



4-2013

Therapeutic Horticulture in Depression and Mental Health

Jody Carlson

[How does access to this work benefit you? Let us know!](#)

Follow this and additional works at: <https://commons.und.edu/theses>

Recommended Citation

Carlson, Jody, "Therapeutic Horticulture in Depression and Mental Health" (2013). *Theses and Dissertations*. 5222.

<https://commons.und.edu/theses/5222>

This Independent Study is brought to you for free and open access by the Theses, Dissertations, and Senior Projects at UND Scholarly Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of UND Scholarly Commons. For more information, please contact und.common@library.und.edu.

Running head: HORTICULTURE IN DEPRESSION AND MENTALH EALTH

SP.COL.
GT2013
C2845

THERAPEUTIC HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

by

Jody A. Carlson

Associate of Science in Nursing, Northland Community and Technical College, 2007

An Independent Study

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Master of Science

Grand Forks, ND

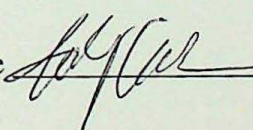
April

2013

PERMISSION

Title Therapeutic Horticulture in Depression and Mental Health
Department Nursing
Degree Master of Science

In presenting this independent study in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the College of Nursing of this University shall make it freely available for inspection. I further agree that permission for extensive copying or electronic access for scholarly purposes may be granted by the professor who supervised my independent study work or, in her absence, by the chairperson of the department or the dean of the Graduate School. It is understood that any copying or publication or other use of this independent study or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of North Dakota in any scholarly use which may be made of any material in my independent study.

Signature  _____

Date 4-24-13 _____

University of North Dakota Libraries

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

Abstract

The purpose of this review is to examine available evidence for the use of Therapeutic Horticulture (TH) as a supplemental treatment of depression. For this paper, TH is defined as active or passive use of plants to achieve wellness (Sempik, Aldridge, & Becker, 2003) as applied to depression. A review of the available literature was performed using academic databases and the internet. Terms used in the search were horticultural therapy, depression, gardening, horticulture, and therapeutic horticulture. Few studies were devoted specifically to depression; applications for other mental health conditions are also discussed. Results support the use of TH as supplemental treatment for reducing depression symptoms. Further primary research to build the scientific evidence base is needed.

Keywords: horticultural therapy and depression, nature and depression, therapeutic horticulture and depression and mental health, gardening and depression

Therapeutic Horticulture in Depression and Mental Health

Introduction

Depression is a common, debilitating mental illness. As a disability, it rivals the impact of blindness or paraplegia, with the disease burden exceeding that of human immunodeficiency virus and all types of cancers combined (Murray & Lopez, 1996). Depression can end in the devastating outcome of suicide, which is the 10th leading cause of death in Americans (Centers for Disease Control and Prevention, 2012).

Medication therapy as a stand-alone treatment of depression has shortcomings. Antidepressants have a slow onset of beneficial action and may bring intolerable side effects. Patients often do not take their antidepressant medications as prescribed (Akincigil, et al., 2007; Muzina, et al., 2011; Olfson, Marcus, Tedeschi, & Wan, 2006), and medication may not be effective for mild or sub-threshold depressive symptoms (Fournier, et al., 2010).

The goal in the treatment of depression is full remission of symptoms (Stahl, 2008, p. 512). However, adequate trials of medication and psychotherapy fail in 10-30% of people treated for depression (Fava, et al., 2003). Finally, "medication cannot change relationships, beliefs, and behavior; only emotional and interpersonal learning can do this," (Wheeler, 2008, p. 46). The social benefits of therapeutic horticulture (TH) have been noted in studies from the United Kingdom; these will be described.

The purpose of this independent study paper is to investigate the potential of TH as an augmentative strategy for holistically treating depressed individuals. Use of TH has been documented for more than 200 years (Sempik, Aldridge, & Becker, 2003). This paper will describe a review of the available evidence to discern the possible impact of engaging in TH for depression and other mental health conditions. The findings were disseminated to the author's academic cohort via power point presentation (see appendix) followed by a discussion.

Horticultural therapy and Therapeutic Horticulture

Horticultural therapy (HT) is a relatively new profession in the United States. Haller & Kramer (2006) provide the following definition:

Horticultural therapy is a professionally conducted client-centered treatment modality that utilizes horticulture activities to meet specific therapeutic or rehabilitative goals of its participants. The focus is to maximize social, cognitive, physical, and/or psychological functioning and/or to enhance general health and wellness. (p. 5)

Therapeutic horticulture (TH) by comparison is broadly described as the active or passive use of plants to achieve wellness (Sempik, Aldridge, & Becker, 2003). Western European countries have been using TH and HT for some time. Sir Richard Thompson, President of the Royal College of Physicians in England, recommends prescribing TH for mental illness in view of its holistic patient benefits, limitations of short appointment times, and economic concerns (Thrive, 2013 a).

History

Marcus & Barnes (1999) provide a history of therapeutic gardens. The first mental hospital in York, England, *The Retreat*, was a revolutionary change from imprisonment of the mentally ill. It was designed with gardens, unobstructed views, trees, and access to the outdoors. The recommended space was one acre for every four psychiatric patients and south-facing land. *Moral treatment* of the time, which included providing routine, re-socialization, and structured activities, was thought to allow the patient to recover their personal resources. This included garden work and walks.

Dr. Benjamin Rush was the first American psychiatrist and the first Western provider to acknowledge the benefits of TH in psychiatric patients (Simson & Straus, 1998). From the mid-18th to early 19th century, TH was used in the inpatient psychiatric hospital in the form of extensive grounds keeping, vegetable gardening, and access to outdoor spaces. Patient population eventually outgrew available space. Subsequently, less thought was given to the outdoor aesthetics of hospitals (Marcus & Barnes, 1999). With the 20th century came advances in psychotropic medication and de-institutionalization of psychiatric patients. TH is still used in psychiatric hospitals today (S. Whaley, personal communication, January 23rd, 2013).

TH advanced as a treatment modality via its use with veterans in the World Wars (Haller & Kramer, 2006). In 1920, truck gardens staffed with Red Cross volunteers visited Veterans' hospitals after World War I (Marcus & Barnes, 1999). Garden club volunteers worked with veterans after World War II; the wounded gained strength and occupational skills. Educational offerings increased and TH as a profession grew (Haller & Kramer, 2006).

Behavioral Activation Treatment

The behavioral approach to depression treatment is based on the idea that symptoms persist with reinforcement, such as avoidance of activity and interaction with others. Positive behavior will yield a corresponding boost in mood (Jacobson, Martell, & Dimidjian, 2001). Those who treat depression are challenged. Symptoms of severely depressed mood, anhedonia, and avolition are not conducive to positive behaviors. Therapists utilize behavioral activation treatment to assist clients to slowly move away from stagnation and/or isolation by changing one's behavior rather than to prolong behavior change until after one's mood improves (Spates, Pagoto, & Kalata, 2006). Participating in a TH group is a positive behavior setting in the 2010 experiment on depression (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold).

Environmental Psychology: Evolution and Attention

Human response to stimuli such as plants and views of our surroundings is explored in environmental psychology research. Studies evaluating participants' environmental preferences revealed that views of natural scenes were favored over human built features; specifically trees, foliage, and water. In addition, *mystery* suggests there is new and useful knowledge to be gained by moving further into the setting (Kaplan, 1987). Kaplan (1987) suggests the vantage points, habitats conducive to species survival and mystery are quickly and subconsciously ascertained as aesthetically pleasing, a preference which "comes to look like an expression of an intuitive guide to behavior, an inclination to make choices that would lead the individual away from inappropriate environments and toward desirable ones," (pp. 14-15, 25).

The Attention Restoration Theory (ART) is an environmental psychology theory derived from the work of early psychologist William James (Kaplan, 1995). It divides attention into two types: directed (voluntary) and undirected (involuntary). Directed attention is used for intense concentration and is finite; undirected attention is thought to relax the mind and allow directed attention's restoration. Being in nature creates *fascination* and *being away*, which "frees one from mental activity that requires directed attention support to keep going." (Kaplan, 1995, p. 173). Kaplan (1995) reasons that directed attention fatigue is protective from an evolutionary standpoint; that humans evolved to be easily distracted by environmental stimuli. Gonzalez, Hartig, Patil, Martinsen, & Kirkevold (2009) apply ART to their primary research to determine the relationship between attention restoration in TH and depression symptoms improvements.

Search Methods

A thorough review of the available literature was conducted. Searches terms included *horticultural therapy and depression, horticultural therapy, therapeutic horticulture* and

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

gardening for depression. CINAHL, PubMed, Google Scholar, SciVerse, Psychiatry Online, *The Journal of Environmental Psychology* and *The Journal of Therapeutic Horticulture* 1986-2009 table of contents document were searched. Reference lists for relevant articles and books were also searched.

The search yielded approximately 1,300 results, the majority of which were Google links to sites without academic validity. Extant literature contained literature reviews on therapeutic horticulture for a variety of conditions, but not depression. The 18 selected articles were generally prospective cohort studies, in the English language, and published in 2002 or later. All of the studies specific to depression are included; other articles addressed changes in depressed mood in a variety of other mental health conditions. Finally, evidence illustrating the value of TH in other diagnoses frequently seen in practice, such as chronic pain and attention deficit is presented.

Results

There were six prospective cohort studies specific to TH as an intervention for depression. Additional articles addressed depressed mood in schizophrenia and dementia. Others included participants with varying mental health diagnoses grouped together. Finally, use in other mental health applications is addressed as well.

Depression

An experiment by Gonzalez, Hartig, Patil, Martinsen, & Kirkevold (2009) measured changes in depression severity and attentional capacity in multiple points of a horticultural therapy program. A total of 18 participants were recruited via newspaper advertisement and practitioner referral. Participants had Beck Depression Inventory (BDI) scores ≥ 15 and diagnoses of "major depression, dysthymia, or depressive phase of bipolar II disorder," (p. 316).

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

Exclusion criteria were having gardening as a personal leisure activity, uncontrolled addiction in the past six months, inpatient hospitalization during the study period, and diagnoses of borderline personality disorder, schizophrenia, post-traumatic stress disorder or eating disorder. Most participants were attending psychotherapy at the time of the program

There was no control group due to a shortage of participants and short growing season in the study area. Potential participants did not want to enter a control group. The intervention included active and passive components, such as planting, garden maintenance, viewing the scene, and bird-watching. Participants worked alone and in groups on urban farms, meeting in three-hour sessions, twice weekly for 12 weeks (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2009).

Standardized measurement tools, the BDI and Attentional Function Index (AFI), were administered at baseline, weeks four and eight (during), week 12 (immediately after) and three months after the study's end. *Fascination* and *being away* experiences related to the program were measured at weeks four, eight, and 12 using the Perceived Restorativeness Scale (PRS). Average baseline BDI was 28.4, indicating moderate depression according to that instrument (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2009).

Results showed that 72% of participants had a clinically relevant change in BDI score of ≥ 6 points; the mean decrease was 9.7 from pre to posttest ($p < .001$). Scores remained clinically lowered at the 3-month check for 16 participants. Mean AFI score increase was 10.2 points, $p = .06$; higher levels of AFI were associated with greater decreases in the BDI score. After three months, AFI returned to baseline. Gonzalez, Hartig, Patil, Martinsen, & Kirkevold (2009) posit that *fascination* and *being away* during TH restores directed attention and allows disengagement from negative thought patterns in depression.

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

In the follow-up study, a sample of 28 people recruited via newspapers and the Norwegian welfare/labor administration (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2010). This study measured AFI and PRS, as well as brooding. Here, brooding is to have one's conscious taken up by negative thoughts of self. Inclusion & exclusion criteria, intervention type, and measurement points were unchanged from the 2009 method.

BDI scores decreased significantly by four to five points, being clinically relevant for 50% of participants and remained decreased at the three-month follow-up. Depression improvement was mediated by higher AFI, *being away* and *fascination*. It is interesting to note, "the greater the increase in perceived attentional capacity, the greater the decline in depression severity," (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2010, p. 2008). Improvements in attentional capacity did not remain at the three month follow up, providing some support for the intervention in the absence of a control group. Rumination also decreased significantly. Unexpectedly, decreased brooding was not associated with AFI or mediated by *being away* and *fascination*.

Gonzalez, Hartig, Patil, Martinsen & Kirkevold (2011) performed an analysis of their TH projects under the context of existential issues: thoughts, feelings and regard for experiencing life. The directional hypothesis tested was that depressed people can derive life meaning from the garden. Measurement tools included the Life Regard Index; the Sense of Coherence Scale which assess life fulfillment, manageability and meaning; and four items rated with five-point scales. Themes of participant benefits were engrossment, interest, and meaning in TH activities. The majority answered positively to questions of changed life view and a sense of caring for nature attributed to TH. Contrary to qualitative themes, quantitative measurements did not

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

indicate significant improvement in existential issues, but those changes that did occur correlated with similar changes in depression scores.

The authors published measurements of several mental health variables in the depressed TH participants (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2011). Group cohesiveness was measured with Therapeutic Factors Inventory Cohesiveness Scale items and correlated positively but not significantly with improvements in mental health variables. Beck Depression Inventory improvements primarily occurred during the first four weeks of both projects and remained at three-month follow up. Participants experienced significantly greater positive affect and decreased anxiety and stress as measured by the Perceived Stress Scale, Positive and Negative Affect Scale, and State-Trait Anxiety Inventory-State Subscale. These changes did not remain significant at follow up. Social interaction was important to 93% of participants; nearly a third of them remained more socially active at the three-month follow up. Considering social gains and qualitative themes of universality (sharing commonality), authors suggest future use of social components in TH for depression.

Alston (2010) measured reduction in depression symptoms for 13 adult participants in a horticultural therapy (HT) group project. Participants had major depressive disorder; the intervention integrated horticultural activities into an existing depression management psychoeducation group program. The HT activities of personalizing a pot and caring for a plant were combined with depression education for eight weekly sessions. Participants discussed recovery, coping strategies, and reactions to HT. For example, "class discussion on feelings regarding caretaking and the role caretaking has in the participant's current symptoms of depression and recovery," (Alston, 2010, p. 32).

A modified *Beck like* inventory was used to measure changes in 50 areas of symptoms. Results indicated significant improvement in overall mood and sleep patterns, while morning mood showed some worsening. The group took place in the afternoon, and participants experienced worsening morning mood. Future studies should include a control group for comparison and address recurrent depression (Alston, 2010). Alston notes lack of demonstrated validity of the scale, which is one weakness of this study. Qualitative measurement would have helped to elucidate therapeutic components.

McCaffrey (2007) performed a study of 60 older adults (mean age=75) with professional or self-diagnosed depression that ranged from mild to moderate. Randomly assigned interventions were: group one, solitary garden walks; group two, garden walks with guided imagery; group three, art therapy with no garden component. Sessions occurred twice weekly for a duration of six weeks.

Post intervention focus groups (McCaffrey, 2007) revealed reflections reminiscent of Erikson's Ego Integrity versus Despair developmental stage:

I learned a lot about myself in the garden. The walk gave me time to think about my life (the good and the bad) and to come to terms with who I am and how I lived my life. I had not done this before and am so grateful to have had this opportunity. (p. 82)

Those who completed the intervention as a group described other effects; "It was so wonderful to meet all of these new people. We have shared so much about our lives. It helps me to see that I am not alone in the way I feel about things," (p. 82). Geriatric Depression Scale results are found in the introduction to the follow-up article; scores decreased nearly equally for all three groups ($t=8.56$, $SD=5.56$, $P=.004$; analysis of variance $f=1.97$, $P=.152$), significantly for 38 participants (McCaffrey, Hanson, & McCaffrey, 2010, p. 253).

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

McCaffrey, Hanson, & McCaffrey (2010) report on geriatric depression and TH under nursing theorist Roger's Science of Unitary Human Beings framework. According to this theory, depression is a shared pattern of energy interaction between people and their environment. McCaffrey, Hanson, & McCaffrey proposed the intervention of garden walking and reflective journaling could change the patterned energy field patterns of depression. For the study, 40 participants over age 65 completed 12 different garden walks using a written guide and journal. They stopped at six points to read a themed reflective paragraph (themes included possibility, connection, joy, awareness, freedom, forgiveness and gratitude), then write in a journal. For example, a reflection on connections at a bridge over water reads:

Sometimes connections in our lives go over elements that are not easy to maneuver. Are there people with whom you connect that are not easy to be with? How can those connections be strengthened? How can you preserve your sense of self in these connections? (McCaffrey, Hanson, & McCaffrey, 2010, p. 254)

Another stop calls for awareness:

Notice the unending nature of the circle. Thoreau said, "let us not look back in anger or forward in fear, but around in awareness," Put all else away for another time. Be aware of the beauty of the earth and water around you, and the sense that you belong here, at this time, for this purpose. (McCaffrey, Hanson, & McCaffrey, 2010, p. 254)

In Hermeneutic interviews and journals, prominent themes were: being forced to get away from daily pressure, beauty in nature, insight gained from using the written guide, and "gratitude for the beauty of nature and the life I have led," (McCaffrey, Hanson, & McCaffrey, 2010, p. 257). As one participant stated:

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

I am so pleased that I was able to get away and do these walks. I was able to do some much needed soul searching. Even when I was not in the mood, the gardens gave me a sense of peace. (McCaffrey, Hanson, & McCaffrey, 2010, p. 256)

On improved mood and thankfulness, another said, "This was a gift. No matter how I felt when I started, I always left with joy," (p. 256). Another participant expresses insight and hope, "The overwhelming beauty and peacefulness of the garden gave me a new approach to old troubles. I hope this will carry me forward in my life," (p. 257). Geriatric Depression Scale scores improved significantly ($t=12.54$, $P=.001$) after the intervention. Use of descriptive interview in conjunction with the scale measurement helps illustrate the meaning and promise of the intervention for depression in older adults.

Rappe and Kivela (2005) examined the effects of garden visits on long-term care residents in Finland. Using the Zung self-rating scale, 12 of the 30 total subjects rated themselves as depressed. Authors measured residents' frequency of visits – visits here meaning actively being in the garden or passively viewing from a balcony- and assessed the effects of the visits and the importance of various elements of the gardens. They found that most (70%) of residents described barriers to visiting the garden and would have attended more frequently if provided with more help to get to the garden. Health problems were not usually cited as obstacles, but physical conditions of the garden and its paths were. Garden attendance was not affected by reported obstacles, however.

Residents who believed the garden visits improved their sleep attended more frequently (Rappe & Kivela, 2005). In the depressed residents, 91.7% reported improved mood, and most experienced less pain. In addition to better sleep, most had improved concentration and balance, as well as less pain. Interestingly, many viewed the visits as a burden. There was no reported

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

difference in medications used. Improvements were largely attributed to being able to get outside and calm down. For depressed residents, fresh air and exercise were more important than seeing and interacting with other people. Authors suggest this may be due to low self esteem associated with depression.

Depressed Mood in Dementia

Kang et al. (2010) performed a quasi-experimental study that included non-equivalent control and experimental groups of 18 and 20 convenience sample participants. Inclusion criteria included Korean Mini-Mental State Examination scores of 23 or less and age 65 or older as well as ability to understand the measurement questions. The primary diagnosis was dementia, but depression scale measurements were evaluated. Exclusion criteria were sensory impairments, participation in other such studies, psychiatric drug treatment, and other mental diseases. The intervention group received 18 sessions of programmed therapy, including music, art, exercise, cognitive activity and horticulture therapy (HT). The HT consisted 30-minute activities of planting Kalanchoe, visiting a Buddhist temple and an arboretum. Median Geriatric Depression Scale scores decreased significantly but actually increased in the control group (Kang, et al., 2010, p. 48). While the intervention was not exclusively HT, it appears to be a useful component in this program.

Depressed Mood in Schizophrenia

A study in China implemented a single-blinded, randomized, controlled trial of 24 convenience-sampled participants with varying mental illnesses; 83% had schizophrenia disorders (Kam & Siu, 2010). The randomly assigned control group received the usual sheltered workshop training. The HT group received 10 days of 1-hour sessions. HT sessions included learning basic horticultural knowledge and skills, sharing experience and coping, and promoting social interactions and support. Sessions were structured by themes and ended in group

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

discussion. Qualitative data collected in semi-structured interview revealed positive effects. Participants reported decreased work stress, relaxing and enjoying the natural environment. They expressed gaining social skills and respect, increased confidence and benefit of new occupational skills, but feeling tired and fatigued.

Rating scale results indicated significant improvements in depressed mood, anxiety, and stress, but not work behavior and quality of life compared to the control group. Participants described spiritual benefits and work motivation in interview; authors suggest this is due to the short duration of the intervention (Kam & Siu, 2010). Utilization of a control group makes this study exceptionally valuable in HT/mental health research.

Depression and Disabilities

Wilson (2012) examines the relationship between outdoor recreational activities and depression in people with disabilities using the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a Centers for Disease Control and Prevention health phone survey conducted annually. First, data collected from the Montana BRFSS compared participation in outdoor recreation with depression incidence and severity. Depression here was defined as a PHQ-8 scale score ≥ 10 . People with disabilities were more likely to be depressed and less likely to participate in outdoor recreation, but there was a negative correlation between outdoor recreation and depression incidence and severity. Second, data from the BRFSS in Utah indicates current gardeners are less depressed than non gardeners. Wilson suggests causal investigation is warranted in light of the relationship between depression and disability.

Mental Health

Therapeutic horticulture in the United Kingdom

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

Sempik, Aldridge, & Becker (2003) performed a literature review the benefits of TH and analyzed 300 of the 1000 articles they found. Their results indicate evidence for improved “self esteem, self confidence and social interaction” in people with mental illness and learning difficulties (Aldridge & Sempik, 2002, p. 2), but studies were lacking in the scientific rigor needed to support TH in treatment of various conditions. As follow-up, authors conducted a nationwide review of Social & Therapeutic Horticulture (STH) programs in the United Kingdom (Sempik, Aldridge, & Becker, 2005). It was approved by multiple ethics committees as the TH programs are a collaboration of public health agencies and the Thrive charity. Thrive is currently involved with about 700 TH clients annually (Thrive, 2013 b). This study would determine implications for health and social care policy.

Clients served have experienced: learning difficulties, substance abuse, unemployment, and mental health problems, as well as elderly and minority status. Modifiable interview questions were used to allow for the different response/communication capacities and styles of the participants. Initial questions were of health, well-being, & aspects of social inclusion. To overcome communication barriers, participants took photographs to add observational data. Participants photographed each other and their activities, then narrative information was elicited about the photographs to illustrate the “capacity of vulnerable respondents rather than their incapacity,” (Sempik, Aldridge, & Becker, 2005, p. 15). They were asked which photo was their favorite and why.

Typically, clients were referred by mental healthcare providers, social workers, or via word-of-mouth; only four were recruited via advertisement efforts. Of 137 participants aged 18-78 included in the study, 49 had *mental health problems*; ten of them self-reported a depression diagnosis. Other diagnoses represented were schizophrenia, anxiety, psychosis, bipolar

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

depression, and post-traumatic stress disorder. The average intervention consisted of 5.5 hour sessions, ≥ 3 times weekly, for duration of 3.1 years. Programs were usually funded by the central government, health trusts, social services, local authorities, and project commercial activities. Projects were: gardening activities, employment skills training, arts and crafts, contracted landscaping and maintenance, construction, and commercial enterprise (Sempik, Aldridge, & Becker, 2005).

Themes from Sempik, Aldridge, & Becker's (2005) findings included feeling useful as a caregiver, fascination with the plant life cycle and eating the final product, a sense of identity with being able to call oneself 'a gardener,' and a sense of control over occupation and food consumption. These and other effects are relative to mental health: learning tolerance of making mistakes, lessons learned from neglect and having something to look forward to in checking the progress of the plants. There was a sense of ownership, attachment, & peace. Social participation was explored as a theme; TH projects were often the only social interaction participants had or took opportunity to engage in. Most clients affirmed the projects helped them make new friends. The project organizers point out that in some settings, participants are working within their communities, alongside and among the general population.

Reports indicate that 81% of participants felt their health had improved; 34.1% experienced a decrease in their symptoms or negative feelings. For example, a participant stated:

Before I came here... I was severely depressed and suicidal. I saw a psychologist and said that I need to do something, because being sat at home with all this nonsense going on in my mind isn't healthy. So I did, I eventually came here. So, it takes me out of myself, it's a distraction from what I, the things that are troubling me, although it never solves anything, even the stuff that's going on in your mind, you never really solve it, but

it's a distraction. You see, when I get home in the evenings, and weekends, it's the same stuff going on in my head. But now, when I get home, I can also think about things I've done at [the project] or any problems that have come up here, and it's a distraction. I plan what I'm going to do the next day, look forward to it. I always look forward to coming. (Sempik, Aldridge, & Becker, 2005, p. 87)

Additionally, case history describes 'Geoff,' who has schizophrenia. Geoff developed increased participation over time and became motivated to prepare his own produce to eat. Authors point out the difficulty and significance of improving motivation in schizophrenia, and attribute it to the positive influence of small group/team work (Sempik, Aldridge, & Becker, 2005). Project organizers report that TH helps clients with auditory hallucinations:

...clients have actually said to me, it's one of the few activities they do, where they're able to do this, they can do other activities... and they find it difficult for their, the voices to stop interfering with their thoughts. With horticulture, it's, they're enjoying it so much and it's so concentrating on what they're doing that they find that the voice problem sort of goes in the background. (p. 87)

The projects are often the only active interests the participants have. Additional findings were themes of improved self-esteem: 94% learned new skills in general, and 84% reported improved self confidence (Sempik, Aldridge, & Becker, 2005). Participants attributed their confidence to positive reinforcement they received from staff, opportunities for creative expression, and the "confidence gained through the acquisition of skills and knowledge," (p. 99).

One client describes his satisfaction in a mushroom-cultivating project:

I come in and water the floors and do the temperature at the weekend, so you see it right from the start right till you're picking, so it's your own product, what you've grown from

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

the start six weeks previous, sort of thing, what you're picking, and then, you know, see the fruits of your labour, sort of thing. (p. 80)

Colin even started growing mushrooms at home. Among the participants, 54% reported improved interpersonal relationships, often due to having "something to talk about," (p. 98). The participants' favorite photograph content was of people, plants, and tools.

Mental Health Rehabilitation

Barley, Robinson, & Sikorski (2012) provide experiences of participants in a Social and Therapeutic Horticulture project of the UK called Sydenham Garden. Funding of the research was from the UK Lottery Fund and charitable trusts. Researchers used semi-structured interviews to assess 16 'coworkers' with depression (8); bipolar disorder (2); and mixed anxiety and depression (1), among other disorders. The coworkers grow and sell herbs, flowers and vegetables; the garden group is attended twice weekly in sessions of 2.5-3 hours. There is an art group as well. Attendance duration ranged from six weeks to four years. Most coworkers chose to join:

I knew, suffering from the depression the way I do, I needed structure in my week.

Because, to me, structure is very important in managing my manic depression. And I love gardening, I love nature and wildlife, so it was an ideal project to get involved with.

(p. e129).

Interviews revealed coworkers found "a sense of acceptance;" "something to do, to look forward to in your mind," and enjoyment of learning (p. e129).

There are excerpts addressing specific aspects of depression: "All three of us weren't feeling very well, but we all stayed for the session and we got on and we did stuff, and we were all feeling a bit brighter at the end of it;" and:

If I hadn't come here, I just would have stayed in bed... To be able to come along and engage in some activities – that can help to get you out of it, sort of focus on something else rather than one sitting at home just being able to see what your problems are.

(Barley, Robinson, & Sikorski, 2012, p. e129)

Social interaction was repeatedly cited in the interviews as coworkers' favorite aspect of the program, but Social Functioning Scale scores point to poor overall social functioning in the group.

Two people effected significant life changes, such as abstaining from alcohol and benzodiazepines:

I would avoid drinking on the nights before the project. But now, I've knocked it on the head completely and that has made a difference, because the depressive episodes that I do still get ... are a lot less severe. (Barley, Robinson, & Sikorski, 2012, p. e130)

Other prominent themes were ownership, being outdoors, and learning skills that transfer to other life areas. Sense of ownership was minimized by some coworkers, possibly with low self-esteem; many coworkers had initial anxiety and were accompanied, at first, by healthcare workers. It is significant that benefits were attributed to social and gardening aspects of the program- coworkers said they had difficulty achieving the same effect in home gardens and were unlikely to visit the nature preserve due to lack of work and people there.

Stepney and Davis (2008) conducted a mixed-method, quasi-experimental study of 10 ~~ten~~ volunteer participants in a supported TH project. Participants had many different mental health diagnoses. Employability indicators such as confidence, attendance and attitude were strengthened. Participants' symptoms of depression and anxiety were decreased by over 25%; social fear increased in four people, significantly in one person.

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

Qualitative interviews revealed feelings of acceptance, confidence, safety, and accomplishment. For example, having a "reason for getting up and showered, I'm much less moody than I was... I feel I'm playing my part," (Stepney & Davis, 2008, p. 386). A participant with schizophrenia and autism increased his social contacts by interacting with the group. Other mental benefits described were, "when I'm doing something I forget about my problems... it keeps your mind occupied and it helped me to sleep," and "activity helps you to concentrate," (p. 387). Participants attributed positive effects to fresh air, exercise, teamwork, and being outside.

Outpatient Mental Health Care

Rappe, Koivunen & Korpela (2008) present a study of ten mental health outpatients, each working with volunteer support persons. The group met at a rented garden plot weekly over the summer to grow flowers and vegetables, with access outside the weekly meetings as well. Discussion and inquiries of specific health diagnoses were avoided to maximize normalcy. Some activities included dividing perennials, gathering seeds, weeding, and watering.

Participants kept journals and completed questionnaires about the impact of the activity on health. They benefitted from outdoor exercise, meaningful work, social interaction, and sensory experiences of the garden. Some illustrative quotes include "Chatting with others was nice and brought relief to my agony," and "It is fine to do something useful in a pleasant environment," (Rappe, Koivunen, & Korpela, 2008, p. 279). There were improvements in mood, concentration, and sleep. Finally, participants experienced joy and relaxation, and said, "Picking flowers made me glad. I could watch them at home for many days and the colours please me," and "The gardening is refreshing me and I believe it will promote my health," (p. 281). Authors found that participants with verbal and written expression difficulties may have benefited from a different assessment tool. Patients and volunteers alike gained positively from the intervention.

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

All participants except one had previous horticultural experience, which could be a useful variable to note in further research.

Chronic pain

A controlled, study in a Switzerland rehabilitation clinic measured a significant improvement in patients' chronic back/fibromyalgia pain, 'mental health,' and anxiety with horticultural therapy (HT) added to treatment (Verra, et al., 2012). Authors cite the biopsychosocial approach as possible rationale for HT. Control (N=42) and HT (37) groups were divided based on order of referral. Both groups were in a four-week pain management program; the HT group received seven group HT sessions of one hour duration each. Measurements taken at baseline and discharge included functional performance tests, Medical Outcome Study Short Form-36, West Haven-Yale Multidimensional Pain Inventory, coping strategies questionnaire, and the Hospital Anxiety and Depression Scale. The HT group had significantly larger effect size in improvements in all measures than the control group. Weaknesses include lack of randomization, chronological separation between groups and inability to rule out regression toward the mean in the pre and post intervention comparison (Verra, et al., 2012).

Pediatric Psychiatry

The article "Psychiatrists Sow Seeds of Good Mental Health," (2007) appears in *Psychiatric News* illustrating the TH practice of child psychiatrist Bella Schimmel, M.D., Ph.D. She stated, "Everything a youngster does in a garden—eye-hand coordination, following directions, smelling, tasting—enlarges their experience and helps them across the board," (p. 14). Dr. Schimmel brings TH materials for children to examine, grow, draw, and talk about. The

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

children gain motor skills, exercise, nutrition education, self-esteem, and a sense of responsibility.

Nature and Attention-Deficit/Hyperactivity Disorder

Kuo & Taylor (2004) present a summary of evidence supporting the positive effect of nature on children with professionally diagnosed attention-deficit/hyperactivity disorder. Typical after-school and weekend activities in *greener* settings reduced symptoms for children from many settings and backgrounds. A controlled experiment showed that 20-minute walks in nature improved cognitive performance in relation to the 'greenness' of the setting, testing and comparing each child to his or herself. For both these studies, even children who already lived in rural settings benefited. Finally, a nationwide sample of 452 parents numerically rated their children's symptoms in mostly green or mostly built settings. Activities in green settings were rated with reduced symptoms compared to matched non-green activities in boys, girls, younger & older children from urban/rural settings in different regions across a range of income levels. Further research is needed in this exciting area.

Richard Louv asserts that nature-based interventions for 'Nature Deficit Disorder' will help us heal depression, attention deficit disorder, obesity and our environment. He presents two valuable bodies of evidence and discussion in bestsellers *Last Child in the Woods* (2008) and *The Nature Principle* (2012), under the premise, "Nature-deficit disorder describes the human costs of alienation from nature, among them, diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses," (2008, p. 36). Louv points out the impact of our diminished contact with natural environments. For the first time the majority of people live in urban areas than not; children are less active and engage in little outside play. It would be helpful for healthcare providers- especially those serving children- to be aware of this concept when holistically assessing and treating their patients.

Stress

In a 2010 study, 30 average, healthy gardeners on allotment plots performed stress-inducing Stroop tests, then engaged in 30 minutes of reading (N=16) or gardening (N=14) (Van Den Berg & Custers, 2010). Mood deteriorated for the reading group but recovered for the garden group as evidenced by the Positive and Negative Affect Schedule tool. Biological stress marker cortisol was measured in saliva before and after the intervention. Cortisol levels decreased for both readers and gardeners but the decrease was greater for the gardeners. Study strengths are random assignment, homogenous groups and uniquely higher quality design. The singular and possibly aversive nature of the control activity, reading, was regarded as a weakness.

Stress in the Elderly

Detweiler et al. (2012) present a review of the available evidence supporting therapeutic gardening in the elderly. They describe biological changes in the brain occurring with aging which can negatively impact stress response and cognition, especially for elderly people who are stressed or depressed. The evidence would suggest support use of TH for dementia, agitation, pain, and stress modulation in the elderly.

Mood and Heart Rate in Cardiopulmonary Rehabilitation

Patients in an inpatient cardiopulmonary rehabilitation program were assigned to horticulture therapy (HT), N=59, or a control patient education class (PEC), N=48 (Wichrowski, Whiteson, Haas, Mola, & Rey, 2005). The HT group participated in tours in the garden and greenhouse, followed by a plant care activity. The PEC group had an interactive lecture on a health-related topic. Both interventions were single, one-time episodes of 60 minutes duration. Changes in Profile of Mood States total mood disturbance (TMD) scores and pulse oximetry

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

heart rate were compared between the groups. Baseline measurements were comparable. The HT group experienced significantly reduced TMD and decreased heart rates, while the control group did not have significant changes. Authors suggest applicability for stress reduction in cardiac rehabilitation patients.

Discussion

Limitations and Implications for Future Research

Scientific studies specific to TH and depression were scarce. Original research articles included here were generally published in the last 10 years and written in English. Older but relevant references were cited in the theory section. Most studies did not have a control group. Many of the authors did not address official diagnostic criteria for depression, which is a crucial component of mental health research. While the body of evidence discussed here lacks stringent inclusion criteria and statistical analysis, it describes a wide range of potentially useful areas for intervention and further research.

Therapeutic horticulture as an intervention has limitations. In the UK garden projects, one participant suffered a fall; one man with schizophrenia developed a negative personality change, becoming rather aggressive (Sempik, Aldridge, & Becker, 2005). Individual motivation is a variable; previously motivated participants can struggle during the interventions (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2011). On the other hand, even the reluctant participant can grow to enjoy TH (Barley, Robinson, & Sikorski, 2012):

I wasn't 100% over happy about doing it. I felt like I was a bit obliged to do it, so I'm not happy about being obliged to do it, but as I done it, I've grown to like it a little bit. (p. e129)

Some gardens hold negative distractions. Marcus & Barnes (1995) provide evidence of incongruent stimulus perceived as stressful- such as mechanical sounds, traffic, voices, smoking, and sunlight without access to shade. These should be considered when designing settings for TH programs. In British culture there is greater interest in gardening; Americans might not see TH as aggressive enough for use in mental health care (Marcus & Barnes, 1999).

The current research presented here borrows from established theoretical frameworks, but TH as a mental health intervention is promising and new theoretical frameworks could be developed. Future studies would optimally utilize randomization and control group designs. There were often discrepancies between the quantitative and qualitative results; combining standardized measurement tools with qualitative measures strengthens validity and clarifies active components. Gonzalez, Hartig, Patil, Martinsen, & Kirkevold (2011) suggest multiple measurement points; double baselines; follow up measurement; randomization and control design, and including group/social components (with opportunities to work alone) in TH programs for depression. There may be some value in conducting and documenting studies of specific diagnoses. Variables worthy of consideration in future depression research include duration, frequency, and type of intervention; participants' previous horticulture experience; attention issues; symptom variation; cost effectiveness; and social benefits.

Conclusion

The evidence suggests that augmenting established treatments with TH can be effective in improving depression symptoms. In reviewing the literature, the author has found the studies converge with these claims for the benefits of TH:

- assisting development of feelings of autonomy and accomplishment;
- opportunity for a learning and social interaction;

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

- attention restoration and other mental health applications;
- distraction from the negative cognition of depression.

Study participants often cited social enhancement, a sense of accomplishment, and being outdoors as reasons for their progress toward wellness. Further primary research is needed to generate a quality evidence base. Finally, theoretical frameworks specific to the horticultural therapy profession are not discussed or used in these studies; it may be helpful for mental health and horticultural therapy professionals to create and disseminate a collaborative framework.

References

- Akincigil, A., Bowblis, J. R., Levin, C., Walkup, J. T., S., J., & Crystal, S. (2007). Adherence to antidepressant treatment among privately insured patients diagnosed with depression. *Medical Care, 45*(4), 363-369. doi:10.1097/01.mlr.0000254574.23418.f6
- Aldridge, J., & Sempik, J. (2002). *Social and therapeutic horticulture: Evidence and messages from the research*. Retrieved January 21, 2013, from Publications - Evidence Papers:
<http://www.lboro.ac.uk/research/ccfr/Publications/Evidence6.pdf>
- Alston, L. (2010). *The effectiveness of horticultural therapy groups on adults with a diagnosis of depression*. Retrieved February 22, 2013, from Digital Commons @Brockport, Counselor Education Master's Theses:
http://digitalcommons.brockport.edu/cgi/viewcontent.cgi?article=1000&context=edc_theses
- Barley, E., Robinson, S., & Sikorski, J. (2012). Primary-care based participatory rehabilitation: Users' views of a horticultural and arts project. *British Journal of General Practice, 62*(595), e127-e134. doi:10.3399/bjgp12X625193
- Centers for Disease Control and Prevention. (2012). *Leading causes of death*. Retrieved from FastStats:
<http://www.cdc.gov/nchs/fastats/lcod.htm>
- Detweiler, M. B., Sharma, T., Detweiler, J. G., Murphy, P. F., Lane, S., Carman, J., . . . Kim, K. Y. (2012). What is the evidence to support the use of therapeutic gardens for the elderly? *Psychiatry Investigation, 9*(2), 100-110. doi:10.4306/pi.2012.9.2.100.
- Fava, M., Rush, A. J., Nierenberg, A. A., Thase, M. E., Sackeim, H. A., Quitkin, F. M., . . . Kupfer, D. J. (2003). Background and rationale for the Sequenced Treatment Alternatives to Relieve Depression (STAR*D) study. *Psychiatric Clinics of North America, 26*(2), 457-494. doi:10.1016/S0193-953X%2802%2900107-7

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

- Fournier, J. C., DeRubeis, R. J., Dimidjian, S., Amsterdam, J. D., Shelton, R. C., & Fawcett, J. (2010). Antidepressant drug effects and depression severity: A patient-level meta-analysis. *The Journal of the American Medical Association*, *303*(1), 47-53. doi:10.1001/jama.2009.1943.
- Gonzalez, Hartig, T., Patil, G. G., Martinsen, E. W., & Kirkevold, M. (2009). Therapeutic horticulture in clinical depression: A prospective study. *Research and Theory for Nursing Practice: An International Journal*, *23*(4), 312-328. doi:10.1891/1541-6577.23.4.312
- Gonzalez, Hartig, T., Patil, G. G., Martinsen, E. W., & Kirkevold, M. (2010). Therapeutic horticulture in clinical depression: A prospective study of active components. *Journal of Advanced Nursing*, *66*(9), 2002-2013. doi:10.1111/j.1365-2648.2010.05383.x
- Gonzalez, Hartig, T., Patil, G., Martinsen, E., & Kirkevold, M. (2011). A prospective study of group cohesiveness in therapeutic horticulture for clinical depression. *International Journal of Mental Health Nursing*, *20*, 119-129. doi:10.1111/j.1447-0349.2010.00689.x
- Gonzalez, M. T., Hartig, T., Patil, G. G., Martinsen, E. W., & Kirkevold, M. (2009). Therapeutic horticulture in clinical depression: A prospective study. *Research and Theory for Nursing Practice: An International Journal*, *23*(4), 312-328. doi:10.1891/1541-6577.23.4.312
- Gonzalez, M. T., Hartig, T., Patil, G. G., Martinsen, E. W., & Kirkevold, M. (2011). A prospective study of existential issues in therapeutic horticulture for clinical depression. *Issues in Mental Health Nursing*, *32*(1), 73-81. doi:10.3109/01612840.2010.528168
- Haller, R. L., & Kramer, C. L. (Eds.). (2006). *Horticultural Therapy Methods: Making Connections in Health Care, Human Service, and Community Programs*. Boca Raton, FL: CRC Press.
- Jacobson, N., Martell, C. R., & Dimidjian, S. (2001). Behavioral activation treatment for depression: Returning to contextual roots. *Clinical Psychology: Science and Practice*, *8*(3), 255-270. doi:10.1093/clipsy.8.3.255
- Kam, M. C., & Siu, A. M. (2010). Evaluation of a horticultural activity programme for persons with psychiatric illness. *Hong Kong Journal of Occupational Therapy*, *20*(2), 80-86. doi:10.1016/S1569-1861(11)70007-9

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

- Kang, H., Bae, Y., Kim, E., Lee, K., Chae, M., & Ju, R. (2010). An integrated dementia intervention for Korean older adults. *Journal of Psychosocial Nursing*, 48(12), 42-50. doi:10.3928/02793695-20100930-01
- Kaplan, S. (1987). Aesthetics, affect, and cognition: Environmental preference from an evolutionary perspective. *Environment and Behavior*, 19(1), 3-32.
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, 15(3), 169-182.
- Kuo, F., & Taylor, A. F. (2004). A potential natural treatment for attention-deficit/hyperactivity disorder: Evidence from a national study. *American Journal of Public Health*, 94(9), 1580-1586.
- Louv, R. (2008). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC: Algonquin Books.
- Louv, R. (2012). *The nature principle*. Chapel Hill, NC: Algonquin Books.
- Marcus, C. C., & Barnes, M. (1995). *Gardens in Healthcare Facilities: Uses, Therapeutic Benefits, & Design Recommendations*. Martinez, CA: The Center for Health Design.
- Marcus, C. C., & Barnes, M. (Eds.). (1999). *Healing Gardens: Therapeutic Benefits and Design Recommendations*. New York City, NY: John Wiley & Sons.
- McCaffrey. (2007). The effect of healing gardens and art therapy on older adults with mild to moderate depression. *Holistic Nursing Practice*, 21(2), 79-84.
- McCaffrey, R., Hanson, C., & McCaffrey, W. (2010). Garden walking for depression. *Holistic Nursing Practice*, 24(5), 252-259. doi:10.1097/HNP.0b013e3181f1acd7
- Murray, C. J., & Lopez, A. D. (1996). *The global burden of disease: A comprehensive assessment of mortality and disability from diseases, injury, and risk factors in 1990 and projected to 2020*. Cambridge, MA: Harvard University Press.
- Muzina, D. J., Malone, D. A., Bhandari, I., Lulic, R., Baudisch, R., & Keene, M. (2011). Rate of non-adherence prior to upward dose titration in previously stable antidepressant users. *Journal of Affective Disorders*, 130(1-2), 46-52. doi:10.1016/j.jad.2010.09.018

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

- Olfson, M., Marcus, S. C., Tedeschi, M., & Wan, G. J. (2006). Continuity of antidepressant treatment for adults with depression in the United States. *American Journal of Psychiatry*, *163*(1), 101-108. doi:10.1176/appi.ajp.163.1.101
- Psychiatrists sow seeds of good mental health. (2007). *Psychiatric News*, *42*(16), 14.
- Rappe, E., & Kivela, S. (2005). Effects of garden visits on long-term care residents as related to depression. *HortTechnology*, *15*(2), 298-303.
- Rappe, E., Koivunen, T., & Korpela, E. (2008). Group gardening in mental outpatient care. *Therapeutic Communities: International Journal of Therapeutic Communities*, *29*(3), 273-284.
- Sempik, J., Aldridge, J., & Becker, S. (2003). *Social and therapeutic horticulture: Evidence and messages from the research*. Reading, UK: Thrive and Center for Child and Family Research.
- Sempik, J., Aldridge, J., & Becker, S. (2005). *Health, well-being and social inclusion: Therapeutic horticulture in the UK*. Loughborough University & Thrive. Bristol: The Policy Press.
- Simson, S., & Straus, M. (Eds.). (1998). *Horticulture as Therapy: Principles and Practice*. Binghamton, NY: The Food Products Press.
- Soderback, I., Soderstrom, M., & Schalander, E. (2004). Horticultural therapy: the 'healing garden' and gardening in rehabilitation measures at Danderyd Hospital Rehabilitation Clinic, Sweden. *Pediatric Rehabilitation*, *7*(4), 245-260. doi:10.1080/13638490410001711416
- Spates, C. R., Pagoto, S., & Kalata, A. (2006). A qualitative and quantitative review of behavioral activation treatment of major depressive disorder. *The Behavior Analyst Today*, *7*(4), 508-521. Retrieved 1 20, 2013, from <http://www.baojournal.com/BAT%20Journal/VOL-7/BAT%207-4.PDF>
- Stahl, S. (2008). *Stahl's Essential Psychopharmacology: Neuroscientific Basis and Practical Applications* (3rd ed.). New York City, NY: Cambridge University Press.
- Stepney, P., & Davis, P. (2008). Mental health, social inclusion and the green agenda. *Social Work in Health Care*, *39*(3-4), 375-397. doi:10.1300/J010v39n03_10

HORTICULTURE IN DEPRESSION AND MENTAL HEALTH

- Thrive. (2013 b). *Thrive's gardens*. Retrieved January 23, 2013, from Thrive: Using gardening to change lives: <http://www.thrive.org.uk/thrives-gardens.aspx>
- Thrive. (2013). *News and updates*. Retrieved January 19, 2013, from Thrive: Using gardening to change lives: <http://www.thrive.org.uk/news/news/news-259.aspx>
- Van Den Berg, A., & Custers, M. (2010). Gardening promotes neuroendocrine and affective restoration from stress. *Journal of Health Psychology, 16*(1), 3-11. doi:10.1177/1359105310365577
- Verra, M. L., Angst, F., Beck, T., Lehmann, S., Brioschi, R., Schneiter, R., & Aeschlimann, A. (2012). Horticultural therapy for patients with chronic musculoskeletal pain: results of a pilot study. *Alternative Therapies in Health and Medicine, 18*(2), 44-50.
- Wheeler, K. (2008). *Psychotherapy for the Advanced Practice Psychiatric Nurse*. St. Louis, MO: Mosby Elsevier.
- Wichrowski, M., Whiteson, J., Haas, F., Mola, A., & Rey, M. (2005). Effects of horticultural therapy on mood and heart rate in patients participating in an inpatient cardiopulmonary rehabilitation program. *Journal of Cardiopulmonary Rehabilitation, 25*, 270-274.
- Wilson, J. F. (2012). The relationship of outdoor recreation and gardening with depression among individuals with disabilities. *All Graduate Theses and Dissertations, Paper 1311*. Retrieved January 22, 2013, from <http://digitalcommons.usu.edu/etd/1311>