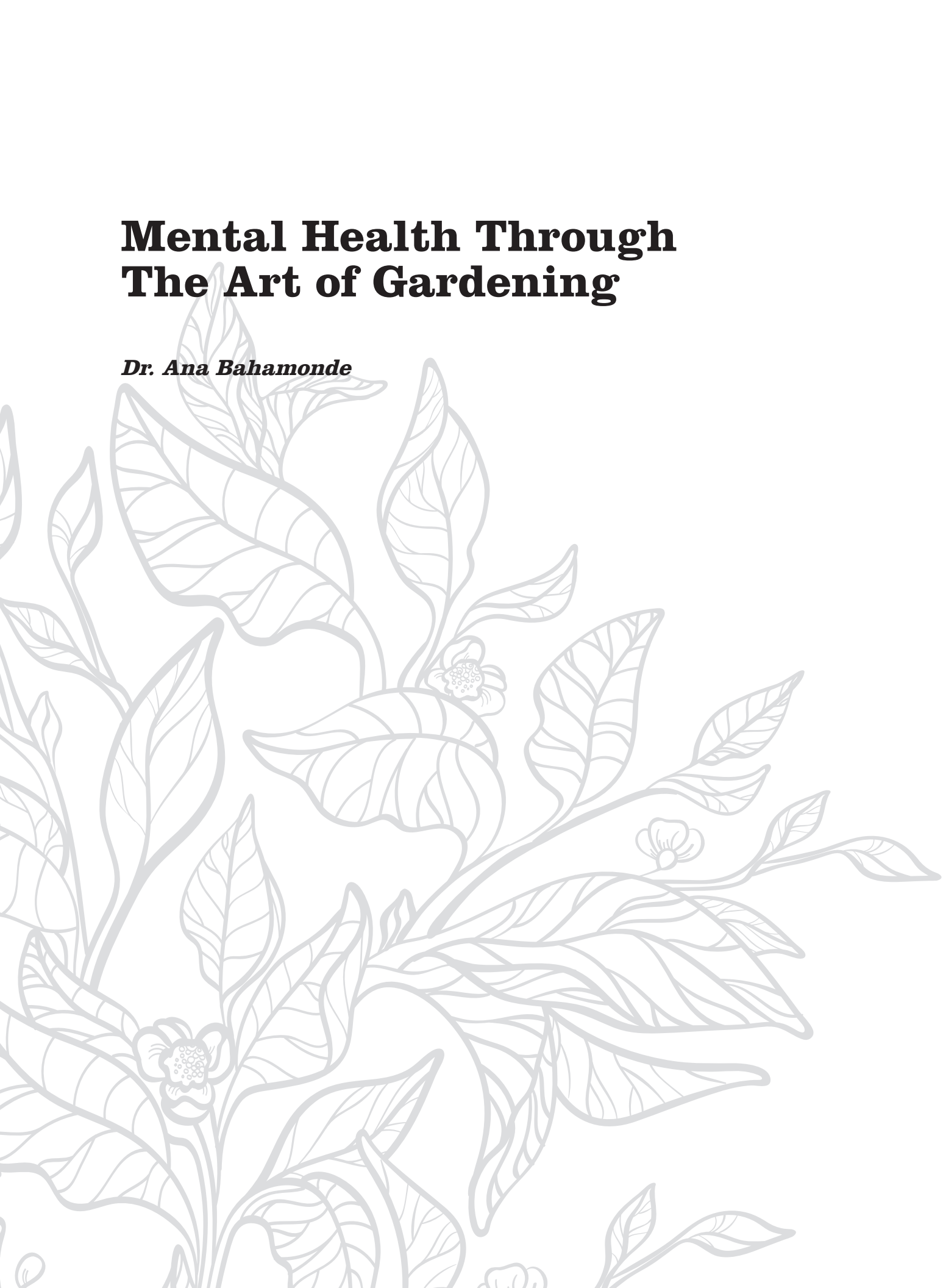
Caregiving river stories

Gratitude bouquets

Seed bombs (that sprouted early)

Mental Health Through The Art of Gardening

Dr. Ana Bahamonde



The number of youth suffering from depression and substance abuse is rapidly increasing. Since mental health problems impair the healthy cognitive and emotional development of children, it is imperative to place mental health programs at the forefront of the school's agenda. Various studies have focused on the mental health benefits of horticultural activities for vulnerable populations, but there is a gap in the literature regarding the potential benefits of therapeutic horticulture in schools to improve the overall well-being of students. For years, school garden programs have focused mostly on nutrition and academics, yet it is important that inquiry extend to the potential benefits of gardening to promote mental health in schools. Due to barriers that exist in implementing and sustaining school gardens, it is necessary to find an alternative method to traditional soil gardens.

Therefore, the researcher used a generic qualitative study of 10 school counselors and 3 school counselors in training who work in low-income communities to explore their perceptions about youth mental health and school mental health barriers. Moreover, the researcher investigated participants' perceptions regarding tower gardening (vertical aeroponic garden systems that grow plants all year both indoors or outdoors without soil) as a therapeutic alternative that can promote students' overall well-being. The findings revealed positive perceptions regarding tower gardens but also showed the need to include more education on alternative therapies that promote a holistic approach.

Introduction

The 2016 Children's Mental Health Report (Centers for Disease Control and Prevention, 2018) found that 6.8% of children suffered from attention deficit hyperactivity disorder, 3.5% had behavioral or conduct problems, 3.0% suffered from anxiety, and 1.1% were diagnosed with autism spectrum disorders. Mental Health America (2018) not only found that over 1.9 million youth suffer from severe depression and 5.13% of youth have a substance problem but, also, that youth mental health is worsening.

Students from low economic resources are more vulnerable to the current mental health crisis since they deal with greater forms of chronic stress compared to students from more affluent communities. Chronic stress refers to high levels of stress sustained over time such as abuse, neglect, financial strains, safety, violence, and malnutrition. These types of stress affect children's physical, psychological, and cognitive functioning by impairing healthy brain development and social competence (Jensen, 2009), thereby resulting in wide educational opportunity and achievement gaps. Clearly, the failure to address youth mental health issues will have stark social consequences and severe financial impacts due to treatment costs and loss of workplace productivity (National Institutes of Health (US), 2007; U.S.Department of Health and Human Services, 2000).

Due to the ongoing mental health crisis, the World Health Organization (WHO) proposed a holistic approach to mental health for young people (2010), and in 2016 they provided guidance on developing school-based mental health promotional programs (WHO, 2016). Even though many policies have been put into place to help mitigate the current youth mental health crisis, there are still many barriers for young people to access mental health services. School counselors, school based mental health clinics, and outside mental health services are unable to meet the increasing demands of this current trend, so it should be a priority for schools to find alternatives to meet the mental health needs of the student population.

Due to the fact that various studies have focused on the mental health benefits of horticultural activities for the elderly (Connell, Sanford, & Lewis, 2007; Gigilotti & Jarrott 2005; Jarrott & Gigliotti, 2010; Lee & Kim, 2008), and other vulnerable populations (Harris, 2017), it was worth exploring if therapeutic horticulture could

be considered in schools as a means to improve the overall well-being of students. While the U.S. trend for the greening of schools through gardens and garden-based learning has been linked to positive impacts on school culture, nutrition, and academics (Ozer, 2007; Schreinemachers et al., 2017), there is still an insufficient number of involved schools; furthermore, research on school gardens as a mental health promotion program is limited (Williams & Dixon, 2013).

School gardens have also faced several systemic barriers, especially in urban areas. The lack of playgrounds, sports fields, and green spaces in inner city schools makes it difficult for many schools to establish gardens or provide horticulture services (Quigley, Tlusty, Hendrix, & Foster, 2015). Other challenges include lack of adequate training for teachers, lack of resources such as seeds and gardening tools, and lack of long-term commitment. Furthermore, other difficulties that commonly arise in schools involve the summer holidays when schools are closed since this is the peak of the growing season (Beery, Adatia, Segantin, & Skaer, 2014). One solution to these challenges is to implement vertical tower gardens (TGs) because they require little space and produce many plants in a short amount of time (Quigley et al., 2015). Tower gardens are also portable, so during the school holidays the whole unit can be transported to another area by wheeling it. Students can also harvest before the holidays and then leave the unit empty until school resumes (Ritz, 2017).

Tower gardens are also economically advantageous because they use artificial lightning and require no soil. They are not dependent on climate factors and are independent of extreme weather conditions. Tower gardens operate by using an aeroponic system, which consists of an enclosed air and water/nutrient ecosystem that fosters rapid growth with little water. Because the system is enclosed, the nutrient rich mist and water-mix solution by which plants are fed are fully recycled, leading to water savings (Al-Kodmany, 2018).

Studies have shown that only by adding plants at the back of a classroom, students' reports of misbehavior and absences were reduced and feelings of comfort increased (Han, 2009). Therefore, it is worth investigating whether tower gardens can be the solution to the unsustainability of school gardens as well as be used as eco psychological tools to expand mental health services in schools.

Theoretical Framework

To understand the therapeutic benefits of horticultural activities, Adlerian psychology, biophilia, and ecopsychology theories shaped the framework of this study. Adler's individual psychology theory emphasizes the importance of holism on mental health practice. His theory proposes that individuals are best understood in the context of their relationships or social embeddedness (Adler, 1928). Additionally, individuals have a natural desire for a sense of social belonging in the world and an interest to contribute to that world in socially useful ways (Miller & Dillman Taylor, 2016). Higher levels of social interest are connected with higher levels of mental well-being, whereas lower levels are linked with feelings of alienation, inferiority, and mental illness (Griffith & Powers, 1984).

Biophilia was defined by Wilson (1984) as the "innate tendency to focus on lifelike processes" (p.1). He later expanded the term as "the innately emotional affiliation of human beings to other living organisms" (Wilson, 1993, p. 31). Previous to Wilson, Fromm (1964, 1973) had already developed the concept of biophilia. He believed that the biophilous person loves life and is fascinated by the process of life and growth (Fromm, 1964). Biophilia encompasses being completely related to the world. According to Fromm, the biophilous orientation is displayed in a person's emotions, thoughts, and gestures, and it is expressed in the natural instinct of all living organisms to preserve life and fight death (Fromm, 1964).

Therefore, humans have a tendency to care for nature and a desire to defend it from destruction (Gunderson, 2014). In summary, Fromm believed that love of nature included the following: (1) an active concern for nature's growth and prosperity; (2) response to and meeting its needs; (3) respect of nature's independence; and (4) knowledge about nature without dominating it (Gunderson, 2014). Since research has also suggested that the expression of compassion and kindness may strengthen relationships as well as mental and physical health, it can be said that horticultural activities may be a way to maintain holistic well-being (Fredrickson et al., 2013; Poulin & Holman, 2013). Clearly, biophilia supports the strong connection that exists between the environment and human psychology (Soderlund & Newman, 2017).

Ecopsychology, first coined by Theodore Roszak in

1992, states that the modern world has alienated us from the natural world. This distancing from nature has negative psychological consequences for people and has also led to ecological devastation as a result of our lack of empathy for nature. Roszak claimed that at the core of the mind is the ecological unconscious, which, if repressed, can lead to an "insane" treatment of nature. The repression of the ecological unconscious is the cause of madness in industrial society, and the only way to heal is to open our access to the ecological unconscious (Roszak, 1992).

Research Methodology

The purpose of this generic qualitative study was to explore the perceptions of school counselors and counselors in training (SC/SCT) regarding the use of tower gardens (TGs) as school expanded mental health programs. The specific research questions were the following:

Q1. What are some of the perceptions of SC/SCT regarding school mental health? Q2. What are thebenefits of horticultural activities in mental wellness?

Q3. How can horticultural activities contribute to the holistic approach of students' overallwell being?

Q4. What are the perceptions of SC/SCT regarding the use of TGs as expanded mental health programs in schools?

The data was collected by using semi-structured interviews of SC/SCT who work in public or charter schools located in areas of high poverty in New York City. This population was chosen because poverty has shown to affect the psychological well-being of children. It is estimated that among children experiencing poverty who are in need of mental health care, less than 15% receive services, and even fewer complete treatment. Furthermore, studies have found lower mental health service utilization among African American and Hispanic children compared to their white counterparts (Hodgkinson, Godoy, Savio Beers, & Lewin, 2017; Kataoka, Zhang, & Wells, 2002; Santiago, Kaltman, & Miranda, 2013).

Low-income communities were determined by using the latest New York City Independent Budget Office (IBO, 2012), including classification as Title I schools under the New York State Department of Education. Title I is a school-wide funding program that is available to schools with a large student population who come from low-income families (New York State Education Department, 2019).

Participants were selected through snowballing sampling. In this way, the sample was created from a series of referrals made within the group who know each other.

Snowballing is quite effective when the objective of the inquiry is to explore and analyze rather than to test hypotheses (Biernacki & Waldorf, 1981).

There were 16 participants who responded to the invitation to participate in the study. However, only 13 participants met the criteria of working in low-income urban communities that qualified as a Title 1 school. As the interview process progressed, saturation was probably reached by the eighth interview. Nevertheless, the researcher decided to interview all 13 participants to ensure that no new themes emerged.

Each participant was asked to complete an informed consent. The criteria for participants included: (a) school counselor or school counselor in training completing a master's degree in school counseling (b) 21 years of age or older (c) working in a public or charter school located in an area of high poverty in New York City. The participants were ensured anonymity and told their responses would be kept confidential. Participation was voluntary and was not financially rewarded.

All participants were female which confirms the current disproportionate distribution of gender in the school counseling profession. The American School Counselor Association (ASCA) membership demographics of 2018 consists of 85% females and 15% males, thereby making women the more common gender in the school counseling field (ASCA, 2018). Despite the fact that this study did not include male participants, the researcher does not believe the results of the study were affected by this factor. The ethnicity of the participants included ten Latinx, one Asian, one African-American, and one Caucasian. From the 13 participants, only three were counselors in training. Two of the counselors in training were in their second year of a master's school counseling program and one was in her last month of the program. All participants worked in Title I schools located in the Bronx with exemption of one participant who worked in Queens. Therefore, the data pool included

a homogenous group of participants. This factor helped the researcher make certain generalizations when analyzing the data for students in low-income communities in New York City, especially the Bronx.

After editing the interview transcripts, the interviews were coded line by line. Transcripts were then imported to NVivo, a software program that is mostly used in qualitative research because it allows researchers to efficiently gather, organize, analyze, and synthesize results (Wiltshier, 2011).

After importing the data, cases were created for each participant. Next, the researcher proceeded to re-code each interview in the software program while verifying the initial manual coding in the transcript documents. This process created preliminary nodes that revealed themes and subthemes. Each node was then categorized into one of the research questions to become the parent nodes.

Table 1 shows the results of demographic attributes such as age and ethnicity.

Validity and Trustworthiness

To ensure validity, reliability, and trustworthiness, the researcher validated the interview questions by using the Interview Protocol Refinement (IPR) framework (Castillo- Montoya, 2016). The IPR is an approach to developing a strong interview protocol that captures the perceptions and experiences of participants. The interview questions concurred with the IPR's four steps:

1. Ensuring that the interview questions aligned with the research questions
2. Constructing an inquiry based conversation
3. Receiving feedback on interview protocols
4. Piloting the interview protocol (Castillo-Montoya, 2016).

These steps offered a framework for further developing the questions. At the same time, the IPR framework helped support the evolving nature of this qualitative study which led the researcher to refine and improve the interview questions as a result of emerging data (Castillo-Montoya, 2016). The researcher also field tested the interview questions. This process involved feedback from 2 New York University professors who have knowledge on the population and school counseling field. These experts did not answer the interview questions; instead, they provided valuable information to help the researcher refine and improve the interview protocol (Yin, 2016). Next, the researcher pilot tested the interview protocol with 2 participants before launching the actual interviews. Finally, credibility was increased by allowing participants to read over the transcripts of the interview session to ensure their views were accurately represented (Yin, 2016).

Findings

The interviews were conducted from April 2019 to June 2019, and they took a span of 15 to 60 minutes depending on the participants' available time and if they had a talkative or reserved personality. During the interview process, the researcher showed photographs of a tower garden (TG) and the process of growing seedlings from seeds. Having these visual aids was extremely helpful especially since it became clear during the interview that most of the participants had no prior knowledge of TGs.

Research Question One (RQ1)

The aim of the first research question was to explore the perceptions of school SC/SCT regarding school mental health. Two themes emerged from this question.

(RQ1) Theme One: Common Youth Mental Health Issues

The most common youth mental health concern reported by 12 of the 13 participants included the personal/social standard of the ASCA model, a framework developed by the American School Counselor Association to guide school counselors in the development of a comprehensive data-driven counseling program (ASCA, 2016). This standard is linked to the school counseling program that targets the general mental health issues that impede student learning. The participants agreed that teaching students adequate coping skills is an area that is needed in schools since many students are currently showing behavioral and anger issues. Participant 3 best summarizes this current area of concern:

> We find [that] a lot of children have difficulties expressing how they're feeling or controlling their anger… They're aggressive towards others...hitting someone or screaming at someone is not the right way to deal with [anger].

Other common mental health issues reported fall under the DSM V diagnosis: depression, trauma, anxiety,

Table 1.
Participants' demographic data

Participant	Age	Ethnicity	Grade Levels	Outdoor Playground	Location	Years Counseling/ if in Training (Credits Completed)
1	40	Hispanic	Elem.	Asphalt	Queens	45+ cr. Internship
2	41	Hispanic	Middle	None	Bronx	2 yrs.
3	37	Hispanic	Elem.	None	Bronx	9 yrs.
4	38	Hispanic	Middle	None	Bronx	3 yrs.
5	32	Hispanic	Elem.	None	Bronx	1 yr.
6	34	Hispanic	Middle	None	Bronx	1 yr.
7	31	Hispanic	Elem.	None	Bronx	11 yrs.
8	34	Hispanic	Middle	Asphalt	Bronx	3 yrs./30 cr.
9	37	Asian	HS.	Green	Bronx	Practicum
10	32	White	HS	Green	Bronx	9 yrs.
11	27	Hispanic	Elem.	None	Bronx	30 cr. Practicum
12	31	Afr-Am	Elem.	Asphalt	Bronx	30 cr. Practicum
13	43	Hispanic	HS	None	Bronx	15 yrs.

substance abuse, ADHD, and autism. Non-suicidal self-injury and suicide attempts were also reported but to a lesser extent since most of these issues happen as a result of a more serious underlying mental health illness. Even elementary counselors reported being alarmed by the current state of mental health with their population. Participant 5 said, "I've noticed an increase in...self-harm within the elementary population".

Most participants confirmed that many students suffer from trauma due to sexual assault, temporary housing, foster care, displacement, and other dysfunctional environments. Anxiety due to academics was also reported. Participants also believe stress is increasing because schools are putting too much pressure on students, especially in passing the state's standardized exams. However, many students from low-income communities do not have the age appropriate literacy level that is required to meet these benchmarks, so students start feeling overwhelmed by these unrealistic demands. Participant 12 reiterated the literacy issues of this population: "A lot of our students are academically behind, especially in my class. I'm in a 12 to 1 [student-to-teacher ratio] setting, and only one student is actually reading on grade level, and...can comprehend what they're reading".

One of the emerging subthemes that the researcher was not expecting to find was related to the negative impacts of technology as a possible cause to what participant 10 claimed is "an alarming number of students that are coming forward with mental health issues". This phenomenon can be explored through the lens of ecopsychology which posits the addiction to technology and the massive expansion of urban development as a "pathological alienation" to the natural world which results in the "madness" of the psyche (cited in Roszak, Gomes, & Kanner, 1995). Participant 13 belabored on this issue:

> I would say, more in the last two or three years, I'm getting...more and more students with behavioral

Table 2.
Comparison query no playgrounds versus mental health references

Category	PLAYGROUND or LEISURE SPACE			
Nodes	None (n=9)	Asphalt/concrete (n=2)	Green Space (n=2)	Total (n=13)
MH	72.92%	12.50%	14.58%	100%

> issues...Internet addiction it's going to be the new wave of things that are going to be impacting the counseling field. To get those kids to disconnect, that is like an atrocity. It's part of the coping skills that they're losing.

The demographic data also provided information regarding how many participants' schools offered an outside area for recreation. Surprisingly, 9 out of 13 schools in these low-income communities, especially middle school, do not have open playgrounds. The NVivo query comparing participants' attitudes regarding mental health issues and schools who had no outdoor areas demonstrated a clear increase in the amount of mental health references from participants who work in schools that have no outdoor common spaces (See Table 1). The comparison between schools that offer concrete or green spaces was not significant.

(RQ1)Theme Two: Mental Health Barriers
The most common mental health barriers that emerged from participants' responses was understaffing of school mental health professionals with 12 of the 13 participants sharing their opinions on the subject. Clearly, the student-to-school counselor ratio is quite high in most of the participants' schools. The ASCA model recommends a ratio of 250 to 1, but even in schools that have this ratio or less, participants reported being unable to complete their caseloads due to the daily crisis interventions they must attend. Participant 1 reported the highest student to counselor ratio at 942 to 1.

Some participants' schools have the benefit of having a clinic on site, but even if this is the case there are long waiting times when students are referred to these outside services. Participant 13 has a Montefiore clinic in her school building, but she still claimed that there is a long waiting list. Consequently, school counselors are forced to refer outside the school, but the long waiting lists are still an issue of concern, especially in high school when the student does not have four years to wait for an appointment. Participant 13 reported:

> There's a three to four year waiting list...to get a student checked by a mental health facility…So, in four years, the kids are supposed to graduate in four years. What am I supposed to do in the interim, if I can't get the kid to come to school?

Participant 4 also made a compelling case regarding the mental health needs of students in low-income communities.

> Well, the Bronx is the borough that has the highest--the most need for mental health and there are not enough agencies that can provide mental health services in a timely fashion. For example, if I were to call the clinic down the block from my school for an appointment for one of my students, they will give me, I'm going to say, 8 to 10 weeks wait time for an appointment.

Finally, 7 participants reported cultural stigma associated with mental health issues.

Many parents will not give their consent for their children to receive services or many students just refuse to accept services. The demographic population of most low-income schools in New York City include Latinx and African or African-American students. Research on these populations has shown that cultural stigma regarding mental health is salient in these ethnic groups (Craft DeFreitas, Crone, DeLeon, & Ajayi, 2018).

Overall, participants' perceptions of school mental health confirmed that youth mental health issues are on the rise; and, though schools are making attempts to deal with this crisis by hiring social workers and even (with some schools) offering school-based clinics, the insurmountable amount of mental health needs makes

it hard to service all students in a timely and equitable manner. Cultural stigma and the inaccessibility to community mental health resources also put a high toll on the academic success of low-income students.

Furthermore, the sudden increase in mental health concerns stemming from a lack of coping and social skills can be analyzed through the theory of ecopsychology. The dramatic rise in urban development and the use of technology have had detrimental effects on human interaction with nature, land, community, and people. Ecopsychology is a theory that transcends individualism and recognizes the inextricable bond that connects humans with the wilderness. This bond provides a holistic foundation that helps humans have healthy interactions with others. Therefore, the theory of ecopsychology makes a convincing case for the urgent need of environmental therapy such as plant therapy, forest therapy, or other therapeutic horticultural activities to counterattack the negative effects of the fast-paced urban life in which humans are currently immersed. This current technological ethos has built a social organization that consists of autonomic principles of standardization and production that has made humans lose perspective and control of this fabricated man-made universe, thereby hindering the optimal development of human psychological processes and resulting in a mental health epidemic (Roszak, Gomes, & Kanner, 1995).

Research Question Two (RQ2)
The aim was to find out if school counseling professionals were aware of the healing benefits of horticultural activities in mental health. From this question two themes emerged: the need to educate counseling professionals on the therapeutic benefits of horticultural activities and anecdotal evidence confirming the theory of biophilia.

(RQ2)Theme One: Educating School Counselors in the Therapeutic Benefits of Plants.
From the 13 participants, only 1 had knowledge of horticultural therapy and therapeutic horticulture (HT/TH), and that was because she had a special interest in the subject. She was also the only counselor who applied TH using a tower garden (TG) with her student population. Participant 10 had some awareness but was not able to fully describe the therapeutic benefits of plants.

Since mental health issues are increasing and school counselors are understaffed, it seems imperative for school counseling programs to educate future counselors in alternative modes of therapy, especially in the therapeutic benefits of plants. This seems a viable solution for schools located in low-income communities where students do not have access to a lot of open green areas.

(RQ2) Theme Two: Anecdotal Evidence and Biophilia
Once the researcher explained the concepts of HT and TH, the participants were able to report anecdotal evidence regarding the healing powers of plants. Therefore, the researcher decided to explore these findings within the context of biophilia. Seven participants were able to share their anecdotal experiences regarding the benefits of plants.

Participant 6 recalled how her students made a connection with a plant that she coincidentally bought for her students to tend:

> They were so involved. I couldn't remember any of the watering because there were so many other things in my mind, but they would remember when to water it; they would go together. So, it became a little social group...with this one plant...and they were just so into it. So, I could definitely see even the social benefits of something like this.

When the researcher shared the data with participants regarding the therapeutic benefits of horticulture with the elderly and incarcerated populations, most participants immediately acknowledged the natural inclination that humans have with the natural world. Participant 1 exemplified the biophilia hypothesis during her interview:

> I'm not very good at [taking care of plants]. But I think that it's something that is a skill and a beautiful thing. If more people would do it, I think that they would feel more connected to the environment and to people. I think it's something very earthy, very natural. I don't know how to say it. But I just think that it just brings us back to our roots, for lack of a better word, to a time where people were nicer to each other, and I think that when you do that, you become better people.

The data collected from the 13 interviews revealed that school counseling programs need to provide more instruction in terms of a more holistic approach to

overall well-being. This approach should incorporate alternative therapeutic models that can give students in schools more access to services; and, at the same time, eliminate barriers such as cultural stigma. If mental health services could be provided in more subtle ways such as an extracurricular activity or even integrated to the curriculum, more students would be able to reap the benefits. Additionally, the anecdotal evidence of participants' direct or indirect experiences with plants lays the foundational framework for the biophilia hypothesis to be considered a theory that supports the assumptions of ecopsychological theory.

Third Research Question (RQ3)
The goal of the third research question was to find out what kinds of holistic benefits do SC/SCT envision regarding horticultural activities for students. Even if participants had never heard of horticulture or had previous knowledge of the data related to HT/TH, the researcher still wanted to explore participants' perceptions regarding the possible benefits of plants for students as related to overall social, emotional, and mental well-being. The findings to this research question concur that TH may be a helpful intervention to most of the mental concerns that were reported by participants in research question 1.

(RQ3) Theme One: Emotional/Personal Benefits
This theme had a total of 34 references and it was reported by 11 participants. There were various subthemes that emerged including benefits related to developing empathy, caring, responsibility, connection with nature, and building self-esteem and self-confidence. However, mindfulness (meditation, peace, tranquility, and patience) was the most prevalent subtheme, with 8 participants emphasizing its benefits.

Participants reported that watching a seed grow into a plant and taking care of it helps students take responsibility and be accountable for the life of that plant. As this relationship is established, students start developing empathy and caring. Participant 5 said, "They name the plants; they water the plants; so, they take responsibility. And you can tell that whatever we're doing with the plants translates with people...You start a conversation and you show the children different ways to care and to build empathy".

Participants also mentioned that low-income students do not get a lot of opportunities to interact with nature. In this way, a TG can be an alternative tool to bring an indoor garden to schools that fail to offer outdoor green spaces. Finally, most participants agreed that plants and plant related activities can help build perseverance and patience. Additionally, plants create a soothing environment that invites students to meditate and find inner peace. (RQ3)Theme Two: Academic Benefits

The academic benefits of gardening activities were a common theme among participants. A total of 10 participants reported benefits in science related subjects, health, nutrition, marketable skills, and even making learning more tactile and relevant. The findings of this theme also match the scientific findings that demonstrate the many academic benefits of school garden programs (Williams & Dixon, 2013).

(RQ3) Theme Three: Social Benefits and Adlerian Individual Psychology Theory
There were 6 participants who reported plant related activities as having social benefits that involve the community, family, and peers. They also viewed this positive interconnectedness as helping students develop a sense of belonging and purpose in the world. Overall the most frequent phrases made by participants in this theme included "a sense of accomplishment," "student happiness", "coming together", "family involvement", and "community involvement". Participant 2 mentioned that students involved in her school's TG program give away the harvests to the community. Sharing the harvests with the community not only helps students feel they are accomplishing good deeds, but it also allows the school to create strong bonds with the community. These positive feelings are directly connected to Adler's theory that mental health and happiness are determined by social interest (Adler, 1964). Adler felt that one of the main goals of human functioning is to strive for a sense of belonging and identification with others (Curlettte & Kern, 2010), and the development of social interest involves the ability to feel empathy with others (Clark, 2007; Watts, 1996). Since humans are genetically predisposed to being social beings, human behavior and emotions are best understood if explored through the social context (Kopp, 2003). Therefore if students have a high level of social interest, they will psychologically be better adjusted.

Research Question 4 (RQ4)
The purpose of the last research question was to explore the perceptions of SC/SCT in low-income communities regarding the potential use of TGs as ecopsychological tools that can provide the therapeutic benefits of

Table 3.
Reviewed codes

Nodes	Description	Files	References
Question 1: Mental Health Services(MHS)		13	93
Barriers to MHS	Theme 2	12	37
Long waiting times/lack of alignment		4	7
Stigma		7	10
Understaffed		12	20
MH needs	Theme 1	13	51
Anxiety, Depression, Substance Abuse, Trauma	DSM Diagnosis	11	22
Ecopsychology & Increase MH & Technology		4	7
SEP & Coping Skills & Crisis		12	22
Resources are adequate		4	5
Question 2: Benefits of HA in mental wellness		13	21
Anecdotal & Biophilia	Theme 2	7	8
Lack of awareness of alternative therapies	Theme 1	10	10
Yes knowledge of TH or HT		2	3
Question 3: Benefits HA in student well-being		13	63
Adlerian community/social/ family	Theme 1	6	9
Learning (Academic, Health, Tactile)	Theme 2	10	13
Benefits Social, Emotional, Personal	Theme 3	11	34
Empathy, caring, responsibility		5	7
Expanding horizons in the city		3	3
Fulfillment/accomplishment/ pride/self- esteem		5	7
Meditation/tranquility/ peace /calm		8	8
Patience, perseverance, step instructions		2	3
Gardening Programs in school		6	6
Question 4: Perceptions TG as EMHS		13	93
Data needed	Theme 3	4	4
Need for protocol/training	Theme 3	4	4
Negative feelings about plants	Theme 4	2	2
Negative or skeptical about TG as TH	Theme 4	4	10
No knowledge of TG	Theme 1	10	14
Positive feelings about plants/Biophilia	Theme 2	6	6
Positive perceptions of TG as TH	Theme 2	10	28
Suggestions TH and TG	Theme 3	3	7
Teachers helping counselors	Theme 3	11	15
Yes Knowledge of TG	Theme 1	3	3

horticultural activities as additional interventions to school mental health programs.

(RQ4) Theme One: Positive Perceptions in the use of TGs for School Mental Health

When participants were asked if they knew what a TG was, 8 responded they did not know; 2 (when shown a photograph of a TG) recognized having seen one; and only three participants knew about TGs because their schools owned one. From the 3 participants, only 1 uses the TG as a therapeutic tool. Despite, the lack of knowledge and awareness regarding TGs and the therapeutic benefits of plants, the results showed mostly positive perceptions.

Overall, 10 participants welcomed the idea. Participant 9 best summarizes the overall perceptions of SC/SCT regarding the implementation of TGs as therapeutic tools:

> I would [consider this program]. Yes. I think this is a great idea. Anything to help our students, you know, anything to bring out the best in them and build on their skills and self-esteem or confidence, because... all of that really plays a big role in their academics and their performance... I would do anything to help them.

(RQ4) Theme Two: Skeptical Perceptions in the use of TGs for School Mental Health

Participant 10 raised objections regarding the differences in soil gardening versus aeroponic gardening. She reported that soil gardening is a more natural process than tower gardening; therefore, the health benefits found in research regarding soil gardening do not necessarily correlate to tower gardening. Participant 7 also raised the same point by saying, "But, I think, it's a different experience when the students are more involved, like maybe watering the plants themselves". These comments confirm the need to have data regarding tower gardening and its potential benefits.

(RQ4) Theme Three: Suggestions for Implementation and Next Steps

A total of 3 participants shared their views regarding possible ways to implement a tower gardening program. All three participants agreed that teachers could run a once a week extra-curricular activity with small groups and build conversations and metaphors regarding the plant growing process. Participant 5, who is the only counselor who uses this mode of therapy, said that due to an absence of an established protocol she uses her creativity and makes the sessions specifically individually based. Nine participants expressed the need for further research, a protocol, and even training. It is clear from the interviews that to successfully implement TGs as ecopsychological tools, school counselors need to have the data that could place this type of program as an evidenced based intervention that directly impacts student learning and overall success.

Limitations and Recommendations

The results of this study cannot be generalized since it consisted of a small sample size and a limited geographical region. Furthermore, because qualitative study is based on the lived experiences of participants, it is possible that both the subjective role of the researcher and the social desirability of participants may have shaped the results. In addition, the data collected in this generic qualitative study was not statistically quantifiable. Nevertheless, this study did reveal various implications for professional practice.

There is an urgent need to increase awareness in the mental health professions regarding the theories of ecopsychology and biophilia. These theories are intrinsically connected to overall mental health and may provide insight into creative ways of treatment that can be attractive and engaging in school settings. Moreover, to understand the rapid increase in mental health disorders, it is necessary to examine not only how people have become disconnected from nature but also how nature's gradual destruction plays an important role in the current mental health crisis.

There is also the need to include courses on alternative therapies in school counseling programs. Alternative therapies offer a powerful way to communicate with clients who have difficulty in communicating verbally especially young populations who might not have the developmental age to articulate their thoughts and emotions. In addition, alternative therapies can be promising in school settings where there is a need to eliminate cultural stigma and provide brief interventions (Bastemur, Dursun-Bilgin, Yildiz, & Ucar, 2016).

Finally, there is a need to disseminate data regarding the mental health benefits of therapeutic horticulture and how TGs may provide feasible alternatives to school gardens. There is also the need to provide education on the benefits of ecotherapy as a modality that gathers nature-based techniques and practices to re-establish the

inherent human-nature connection (biophilia) that has been severed by technological obsession (technophilia). Ecotherapy is the applied form of ecopsychology in which both the passive and active participation with nature has healing properties, particularly with anxiety (Mackay & Neill 2010), depression (Barker & Dawson 1999), stress (Kam & Siu 2010), as well as improves self-esteem (Pretty, Peacock, Sellens, & Griffin, 2005) and concentration (Duvall 2011).

Implications and Conclusions

Results from this generic qualitative study offer several opportunities for further research. Future studies should expand the pool of participants to include other school mental health professionals, such as social workers and school psychologists, as well as school administrative personnel and teachers. The location of this study was also limited which means there is a need to broaden the geographical location and include both schools from low-income communities and affluent communities. It would be interesting to compare if there are differences in the perceptions of school mental health professionals who work with students from different socio-economic backgrounds when it comes to the topics of common youth mental health concerns, school mental health services, and the possible use of TGs as expanded school mental health programs.

Future research can also include mixed methods designs since a combination of qualitative and quantitative data will provide a more complete analysis. Qualitative research may include biases and is not statistically quantifiable, whereas quantitative data will fail to understand the context and setting of the study. Therefore, by providing both methods and including inductive and deductive reasoning the results are further validated within the study and the findings will appeal to a wider audience of professionals, practitioners, and academics.

Randomized controlled experiments are key in trying to uncover whether an intervention or program had a causal impact on a group of participants. These are the types of studies that have been limited in HT/TH programs. The benefits in mental health from either passive or active involvement with plants have until the present time only shown a correlation, but have yet to prove causation. However, it is also clear that randomized controlled trials will be extremely difficult to replicate in a school settings, especially because there is no guarantee there will be strict fidelity in the implementation of the program.

Another important factor in educational research is that it is not feasible to use individualized randomization since too much information is shared within the school community; instead, whole groups have to be randomized in a cluster randomization trial (CRT) to provide more accurate results. Even though, CRT will require larger samples and more complex methods for statistical analysis, it is worthwhile to include these types of studies since optimal impact to youth mental health care programs must be embedded within the whole-school as a multimodal approach (Clarke & Barry, 2015).

Finally, scientific studies on tower gardening need to investigate if this activity has similar effects in well-being compared to traditional gardening. The need to have evidence- based research regarding the implementation of a protocol for therapeutic tower gardening is an urgent recommendation for future research. In order to have evidence-based research in this topic, the literature must provide data from a range of studies including meta-analyses, randomized controlled trials, longitudinal studies, as well as information obtained from single-case reports, systematic case studies, qualitative and quantitative research, and clinical observation (Cook, Schwartz, & Kaslow, 2017). The future evidence-based research arising from the present study might even develop tower gardening as a trending psychotherapy modality in school mental health care.

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Appendix I: Visual Charts on Specific Nodes

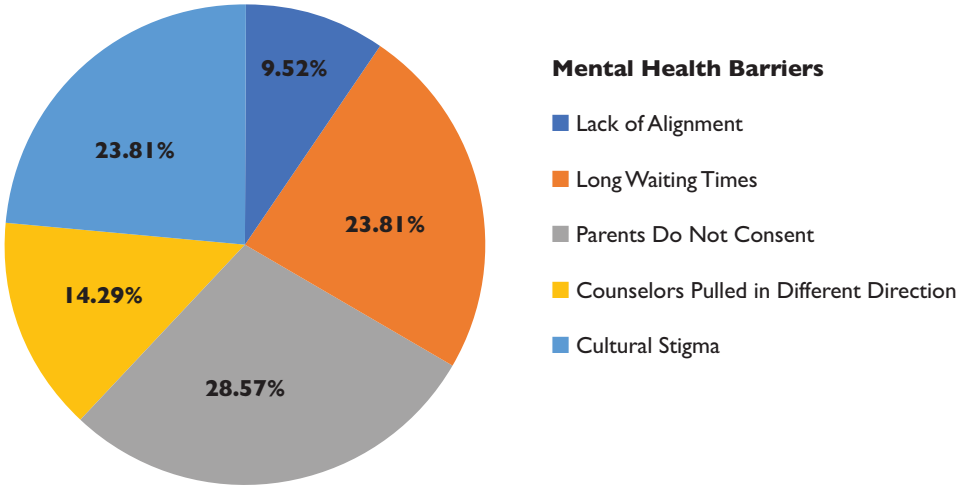


Figure 1. Pie chart of mental health barriers.

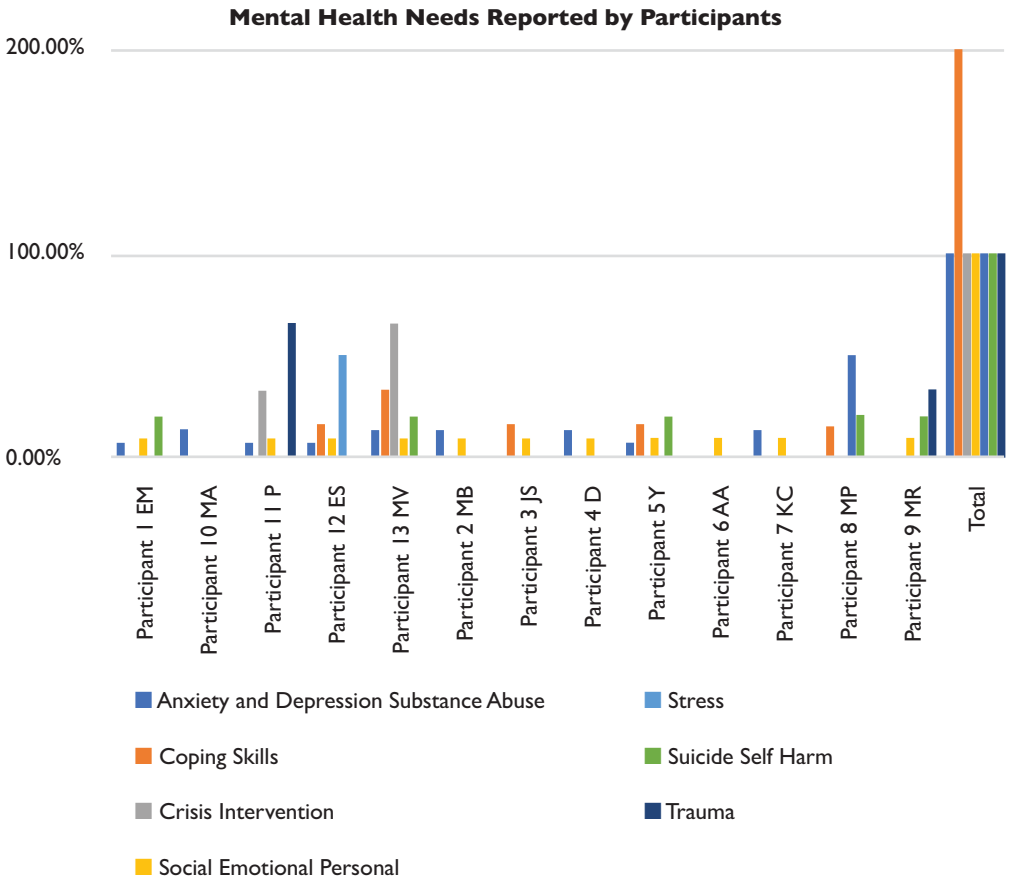


Figure 2. Bar chart of mental health needs by participants

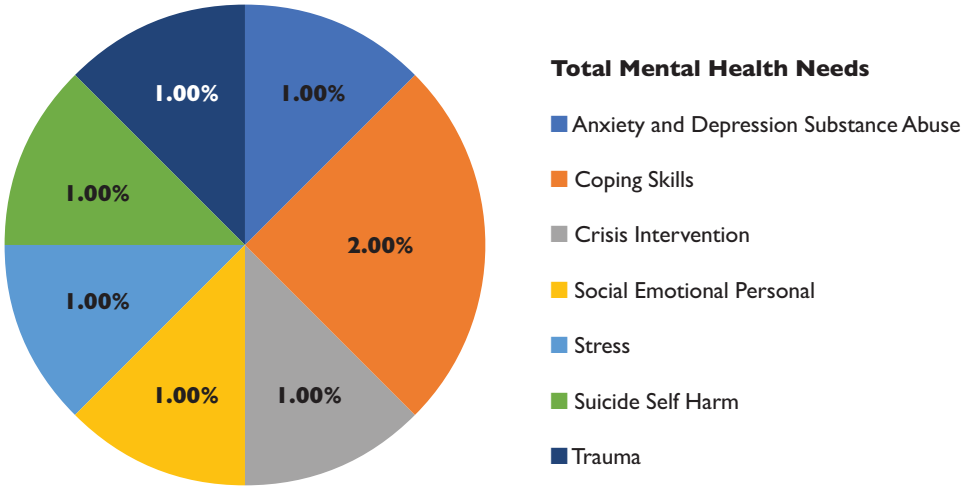


Figure 3. Pie chart of mental health needs.

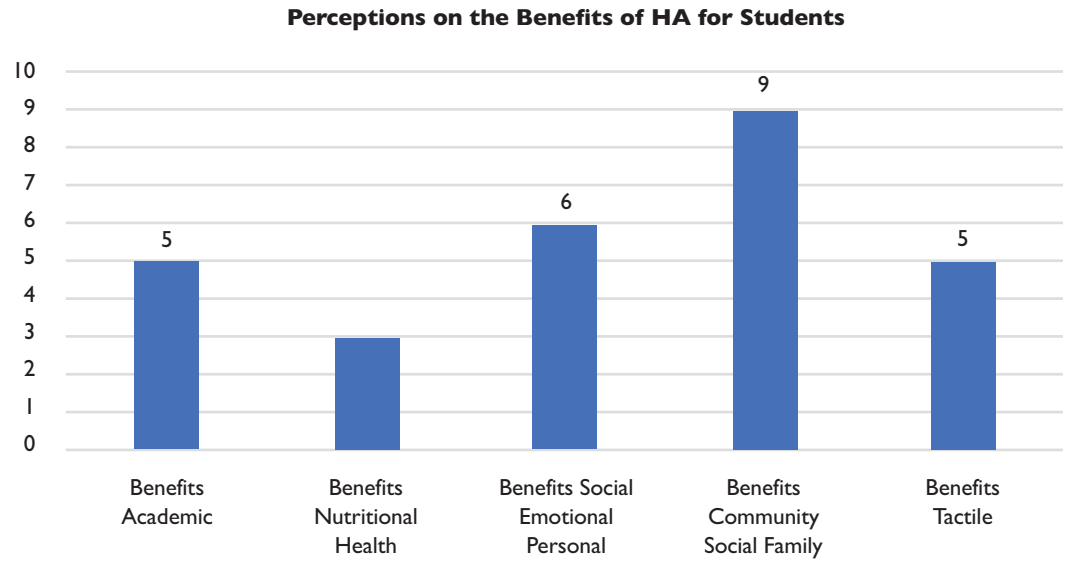


Figure 4. Bar chart of perceptions of benefits of horticultural activities for students.

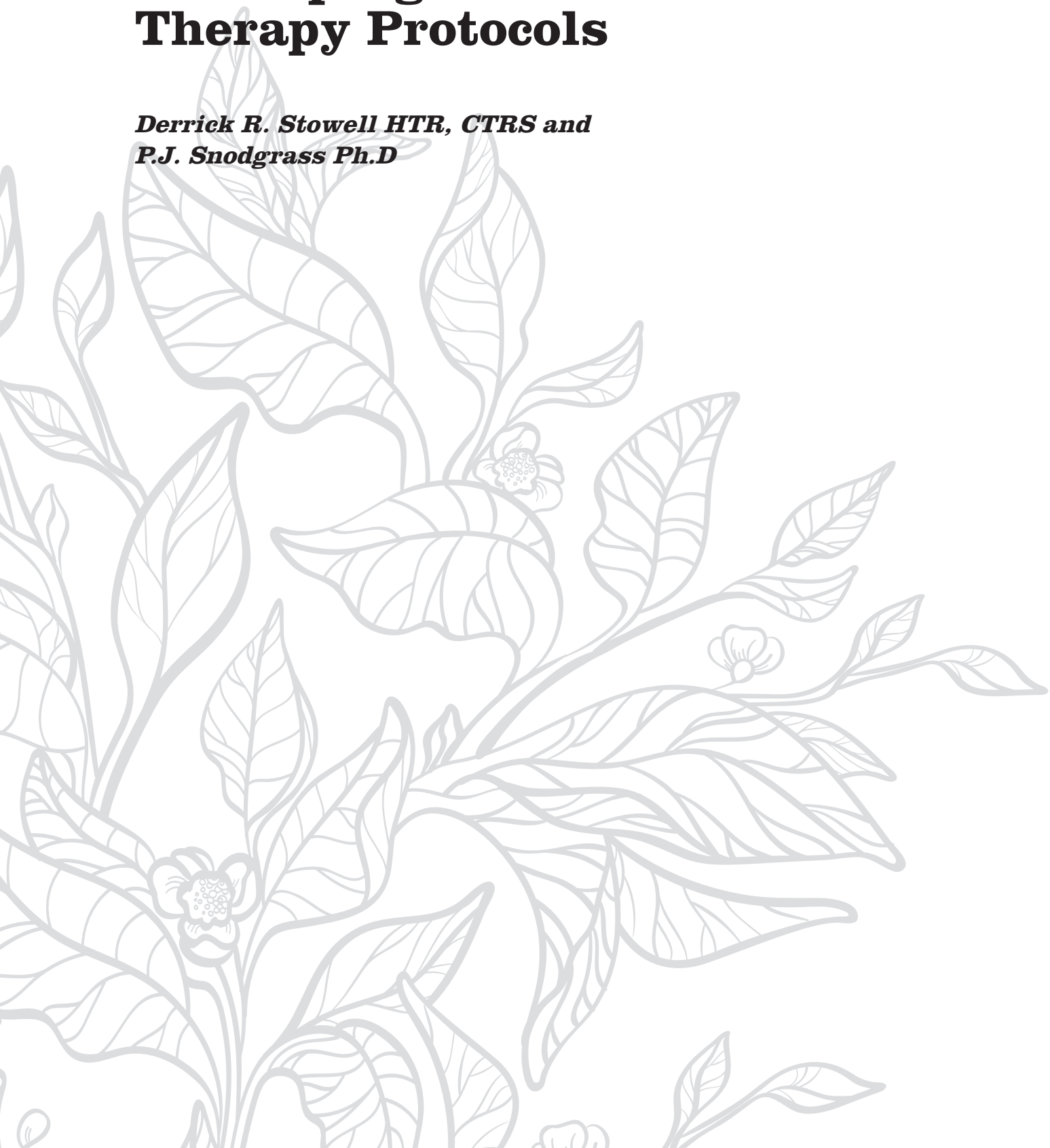
Figure 5. Plants in tower garden ready for harvest.

BIOGRAPHY

Ana Bahamonde has been an educator for over 28 years and has taught internationally as well as in North American inner-city schools. She received her PsyD in Clinical Psychology from California Southern University, Costa Mesa, CA, and her Master of Arts in Education from the University of Toronto, Canada (OISE). Her research interests are in the fields of education and counseling psychology. Dr. Bahamonde is a member of the American Horticultural Therapy Association, American School Counselor Association, International Honor Society for Counseling Students, and the Golden Key International Honor Society.

Developing Horticultural Therapy Protocols

Derrick R. Stowell HTR, CTRS and
P.J. Snodgrass Ph.D



Protocols are tools used in many professions. In health care settings, protocols are often used to establish evidence-based practices to implement treatments in a variety of settings. There are three main types of protocols found in health care which include research protocols, treatment protocols, and diagnostic protocols. Research protocols help to establish guidelines for conducting research related to specific interventions. A well-written research protocol should be included in the methods section of published research. This will allow for replication of the research and further validate research findings. Treatment protocols establish how specific treatments are implemented. Diagnostic protocols focus on specific diagnostic groupings.

Another term that is often used interchangeably with protocols is clinical practice guidelines. This article will discuss the need for establishing horticultural therapy protocols and explore the differences between protocols and clinical practice guidelines. The article will conclude with an example of a written protocol for a mobile horticultural therapy program.

Introduction

Creating positive outcomes in health care should be the priority of all health care professionals. To provide the best care for clients, practitioners have a responsibility to implement the most current evidence-based practices (EBP). One way to incorporate the use of EBP into horticultural therapy is through the use of protocols. A protocol is a written document that utilizes evidence-based practice and professional consensus to describe how to conduct health care interventions (Fumagalli et al., 2016; Stumbo & Peterson, 2004; Warren, 1993).

Due to the variety of health care settings, organizations often create unique protocols for their specific treatment settings. One example of organization-specific protocols is Kelland's recreational therapy protocols for the Alberta Hospital Edmonton (1995). Additional protocols for physical therapy (Brigham and Women's Hospital, 2019; Seacoast Orthopedics & Sports Medicine, 2019) and recreational therapy (Bailey, 2015) provide examples of protocol formats. Another term that has been used interchangeably with protocol is clinical practice guideline (Stumbo & Peterson, 2004). This article will discuss the use of protocols and clinical practice guidelines in health care. It will also discuss the similarities and differences in protocols and clinical practice guidelines. Finally, the article will provide a suggested protocol for a mobile horticultural therapy program.

Health care professions define EBP as a systematic approach to make decisions on interventions (Karkada, 2015; Yoder-Wise, 2011). Kreski (2019) states that EBP improves quality of care when practitioners utilize valid and reliable methods to making decisions on which interventions to use. At times, research evidence may not exist for interventions. In this situation, it is important to research information on what not to do (Austin, 2013). This will also allow practitioners insight on how to develop new programs and then research the effectivities of those new programs. Using EBP is a way to steer practitioners away from using the same, sometimes outdated, practices just because it has been done that way in the past. Other pitfalls of practice include relying on outdated academic thought and teaching, and organizational practices that are not founded in theory or EBP (Austin, 2013). Evidence-based practice should be implemented in all health care profession including horticultural therapy. Using EBP, will help improve practice and contribute to improved

Table 1.
Treatment Protocol Format

Program title
General statement of purpose
Description of program
Appropriate presenting of client problems that may be addressed
Referral criteria
Contraindicated criteria
Therapeutic recreation intervention activities or techniques employed
Staff training/certification requirements
Risk management considerations
Outcomes expected
Program evaluation
Approval signature and date

Note. Adapted from Ferguson, D. D. (1992). Problem identification and protocol usage in therapeutic recreation. In G. L. Hitzhusemn, L. T. Jackson, and M. A., Birdson (Eds.) Global therapeutic recreation. Columbia, MO: Curators University of Missouri.

outcomes of horticultural therapy interventions and research (Haller & Capra, 2017, Kreski, 2019).

Research Protocols
There are three main types of protocols in health care settings. The first protocol type is a research protocol. Research protocols describe methods used for research related to health care interventions (Kreski, 2019). Most research includes a methods section. A well-written methods section should give others the information necessary to replicate the study.

A standardized research protocol can set up guidelines that can help increase the measure of the impact of health care interventions. There is currently only one published research protocol for horticultural therapy. This protocol lists the steps necessary to conduct a study to measure the effect of horticultural therapy on the elderly (Chan et al., 2017). Other research protocols examples include physical therapy (Carvalho et al., 2018) recreational therapy (Saposnik, 2010) and allied professions (Mickan, 2017).

Table 2.
Diagnostic Protocol Format

Diagnostic grouping
Specific diagnosis
Identified problems
Defining characteristics
Related factors or etiologies
Process criteria
Outcome criteria

Note. Adapted from Ferguson, D. D. (1992). Problem identification and protocol usage in therapeutic recreation. In G. L. Hitzhusemn, L. T. Jackson, and M. A., Birdson (Eds.) Global therapeutic recreation. Columbia, MO: Curators University of Missouri.

Treatment Protocols
Treatment protocols describe how specific treatments are delivered (Stumbo & Peterson, 2004). These protocols offer guidelines for evidence-based interventions. Ferguson (1992) outlined the essential components needed for therapeutic recreation treatment protocols (see Table 1).

Diagnostic Protocols
Diagnostic protocols focus on a specific diagnosis or a cluster of problems related to a diagnosis (Stumbo & Perterson, 2004). Diagnostic protocols are important in reducing diagnostic errors by assisting health care professionals in the process of observing symptoms presented in a client and determining a specific diagnosis (Fink, Kamenski, & Konitzer, 2018). A suggested format for diagnostic protocols can be found in Table 2.

Protocols and Clinical Practice Guidelines
The terms protocols and clinical practice guidelines have been used interchangeably (Stumbo & Peterson, 2004). The Institute of Medicine of the National Academies produced a publication in 2011 that set the standard for defining and developing clinical practice guidelines. Clinical practice guidelines are intended to assist practitioners in making complex medical decisions based on the best scientific evidence (Institute of Medicine, 2011). Clinical practice guidelines are "statements that include recommendations intended to optimize patient care that is informed by a systematic review of evidence and an assessment of the benefits and harms

Table 3.
Results of a search for research on horticultural therapy and occupational therapy.

Search Engine	Search Terms	Profession	Results
Google Scholar	"systematic review","horticulture","horticultural therapy"	horticultural therapy	6
Google Scholar	"systematic review","occupational therapy"	occupational therapy	13
Google Scholar	"horticultural therapy"	horticultural therapy	745,000
Google Scholar	"occupational therapy"	occupational therapy	2,640,000
PubMed Central	"systematic review","horticultural therapy"	horticultural therapy	68
PubMed Central	"systematic review","occupational therapy"	occupational therapy	22,558
PubMed Central	"horticultural therapy"	horticultural therapy	624
PubMed Central	"occupational therapy"	Occupational therapy	65,573

of alternative care options" (Institute of Medicine, 2011, pg. 4).

This article will present one horticultural therapy protocol based on Stumbo & Peterson's (2004) definition. This definition does acknowledge the need for written protocols to use for evidence-based practice. The Institute of Medicine's definition included the addition of evidence from systematic reviews for a document to be considered a clinical practice guideline. The Clinical Practice Guidelines We Can Trust text sets up a method for developing clinical practice guidelines adaptable in horticultural therapy research (Institute of Medicine, 2001).

One of the current challenges with the development of clinical practice guidelines for horticultural therapy is the lack of rigorous research. It is well known and discussed throughout the profession that additional research is needed to further validate the impact of horticultural therapy on various populations (Haller & Malone, 2019; Soga, Gaston, & Yamaura, 2017). The lack of research also limits the presence of systematic reviews related to horticultural therapy in the literature. This further limits the creation of clinical practice guidelines for horticultural therapy.

Although this article is not a systematic review, a brief search for research and systematic reviews of horticultural therapy and occupational therapy was conducted to highlight the need for additional research. Google Scholar and PubMed Central were searched using specific terms to find systematic reviews and research related to horticultural therapy and occupational therapy (see Table 3). This brief review of research and systematic reviews related to horticultural therapy illustrates the need for more rigorous research on the impacts of horticultural therapy.

The remainder of this article will present a mobile horticultural therapy program protocol. Currently, there are limited peer-reviewed publications on horticultural therapy protocols. One is a protocol on a plant-cart horticultural therapy program (Malamud, 2015). The second one is a protocol for gardening activities in a nursing home setting (Fumagalli et al., 2016). The University of Tennessee Gardens added horticultural therapy and therapeutic horticulture programs to its education programing in 2012. Since that time the programs have continued to evolve, and we currently offer on-site programs and a mobile horticultural therapy/therapeutic horticulture program.

The difference whether a program is defined as horticultural therapy versus therapeutic horticulture depends on the needs of the organization and clients served. If the programs were developed as horticulture therapy, there would be clinically defined goals for clients that will be measured and documented. The therapeutic horticulture programs will have therapeutic

goals and objectives, but they will not necessarily be clinically defined (American Horticultural Therapy Association, 2017; Capra, Haller, & Kennedy, 2019).

Mobile Horticultural Therapy Program Protocol

Program Title: Mobile Horticultural Therapy Program

General Statement of Purpose: To bring horticultural therapy programming to facilities throughout the region. This program is designed to meet the needs of facilities and individuals who are not able to travel to the program facility. Populations for this type of program may include assisted living facilities, memory care facilities, special education programs in schools, day service programs for individuals with physical or intellectual disabilities, outpatient mental health programs, and other organizations that are unable to bring their clients to a horticultural therapy program at a public garden. Organizations may also not be able to bring clients to a public garden for programs based on transportation issues or scheduling constraints.

Description of the Program: One-hour sessions are conducted at memory care or assisted living facilities. A mobile horticultural therapy program brings programming to more facilities throughout a local area therefore making it accessible to many more clients.

Many facilities would not be able to bring their clients to a public garden or a specific horticultural therapy program site. Some reasons could be the cost of transportation, time to transport (which would reduce program length), and scheduling conflicts with other programming events at the facility.

Horticultural therapy has been shown to have many important benefits for residents in memory care and assisted living environments as well as many other populations. Horticultural therapy has been successfully used in prisons (Ascencio, 2018), mental health settings (Kenmochi, Kenmochi, & Hoshiyama, 2019) and schools (Baker, Waliczek, & Zaljicek, 2015). It has also been used as therapeutic treatment of PTSD including anxiety (Lorber, 2011), persons dealing with sexual assault (Watkins, Teh, & Fernandez, 2019), and many other situations where there is a need for socialization, decreased anxiety and/or stress, and increased motor functioning.

Horticultural therapy program activities can vary throughout the year depending on climate, growing seasons, available indoor and outdoor space, and interest of participants. Activities can at times be cyclical from garden planning and sowing seeds to watering, transplanting and harvesting. Activities during a growing season can provide opportunities for clients to build upon and practice skills. Horticultural therapists may also want to introduce new plants and activities during programs to keep the interest of clients.

Appropriate presenting of client problems that may be addressed: The mobile horticultural therapy program can be developed to meet needs of a variety of populations. These needs will be utilized to create specific horticultural therapy goals and objectives which also meet the clinical goals of the client population. Horticultural therapy has been shown to help improve mood, reduce stress, increase fine and gross motor skills, increase socialization, increase self-esteem, and reduce effects of dementia (Cipriani, 2017; Haller & Capra, 2017; Hall et al., 2018; Han, 2018). Clients need to be able to follow directions to the best of their ability, and not pose a danger to oneself or others to be included in horticultural therapy programs.

Referral criteria: Clients referred to the mobile horticultural therapy program by health care staff at the facility the program is visiting. Clients must be non-violent. Clients with occasional behavioral issues may need assistance from health care facility staff. Aggressive clients may be asked to sit out of the program.

Assessment Information: A mini-assessment is conducted at the beginning of each session (see Appendix 1). This mini-assessment gives horticultural therapists a snapshot of each client and their orientation for the day. Questions during the assessment include asking the participant for their name and one or two additional questions related to the plant topic for the day. Clients who are unable to answer the mini-assessment questions may need additional prompting and assistance during the activity. Additional assessments may be conducted depending on facility needs, and population served.

Contraindicated criteria: Clients who are regularly aggressive and physically violent may pose a danger to oneself and others in the group and should not participate in the mobile horticultural therapy program. Other contraindications are clients with a lack of ability to physically perform a task, not being able to follow

simple instructions, too withdrawn, not able to get benefit from the session.

Horticultural Therapy intervention activities or techniques employed: Typical activities used for mobile horticultural therapy program may include the following: Sowing seeds, transplanting, propagation, garden crafts, harvesting vegetables, planting flowers, creating fairy gardens, flower arranging, forcing bulbs, and forcing flowering branches.

Techniques to be used include reminiscing, therapeutic use of self, mindfulness, social interaction, and metaphors.

Staff training/certification requirements: The horticultural therapy program must be managed by a registered horticultural therapist (HTR). Students and interns may be involved in the delivery of program sessions. Volunteers may also participate at times. All staff and volunteers must have passed a criminal background check and have participated in training led by an HTR. This training will focus on working with specific populations and program delivery, mini-assessments, program documentation, and safety.

Risk management considerations: Tools such as pruners must be managed by the horticultural therapy staff. Staff must determine who can use pruners and other sharp objects. Pruners will be counted before and after each session and documented in a count sheet.

Plants used are known to not be poisonous to humans or a danger to the clients. Clients are also monitored to make sure they do not ingest the potting mix or other materials in the activity.

Outcomes expected: The outcomes will vary by population and facility needs. General outcomes may include: improved cognitive abilities, following directions, increased mood, increased ability to focus on a task, reduced agitation and stress, improved physical abilities and fine motor skills, increased consumption of fresh vegetables, increased social abilities and communication which can increase integration into the community.

Program Evaluation: A group evaluation will be completed to document individual participation and ability to accomplish the objectives of each session. Individual evaluations and or progress notes will be documented as needed by each specific facility. The group evaluation format for our programs include a chart (see Appendix 2) where we list client's names and if they meet the objectives for the program sessions. This form has been developed and adapted from horticultural therapy documentation formats (Kreski, 2019; Sieradzki, 2017).

Additional program details:

Equipment: This is a list of regularly used equipment for a mobile horticultural therapy program. Additional equipment may be used depending on the specific activity for a session.

1.) Folding wagon - A folding wagon is utilized to carry soil, gloves, trowels, plants, potting trays, and other items into a facility. This folding wagon was purchased from Academy Sports & Outdoors. It sells between $39.99-49.00. The item number is #110319055.

2.) Garden trowels – Lightweight plastic trowels are used for digging, scooping soil, and planting. These trowels are easy for clients to pick up and manipulation. Non-metal trowels are ideal because there is less chance for a client to use to injure oneself or others. Trowels pictured in Figure 3 are Expert Gardener brand and were purchased from Walmart for $0.25. The item number is #555986760.

3.) Soil – A soil-less potting medium is utilized. We utilize a 3.8 cubic foot bale of Promix or Lamberts that is primarily composed of peat moss and pearlite. This potting medium is sterile. We do not use a potting medium that has mycorrhizae to reduce the chance of bacterial infections in clients. Discussions about soil and infection control are held before the beginning of the mobile horticultural therapy program. A soil or infection control protocol may be developed by a facility's infection control staff or horticultural therapist if indicated by facility staff. We purchase our potting medium from Knoxville Seed and Greenhouse Supply.

4.) Soil container – An 18-gallon Sterilite tote is used to carry soil into the facilities. The size we use fits sideways into the folding wagon. We purchased out totes from Walmart for $2.89. The item number is #565302502.

5.) Potting trays – We utilize three types of potting trays.

Tidy tray - $10 each, 24" L x 21.6" W x 7.8" H. These trays are good for keeping soil off the floor. They also help clients keep materials close to them. The size of these trays makes them heavy when carrying more than three at a time. Some tables at facilities are too small to fit these trays for each client or multiple clients at the same table. The manufacture name is Garland. We order our trays from Greenhouse Megastore. The item number is #CN-GAR-048.

Compact Tidy Tray - $9 each, 19" L x 19.5" W x 6" H. These trays are smaller and easier to maneuver for a mobile horticultural therapy program. They also can interlock for use on tables where clients are sitting across from each other. The manufacture name is Garland. We order our trays from Greenhouse Megastore. The item number is #CN-GAR-185G.

Rabbit dropping pan - $7.99, 24" x 24". These trays were purchased to use at facilities that had tables that were too small to interlock the Compact Tidy Trays. These trays work well and are light-weight. They also allow for more than one client to work together and can promote social interaction and cooperation. The manufacture name is Country Road. We purchased our trays from Rural King. The item number is #219190022.

Figure 1. A folding wagon loaded with program materials.

Figure 2. A folding wagon provides ease of transport.

Figure 3. A light-weight plastic trowel.

Figure 4. Large Tidy Tray.

Figure 5. Compact Tidy Tray.

Figure 6. A Rabbit Dropping pan can be used as a potting tray.

Figure 7. Various Garden Gloves.

Figure 8. A small broom can help clean up after a program.

Greenhouse Megastore also carries a square garden tray that could be used in place of the rabbit dropping pan. It is $9.95 and is item number #CN-GAR-045.

6.) Gloves – A variety of gloves can be utilized. Cotton gloves and rubber dipped gloves can be used however, due to working at multiple facilities, these gloves need to be washed after each use to avoid any spreading of viruses or bacteria. Vinyl (latex free) gloves can be used to reduce the need for washing but must be disposed of after each use. Some clients are nervous about using vinyl gloves over rings. Staff will need to work with clients who may have these concerns. The disposable vinyl gloves were purchased on Amazon for $32 for a case of 1,000. The model number is #GVP9-XL-1-Case. The cotton gloves are Blue Hawk brand and were purchased at Lowes.

7.) Disinfectant wipes – After each session the trays are wiped down to keep from spreading bacteria or virus between facilities or plants. We utilize Clorox brand wipes purchased from Amazon.

8.) Small broom and dustpan – A small broom with a dustpan can be used to clean up any spilled soil or plant materials at the end of a session. We utilize a Quickie Stand & Store Lobby Broom and Dustpan purchased from Walmart for $13.22. The item number is #553508248.

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BIOGRAPHY

Derrick R. Stowell is the University of Tennessee Gardens Education and Horticultural Therapy Program Administrator. Derrick is responsible for directing education programs and outreach for the UT Gardens, Knoxville location. He received his bachelor's degree from Maryville College with a double major in environmental studies and outdoor recreation. He has a master's degree in therapeutic recreation from the University of Tennessee. He spent five years directing the national camp program for the Amputee Coalition of America and was also their Annual Giving Manager.

Derrick has developed numerous programs for the UT Gardens including horticultural therapy programs. He is a Certified Therapeutic Recreation Specialist (CTRS) and became a registered Horticultural Therapist (HTR) in 2015. Derrick served on the Board of Directors for the American Horticultural Therapy Association (AHTA) from 2016-2018. He is currently a pursuing his PhD in Plant, Soil, and Environmental Science from the University of Tennessee and is focusing his studies on horticultural therapy.

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Author Guidelines

You are invited to submit manuscripts for consideration for publication in the Journal of Therapeutic Horticulture. Manuscripts may include research projects, case studies, program and services descriptions, therapeutic practice descriptions, therapeutic horticulture philosophies, therapeutic design project descriptions, relevant book reviews, and other related topics.

Manuscripts should be submitted to one of the following sections:

Research
Includes manuscripts of research reports and case studies that contain research components such as a research question, objective, literature review, data collection and analysis, and results and conclusion.

Practice Forum
Includes manuscripts describing horticultural therapy and related programs, case reports, teaching techniques and tools, and other related items.

Therapeutic Landscape and Garden Design
Includes manuscripts on the design, history, and/or theory of gardens and other landscapes as they relate to the field of horticultural therapy.

Issues in the Profession
Includes manuscripts on such topics as education and training, professional or organizational issues, legislative issues, or other related areas.

Horticultural Therapy and the Community
Includes manuscripts on the interaction of horticultural therapy issues and the community at large.

Upon Reflection
Includes thoughts on the more philosophical, reflective, and/or spiritual aspects of therapeutic horticulture.

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Manuscript submissions to the JTH should be sent as an e-mail attachment in Microsoft Word. Manuscripts must represent original material that has not been previously published or that is not under consideration for publication elsewhere. In addition, authors are required to submit an abstract of the manuscript and a brief biography. If the author does not have mastery of the English language, the manuscript must be professionally translated before being submitted.

Authors are asked to follow AHTA's published definitions when describing horticultural therapy and related programs in their manuscript, please include funding and conflict of interest statements. References should follow the author-date format. The authority for style is the Publication Manual of the American Psychological Association. For more information on style and formatting, please contact the editor-in-chief.

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