DISSERTATION

# GIVING LANGUAGE TO HORTICULTURAL THERAPY: FRAMING HORTICULTURAL THERAPY THROUGH THE LENS OF EMPIRICALLY SUPPORTED THERAPIES

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In partial fulfillment of the requirements

for the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Summer 2020

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ABSTRACT

GIVING LANGUAGE TO HORTICULTURAL THERAPY: FRAMING HORTICULTURAL THERAPY THROUGH THE LENS OF EMPIRICALLY SUPPORTED THERAPIES

Horticultural therapy, a plant-based intervention for reaching client goals, is an under-researched yet promising treatment modality for psychiatric disorders. This study aimed to forge a connection between empirically supported therapies (ESTs) and horticultural therapy's interventions by describing how EST methods were used in horticultural therapy. A horticultural therapy proof-of-concept study incorporated behavioral, positive, and humanistic ESTs with youth with disabilities and at-risk youth. The largest positive impacts of the intervention were on clients' prevocational skills, social skills, and gardening skills. No change was detected on measures of mindfulness, resilience, nature relatedness, or strengths use. The impact on depression yielded mixed results, and a small worsening was seen in the self-report of anxiety, strengths use, and emotion regulation. This study demonstrated that horticultural therapy utilizes components of a variety of ESTs and its impact can be quantitatively evaluated.

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# INTRODUCTION

This paper provides background information on empirically supported therapies, horticultural therapy, and the field of ecopsychology. It then explores the use of horticultural therapy as a mental health intervention by discussing how psychological knowledge of common factors, the therapeutic relationship, and empirically supported therapies can be applied. This paper also includes a proof-of-concept study, whose purpose is to examine the overall effectiveness of a horticultural therapy intervention on several domains of functioning. This study is not intended to assess specific mechanisms of change, but rather to identify ones that may be impacting outcomes and can be studied in the future. Finally, conclusions and future directions will be discussed. Jordan (2015) states, "One of the weaknesses of the literature on nature-based therapies is the absence of a strong and coherent link to mainstream counseling and psychotherapy approaches." This study forges a link between the field of counseling psychology and horticultural therapy.

## Empirically Supported Therapies

Robust evidence exists for psychotherapy's benefit to clients, and the past thirty years have been characterized by a search for specificity. Knowing the efficacy of therapy in general, researchers now try to understand if there are specific treatments that work best for specific client problems (Chambless & Hollon, 1998). Chambless and Hollon (1998) began this conversation by defining empirically supported therapies as those which are efficacious at reducing specific symptoms, as determined by having two or more randomized controlled trials or well-controlled single case experiments conducted by two independent groups. This new viewpoint helped to identify and increase treatment

options, influenced policy and training, increased accountability, and established the legitimacy of therapy. However, the view overemphasized brief, manualized interventions that may not generalize to different settings and underemphasized common factors. The methods Chambless and Hollon (1998) proposed to identify empirically supported therapies reigned for over two decades and are still utilized in many high-profile resources (e.g., the website of the American Psychological Association's Division 12: Society of Clinical Psychology) as they work to transition to a newer model.

David and Montgomery (2011) critiqued Chambless and Hollon (1998), saying that research needs to go beyond outcomes and include theory. They added that contradictory evidence must be considered when assigning empirically supported therapy status. Tolin, McKay, Forman, Klonsky, and Thombs (2015) then created new empirically supported therapy guidelines. Tolin et al. (2015) stated that clinical significance (rather than statistical) and long-term efficacy should be examined, systematic reviews that include contradictory evidence should be used (in place of two randomized controlled trials), and treatments should work to increase quality of life in addition to reducing symptoms. They stated that research should be conducted across various settings and with diverse populations. Finally, Tolin et al. (2015) said that specific components of change must be identified, instead of assuming that all parts of the "packaged treatment" were equally effective. Tolin et al. (2015) speculated that practitioners would be able to use these new research findings to recommend a specific empirically supported therapy. Clinician's goals transitioned to becoming evidence-based practitioners by using the best research evidence (including empirically supported therapies), clinical expertise, and client characteristics to make treatment decisions.

Empirically supported therapies are important to research and implement to ensure that interventions are not steeped with pseudoscience and to increase the effectiveness of therapy. Without empirically supported therapies, psychotherapy may rely on common factors or elements that do not work as intended, making them ineffective or inefficient.

## Horticultural Therapy

**Definitions.** Horticultural therapy is a type of "ecotherapy," defined by the American Horticultural Therapy Association (AHTA) (2017) as "the engagement of a person in gardening-related activities, facilitated by a trained therapist, to achieve specific treatment goals." The AHTA requires that to be a horticultural therapist, one must have a bachelor's degree in horticultural therapy or the equivalent (a bachelor's degree plus four horticultural therapy courses, four psychology courses, four horticulture courses, and a supervised internship). While the national governing body for horticultural therapy maintains this broad definition, the literature contains debate as to what practices should belong within horticultural therapy and how the field should distinguish itself from other similar practices.

Other sources have proposed increasingly specific definitions. Haller and Capra (2017) elaborated that horticultural therapy is "client-centered" and used to meet "therapeutic or rehabilitative goals." Relf (2012) offered additional specificity by stating that the client must have a diagnosis and the horticultural activities must focus on nurturing a living plant. Finally, Son, Jung, Lee, and Park (2016) added that horticultural therapy is a "complementary medicine" which rehabilitates the "social, emotional, psychological, physical, and cognitive ability of the clients," and scientifically assesses the outcomes.

In this study, the definition of the AHTA will be used, as it outlines the most essential, agreed upon components (i.e., a trained therapist, horticulture activities, and a client with treatment goals) while not narrowing the field too greatly by including a requirement of a diagnosis or research. It seems unlikely that clients can only benefit if they have a specific diagnosis rather than a general or undiagnosed concern, as research on specific therapies suggests that mechanisms of psychopathology (not only specific diagnoses) can be a target of treatment (Tolin et al., 2015). Similarly, while research is essential to the field, a horticultural therapist who does not conduct research is still a horticultural therapist, much as a mental health counselor is still a counselor without conducting analyses on client outcomes.

Agreeing upon a definition is important if horticultural therapy is to be accepted as a treatment modality and progress as a field (Relf, 2012; Son et al., 2012). Similar fields, which debuted after World War II, such as music therapy, recreational therapy, and art therapy, have become established professions while horticultural therapy remains an emerging profession. This may be due to the lack of a clear definition and universal standards for practice, insufficient research evidence, and little collaboration between practitioners and researchers (Shoemaker & Diehl, 2012). With a clear and common definition of horticultural therapy, researchers can conduct research, tailor interventions, develop manualized treatments, form guidelines for best practices, and become an established field.

**History.** Horticultural therapy has deep historical roots with records dating back to ancient Egypt when court physicians prescribed walks through the gardens for royalty suffering from mental illness (Simson & Straus, 1997). Since then, it has increased in

popularity and scope. Horticultural therapy emerged in the United States when improvement was seen in individuals working in psychiatric hospital farms in the 1790's. In 1817, Friends Hospital initiated the first of many gardening programs for people with mental illness, and in the mid-1900's, horticultural therapy expanded throughout the fields such as occupational therapy, vocational training, and physical therapy (Simson & Straus, 1997). In 1973, the American Horticultural Therapy Association was formed (albeit under a different name), which resulted in related conferences, professional registration, and the expansion of bachelor's and master's degrees in horticultural therapy (Shoemaker & Diehl, 2012).

**Horticultural therapy's applications.** Horticultural therapy groups occur in a variety of settings such as schools, prisons, hospitals, retirement homes, community gardens, and mental health units. Horticultural therapy is more commonly conducted in a group setting but can be implemented with individuals as well (Haller & Capra, 2017). Park et al. (2016) examined 509 published papers, theses, and dissertations in English or Korean to further illuminate the use of horticultural therapy. They found that 92.5% of the articles were published by South Korean researchers and only 5.5% were published within the United States. That only 8.3% of these articles were written in English indicates a wealth of knowledge that is inaccessible to many horticultural therapists. While the research needs to be replicated in United States-based samples to ensure cross-cultural applicability, these studies could provide guidance to what the field may offer. Park et al. (2016) identified horticultural therapy groups as occurring at varying rates depending on the clients' ages: 11.8% preschoolers, 26.1% children, 14.5% adolescents, 22.8% adults, 16.9% elders, and 7.9% mixed age groups, with the foci of the groups varying by ages. The

majority of preschoolers and children were in "general" groups, whereas adolescents were often in general groups or developmental disorder groups. Adults' participation spread across general, developmental disorder, and mental illness groups. Finally, elders participated most in general or dementia-focused groups. Most interventions spanned 11-20 sessions and session durations were 1-2 hours, except for preschoolers who had groups lasting less than one hour. Group sizes were 10 or less when the clients had a diagnosed disease or disorder, but they were larger when working with students (Park et al., 2016).

## Ecopsychology

Ecopsychology is the field in which horticultural therapy is situated and has inspired an abundance of research surrounding the impact of humans' connection with nature. Wohldmann (2016), a cognitive psychologist, asks the questions at the heart of ecopsychology: "Why does it feel so good to lie on the beach, to sit in the sand or under the shade of a tree, or to stand barefoot in California native grass?" Ecopsychology examines the interdependent relationship between humans and the rest of nature, explores the implications for identity and well-being (American Psychological Association, 2018), and places humans within their ecological context (Fisher, 2013). Sussman (2014) recognized the breadth of the field of ecopsychology and proposed five basic tenets and values of ecopsychology: the quality of humans' contact and relationship with nature is declining, humans have a deep, reciprocal bond with nature, social systems contributing to natural destruction must be examined and altered, social justice and sustainability are essential commitments, and contact with nature contributes to human well-being.

**Quality of contact and relationship with nature is declining.** Fisher (2013) stated that the field of ecopsychology is largely a Western necessity, as many other cultures

continue to live in harmony with the land. In his book *Last Child in the Woods*, Louv (2008) noted that the United States is in its third frontier, a period characterized by disconnect. He described the first frontier as one of exploration, discovery, and survival; the second as celebration and preservation; and the third as urbanization and decreased contact with nature.

Explanations for why much of humankind has separated from the natural world abound. Louv (2008) postulated that nature play has been criminalized. He named examples such as building codes that have evolved to disallow tree houses, natural area preservation sites which prohibit off-trail exploration, and increased technology use, all of which have decreased the time people spend in nature. In a study of nearly 12,000 people in the United States, themes of not having enough time, money, or social support, nature-less built environments, increased technology use, and the ability to secure a livelihood without going outside were cited as reasons people spent less time outside (Kellert et al., 2017). Over half of the people studied by Kellert et al. (2017) endorsed associating nature with danger. These dangers include cancer-causing sunlight (Louv, 2008), dangerous animals (Kellert et al., 2017), and disease-spreading bugs (Kellert et al., 2017; Louv, 2008). This perceived danger increases the amount of time people spend indoors and furthers the disconnect between humans and the rest of the natural world.

**Humans have a deep, reciprocal bond with nature.** Psychology's roots rest in examining intrapersonal processes, then the field expanded to include interpersonal and social processes, and now it must move into the next phase of incorporating ecological processes (Fisher, 2013). In the study by Kellert et al. (2017), most people reported feeling a profound sense of loss over their decreasing connection to nature, and they equated

losing connection with nature as synonymous to losing connection to one another. Researchers and practitioners within ecopsychology emphasize that human beings' separateness from the natural world is an illusion, as is the idea that humans can sever ties to nature without enduring significant health impacts.

**Social systems contributing to nature decline must be examined and altered.**

Over half of United States adults spend five or less hours outside each week (Kellert et al., 2017). Contributing to this disconnect are the built environment, cultural shifts, and the Dominant Social Paradigm (described below). Residential and business facilities are quickly replacing trees and nature, and these buildings rarely promote interaction with the outside world (Kellert et al., 2017). Aumann, Heschong, Wright, and Peet (2004) found that classroom window characteristics (e.g., location, amount of light, view) accounted for more variance in student test scores than attendance, number of students in the school, or number of computers. Despite evidence such as this, the book *Cubed* (Saval, 2014) reports that sixty percent of Americans work in windowless cubicles, with windowed offices belonging to managers. Similarly, schools are decreasing recess time, furthering children's separation from nature.

Cultural shifts were described by participants in Kellert et al. (2017). They explained that due to the easy accessibility of food, people do not need to spend time outside growing or gathering food. Similarly, they shared that cultural expectations of where it is appropriate to spend time have shifted. They noted that presently it is acceptable to spend a day entirely indoors, but it is not acceptable to allow children to play outside for stretches of unsupervised time.

The Dominant Social Paradigm is a predominating worldview in the United States (Amel & Manning, 2012), although the New Ecological Paradigm is being promoted and met with increasing acceptance (Dunlap & Van Liere, 2008). Worldviews provide people with an experientially and socially-based lens through which to understand the world around them (Amel & Manning, 2012; Dunlap & Van Liere, 2008). The Dominant Social Paradigm considers humans as dominant over all other living organisms, able to use planetary resources as they see fit, and capable of solving problems with innovation and technology. Conversely, the New Ecological Paradigm recognizes humans as only one of Earth's interdependent species, that nature has limits, and that nature is a complex balancing act (Amel & Manning, 2012; Dunlap & Van Liere, 2008). People's interaction with nature is impacted by the worldview they hold.

**Social justice and sustainability are essential commitments.** Environmental justice's premise is that no community should experience more environmental burdens and less environmental benefits than any other (Carter, 2006). However, the United States' racial minority groups and low-income populations are disproportionately living near power plants and waste facilities and have little access to green spaces. Those living within one kilometer of hazardous waste facilities are comprised of 47.7% people of color, while those living over five kilometers away are only 22.2% people of color (Bullard, Mohai, Saha, & Wright, 2007). As a result, health disparities abound: one of four south Bronx children are diagnosed with asthma due to their exposure to exhaust from waste-hauling trucks and nearby factories (Carter, 2006). Unsurprisingly, racial minorities report that feeling unsafe outside is an important barrier to their interests in nature (Kellert et al., 2017).

Psychological processes and ecological events mirror and impact each other. Fisher (2013) stated that issues cannot be categorized as either human or environmental, as they are interconnected, and that mistreating nature and mistreating humans are both transgressions of the natural world. As John Rodman (as cited in Fisher, 2013) stated, "The same basic principles are manifested […] in clear-cutting a forest and bombing a city […] liquidating a religious or racial group, and exterminating a species of flora or fauna." The attitudes, beliefs, and behaviors that cause environmental destruction are the same attitudes, beliefs, and behaviors that cause human destruction.

**Contact with nature contributes to human well-being.** As cultures have distanced from nature, research has become necessary in order to understand the consequences. Louv (2008) coined the term "Nature Deficit Disorder" as a means of describing the cost of alienation from nature. "Symptoms" include "diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses." Louv (2008) emphasized that research must examine the effects of being separated from nature as well as being immersed in nature. These effects can broadly be categorized into physical, psychological, social, vocational, and spiritual domains.

**Physical benefits.** Physical benefits from exposure to nature include improved mobility, quicker post-surgery recovery, an activated parasympathetic nervous system, physical activity, muscle strengthening (Park et al., 2016), lowered heart rate, lowered blood pressure, improved eating habits (Wise, 2015), increased serotonin levels, a restored digestive microbiome, and reduced digestive tract inflammation (Brogan, 2015). These last three benefits derive from direct interaction with the beneficial microbes within the soil and have been linked to decreased mental illnesses such as depression (Brogan, 2015).

Wood (2013), founder of Wildfitness, described the notion of purposeful physical activity, such as activity used to connect with nature or with others, to master one's body, or to express oneself, rather than simply to lose weight. She emphasized more natural, "wild" movements, rather than the restricted repetitive ones often see when exercising, as essential to physical health. Many of these physical health benefits link to increased mental health. For example, parasympathetic nervous system activation is important to managing anxiety and post-traumatic stress. Increased physical activity has a wealth of mental and emotional benefits, including decreased depression. Several meta-analyses found exercise to have equivalent effectiveness to therapy and antidepressant medications (Daley, 2008).

***Psychological benefits.*** Psychological benefits from exposure to nature include decreased depression (Clatworthy et al., 2013; Korpela, Stengard, & Jussila,, 2016; Gonzalez et al., 2010), stress, anxiety (Park et al., 2016), and brooding (Gonzalez et al., 2010), and increased attention, perceived being away, fascination (Gonzalez et al., 2010), cognitive functioning, emotional intelligence, happiness, self-esteem, patience, life satisfaction, self-confidence, self-expression, fun, accomplishment of goals (Park et al., 2016), connection,, and compassion (Wohldmann, 2016). Psychotherapies often target any number of these psychological domains, indicating that horticultural therapy may have overlapping benefits.

***Social benefits.*** Social benefits of time in nature include increased sociability, collaboration, interpersonal navigation strategies, social skills, interpersonal relationships, social support, peer stature (Park et al., 2016), social inclusion, teamwork, cooperativeness, and communication skills (Wise, 2015). Building social skills and relationships is likely to improve mental health. Perceived social support buffers the impact of stress on distress,

anxiety, and depression (Cohen, 2004). By fulfilling one's role expectations, individuals gain a sense of identity, purpose, meaning, belonging, and self-worth. Interacting with others has been linked to increased emotional regulation (Cohen, 2004). These positive impacts of strong social ties parallel the benefits that psychotherapy works to create within clients. Horticultural therapy may offer further benefits, as studies have found that children who spend more time outside have more friendships (Louv, 2008).

***Vocational and educational benefits.*** Vocational and educational benefits of time in nature include increased income from selling produce or saving on food costs, improved prevocational skills (Haller & Capra, 2017), improved environmental attitude, scientific attitude, exploration ability, and academic motivation (Park et al., 2016). Fostering these abilities and this knowledge may help clients who are impacted by social hardships such as poverty, as it could increase their employability or access to nutritious food.

***Spiritual benefits*.** Spiritual benefits from time in nature include experiencing meaning, purpose (Haller & Capra, 2017; Kellert et al., 2017), a deep emotional connection, mindfulness, reflection on one's place in the cycle of life, and a method of expressing communion with a higher being (Wise, 2015). Three-quarters of United States adults agreed that nature has helped them connect with something greater than themselves (Kellert et al., 2017). Psychotherapies, including cognitive-behavioral therapy, when accommodating client's religious beliefs and practices, have been as successful in treating depression and anxiety as secular therapies (Moreira-Almeida et al., 2006). This indicates that horticultural therapy's incorporation of spirituality may hold similar benefits. Spirituality and religiousness have been linked to well-being at equivalent levels to social support and income, indicating that these beliefs are important to integrate. Religiousness

and spirituality are linked to increased hope, optimism, meaning, purpose, social support, and internal locus of control. They are also linked to decreased depressive symptoms, drug use, and suicidal thoughts, attempts, and completions (Moreira-Almeida et al., 2006). These benefits and reduced symptomology again parallel those sought in traditional psychotherapy.

## Theoretical Basis of Nature's Impact on Human Psychological Functioning

The positive effects of interacting with nature currently have several theoretical bases. These span from cultural and learning-based explanations, to biological preparedness, arousal theories, and evolutionary theories (Ulrich et al., 1991). The most popular explanations include the Biophilia Hypothesis, Attention Restoration Theory, and the Stress Recovery Theory.

**The biophilia hypothesis.** The biophilia hypothesis is an idea proposed by Edward Wilson in his book *Biophilia Hypothesis* (1984). It is holistic in nature and rooted in humanism (Son et al., 2012). The biophilia hypothesis focuses on "the innately emotional affiliation of human beings to other living organisms," (Kellert & Wilson, 1993). Humans are deemed genetically wired to love and seek connection to other life forms, be they humans, animals, or plants. Because genetics do not change as quickly as technology, predispositions for certain learning preferences, needs, and emotional reactions do not map well onto modern life (Kellert & Wilson, 1993). It is necessary to develop this biological inclination through learning and behavior for it to translate into nature-oriented behaviors (Kellert et al., 2017). By engaging in practices such as horticultural therapy to reconnect with life (Haller, Kennedy, & Capra, 2019), people begin to feel empathy, experience catharsis, and further engage in activities that benefit them holistically (Son et al., 2012).

**Attention Restoration Theory.** Attention Restoration Theory (ART) is a cognitive theory. ART states that attention has two parts, effortful (or directed; voluntary) and effortless (involuntary) attention. It assumes that using effortless attention allows effortful attention to replenish (Berman et al., 2008). When effortful attention capacity is depleted, it is difficult to focus on important activities and inhibit distractions. Depletion occurs when attention decays due to factors such as boredom, multi-tasking, and/or anxiety (Berto, 2005). Once depleted, effortful attention fatigue occurs and must be replenished via effortless attention within a restorative environment (Holden & Mercer, 2014).

Restorative environments are defined as being distinct from the typical environment, being extensive enough to maintain distinctness, being enjoyable, and creating fascination (Rider & Bodner, 2016). Nature, experienced first-hand or via photographs, has been found to be a restorative environment, whereas city (Berto, 2005) and geometric images (Berman et al., 2008) did not replenish attention. Further, Gonzalez et al. (2010) found that "being away" and "fascination," two components of restorative environments, increased when participants were in nature. Park et al. (2016) more generally noted that humans recognize nature without needing sophisticated thinking, so contact with nature may relieve mental fatigue. Notably, these cognitive benefits can be observed in those with declining cognitive capacities, such as people with dementia. Whear et al. (2014) captures the reasoning behind this, stating, "In green environments, no demanding cognitive appraisals are needed to understand how to act successfully. The environment is easy to interpret even with a diminishing cognitive capability, because it provides abundant information and cues about time, place and purpose, helping

orientation toward reality." Exposure to nature restores cognitive abilities by engaging effortless attention.

**Stress Recovery Theory.** Stress Recovery Theory (SRT) centers around the holistic impacts of, and recovery from, stress. Experiencing stress involves cognitive appraisal, emotional responses, behavioral coping, and physiological arousal. These experiences are tiring on the body and, when prolonged, have negative impacts on physical and psychological health (Ulrich et al., 1991). Stress Recovery Theory posits that when humans are exposed to an unthreatening nature scene, they experience immediate and unconscious restorative responses, resulting within minutes in many positive changes in psychological and physical functioning such as positive emotions, cognitive restoration, and reduced physiological arousal (Ulrich et al., 1991).

## Researching Ecopsychology

Fisher (2013) highlights ecopsychology's departure from what he describes as "environmental psychology," a similar field using traditional scientific methods to study specific environmental factors and their impact on human well-being. Fisher (2013) argues that ecopsychology needs to include more qualitative and poetic approaches in order to truly capture the essence of the field's topics. Even Kaplan and Kaplan (1996), creators of one of the leading cognitive theoretical bases for nature-based therapies, say "it is hard to justify the role that nature plays in rational terms." The result of this narrow research approach is that psychology cannot see the forest for the trees; the field becomes involved in specific tasks such as understanding how to use rewards to increase pro-environmental behaviors, rather than exploring questions that push the limits of current research methods, such as what it means to be in an environmental crisis, what it means to

be a human being on a living earth, and what our relationship with the earth consists of (Fisher, 2013). Wood (2013) clarifies, "Science isn't necessarily wrong, but it can never fully map out the full richness of reality."

In order to better understand the impact of interacting with nature, research, in a variety of forms, must be increased. Without additional research, discourses surrounding ecopsychology will decline, as will the ability to engage in discussions. Louv (2008) noted that children now know less nature-related vocabulary than children of the past, and he expressed concern that people cannot value what they cannot name. Fisher (2013) illuminated the challenge faced by the field, "[Ecopsychologists] are burdened with the task of finding a language capable of honestly illuminating their ecologically and psychologically informed accounts of what truly and finally matters, while at the same time being respectable or legitimate before a public audience." Walking the line between depicting authentic experiences and maintaining research-laden language is a necessity in order to capture both the full scope of ecopsychology and to further legitimize the field. This study and its focus on horticultural therapy, an ecopsychologically-based therapeutic intervention, is significant in that its intention is to increase the language surrounding horticultural therapy practices. Jordan (2015) identified the lack of connection between mainstream therapy and nature-based therapies as a key weakness of the field. This study aims to create a link between the fields of counseling psychology and horticultural therapy.

**The Call to Research Horticultural Therapy**

As an emerging field, horticultural therapy has centuries of anecdotal support, but lacks sufficient empirical support (Haller & Capra, 2017). Conducting research is essential to determining the effectiveness of horticultural therapy interventions (Kamioka et al.,

2014). Relf (2012) stated that horticultural therapy research must focus on testing theories, applying information, reaching a consensus on what horticultural therapy is, and identifying relevant models. He posed this research will advance the field, increase its legitimacy, increase job opportunities, and expand AHTA membership. The preponderance of graduate students conducting a large portion of the United States-based horticultural therapy research was critiqued by Relf (2012). This emphasizes that professionals within the field must conduct consistent, quality research. Similarly, it implies that graduate students should continue their horticultural therapy research upon entering the field.

Current research quality within the field of horticultural therapy in the United States is poor. Almost none of the research conducted is rigorous or meets evidence-based standards (Relf, 2012). Sempik et al. (2003) reviewed twelve mental health and horticultural therapy articles, finding that most relied on clinician's observations, none used validated measures, and there were no controlled trials or pre/post tests. Clatworthy et al. (2013) examined ten articles (eight of which were horticultural therapy) and noted that papers needed to describe the intervention, describe who worked with the clients, identify a theoretical basis and measure it, identify other treatments being conducted, and report the statistical power. Kamioka et al. (2014) identified four randomized controlled trials and rated them on use of randomization, assignment, group similarity at baseline, use of blinding, similarity of co-interventions, compliance levels, drop-out rate descriptions, outcome assessment timing, and analyses used. They found overall quality scores of criteria explained or implemented satisfactorily were 27%, 27%, 55% and 73%. Because of the poor methodology and reporting, potential benefits of horticultural therapy could not be demonstrated (Kamioka et al., 2014).

There are many suggestions as to how to improve the research being conducted. Kamioka et al. (2014) suggest that interventions need to be more homogenous so that they can be comparable and that outcome measures should be designed and used consistently. They also suggested using randomized controlled trials, proper design, proper analysis, and clearly explaining the process. They recommend following the Consolidated Standards of Reporting Trials (CONSORT) to do so, which is an evidence-based, minimum set of recommendations for reporting randomized controlled trials. It is similarly important to outline specific hypotheses instead of only stating post hoc whether the intervention helped (Relf, 2012).

Overall, the emphatic recommendation of Simson and Straus (1997) is still relevant today: "The need to have available data on the efficacy of psychiatric treatment [via horticultural therapy] has never been more urgent." This call to research has been echoed for decades, and answers are still needed.` For further details, Relf (2012) offered a list of potential research topics and suggested how horticultural therapists can integrate research. Conducting proper research will help to identify whether the treatment's effects are due to the specific modalities, common factors, or confounding factors (e.g., passage of time) (Chambless & Hollon, 1998).

## The Need to Further Investigate Horticultural Therapy as a Mental Health Intervention

**Holistic benefits.** Horticultural therapy is a treatment worth further exploration as it incorporates many benefits found in traditional psychotherapy (described in detail below) and also adds many dimensions that extend beyond the scope of typical psychotherapy. Im, Son, and Kam (as cited in Son et al., 2016) conducted a meta-analysis of 547 dissertations and unpublished articles on horticultural therapy and found four areas

affected by horticultural therapy: physical, social, psychological/emotional, and cognitive. Horticultural therapy also results in improved prevocational (e.g., time management), horticulture-based vocational (e.g., soil amendments), and academic skills (e.g., plant parts) (Haller & Capra, 2017). Horticultural therapy provides a holistic understanding of people and their functioning and recontextualizes them within their natural environment (Gibson, 2012). Simply being in or near nature has benefits, and horticultural therapy capitalizes on that. Taking a holistic approach also makes horticultural therapy more time- and cost-efficient, as mental illnesses such as schizophrenia require people to seek several types of domain-specific treatment in order to see whole-person improvements (Patterson & Leeuwenkamp, 2008). Horticultural therapy often involves physical exercise, which can decrease depressive symptoms at a level equivalent to therapy and antidepressant medication. Depression is linked to an increase in physical disease, yet traditional psychotherapy and medication interventions do not directly improve cardiovascular health, weight management, fatigue, and cognitive function like exercise does (Daley, 2008).

**Cross-cultural applications.** Horticultural therapy also offers a potential bridge for psychotherapy to move into cultures where talk therapy is inappropriate or harmful. An International Medical Corps mental health advisor explained, "It's a very foreign concept in many countries to sit down with a stranger and talk about your most intimate problems" (cited in Leach, 2015). A Rwandan was paraphrased by the author of *The Noonday Demon*, describing what talk therapy lacked, "Their practice did not involve being outside in the sun where you begin to feel better. There was no music or drumming to get your blood flowing again. There was no sense that everyone had taken the day off so that the entire

community could come together to try to lift you up and bring you back to joy. Instead they would take people one at a time into these dingy little rooms and have them sit around for an hour or so and talk about bad things that had happened to them. We had to ask them to leave" (cited in Leach, 2015). While it is premature to claim that horticultural therapy is appropriate in cultures where talk therapy is not, it does seem worthy of consideration and further exploration. Clients are often kept in groups instead of spending time alone with a stranger, activities often increase physical activity and heart rate, and whenever weather permits groups meet outside. Jordan (2015) explains that simply moving psychotherapy outside can make clients more comfortable.

**Activity-based benefits.** Horticultural therapy is an activity-based therapy, as it centers on the use of plants and work in gardens. Haller and Capra (2017) cite Hagedorn's five foci for the "applied use of activities" and describe how each is incorporated into horticultural therapy. These foci are arguably unique to activity-based interventions, as activities lend themselves to a structure that creates the conditions necessary for each. They include a focus on the product, focus on the process, competent performance, interaction with others, and interaction with the environment. Haller and Capra (2017) state that focusing on the product, such as the end-of-season harvest, an arranged bouquet, or a planted pot, provides meaning and motivation. Focusing on the process, or the client's experience of the intervention, improves mood and attention and can result in a sense of flow. Competent performance, such as completing an activity or selling produce, improves clients' self-concepts. Activities provide a natural modality for interacting with others, promoting cooperation, communication, and a strengthened therapeutic relationship. Finally, interacting with the environment, by either changing the environment in some way

or being a recipient of the environment's impact, helps the clients to experience "growth, restoration, and enjoyment" (Haller & Capra, 2017). Activity-based groups benefit clients who struggle to communicate, as the non-threatening nature of horticultural therapy activities decreases self-focus, anxiety, and resistance (Wichrowski, 2006). Because many empirically supported therapies are typically not activity-based, these additional foci of horticultural therapy offer unique mental health benefits.

**Incorporation of natural elements.** The healing effects of nature are capitalized upon in horticultural therapy, which centers around working with living plants and is often located outside. Potential specific mechanisms of change within the environment include the soil, sunlight, natural sounds, and eating whole foods. Mycobacterium vaccae in the soil has been linked to increased serotonin levels (Brogan, 2015). Vitamin D, absorbed through the skin when exposed to sunlight, has been linked to improved mental health and reduced depression levels (McGeeney, 2016). Similarly, loud city-related sounds have been linked to nervous tension, fatigue, irritation, raised blood pressure, cognitive skill decline, and negative attitudes, whereas natural sounds have been tentatively linked to faster recovery of the sympathetic nervous system (McGeeney, 2016). Finally, horticultural therapy, as a gardening-based intervention, often includes eating whole, healthy foods. Such foods increase diversity within the gut's microbiome, which decreases inflammation, which links to decreased depression (Brogan, 2015).

In addition to the benefits obtained by passively being in nature, horticultural therapy's active participation with nature positively impacts client outcomes. Pitt (2014) suggests that the activities people engage in are as relevant as the location in which they do the activities. She argues that locations are not intrinsically therapeutic (e.g., nature can be

comforting as well as dangerous); instead, it is the experiences of people within the places that make them therapeutic. Horticultural therapy, unlike passive time in nature, involves work. This work creates a sense of belonging and pride, which facilitates the therapeutic process. In other words, "Therapeutic places are made not discovered" (Pitt, 2014).

**Empirically supported therapy components.** In addition to the benefits stemming from horticultural therapy's holistic approach, it also incorporates components of empirically supported therapies. Linking horticultural therapy to the knowledge base of empirically supported therapies will begin the discussion about the active ingredients in horticultural therapy, which client populations they work best for, and how they work. It will also provide a common language for therapists and provide clients with a rationale for why horticultural therapy is expected to work. Without linking to and developing its own empirical support, horticultural therapy will remain a developing field that relies on common factors, nature benefits, unknown factors of change, and practices which do not benefit clients. It is therefore essential to use the empirically supported therapies and terminology that already exists in order to advance horticultural therapy practices, research, and discussion.

## Using Psychology's Empirical Base to Inform Horticultural Therapy Practices

Incorporating methods and language from counseling psychology into horticultural therapy literature and practices will benefit the horticultural therapy field in many ways. By forging this link between mainstream, research-supported methods and this emerging field, horticultural therapy could become more legitimized. It may also promote the incorporation of interventions with research support. Horticultural therapy can use psychology's knowledge of client needs, best practices for specific diagnoses, mechanisms

of change, and integration of assessment and psychometrically sound measures to intervene most effectively. Horticultural therapy, as a psychotherapy in the context of this paper, must include the common factors and will often include group factors. It should be noted that horticultural therapy is more than a conglomeration of empirically supported therapies, as it seamlessly integrates several modalities and its own unique elements into one cohesive intervention. No one therapy can truly "do it all," so researching the specific empirically supported components within horticultural therapy is essential to identifying what it is, how it works, who it works for, and when it works.

**The therapeutic relationship in horticultural therapy.** The therapeutic relationship, or the "feelings and attitudes that therapist and client have toward one another and how these are expressed," (Duncan, Miller, Wampold, & Hubble, 2010) accounts for 30% of the change experienced by clients in psychotherapy (Lampert, 1992) and is predictive of client outcomes regardless of the type of psychotherapy being implemented (Duncan et al., 2010). Having a positive alliance, or a strong partnership with agreement on treatment goals and methods, is key to the therapeutic relationship. The alliance should be established by the fifth session (Duncan et al., 2010). Haller and Capra (2017) emphasize this "therapeutic use of self" in horticultural therapy by stating that a therapist should help a client identify goals but not require the client to reach goals that are only held by the therapist. They add that this can maximize therapeutic effectiveness within horticultural therapy interventions (Haller et al., 2019).

The therapeutic relationship also includes humanistic aspects. The first is empathy, a willingness to understand a client's point of view and respond in a way the client perceives as empathetic. Second is positive regard, or warmly and unconditionally accepting a client

and affirming the client's basic sense of worth. Third is genuineness, or therapeutically integrating the therapist's authentic self into the session (Duncan et al., 2010).

The therapeutic relationship further includes techniques such as providing feedback to clients, repairing relationship ruptures, and using self-disclosure. Feedback to the client is descriptive, evaluative information. Positive feedback should be emphasized, particularly early on in the relationship, and it is important to be clear in the intention of providing feedback (Duncan et al., 2010). Therapists should be aware of early signs of a rupture (a tension or breakdown) in the therapeutic relationship, as clients will not often talk explicitly about it to the therapist but develop a high risk of discontinuing therapy (Duncan et al., 2010). Finally, Duncan et al. (2010) state that self-disclosure can be used, but should be done infrequently, not shift the focus from the client, and used only when it will benefit the client. Haller and Capra (2017) state that empathy can be portrayed via self-disclosure, but Duncan et al. (2010) emphasize that a therapist must solicit client feedback as to whether the therapist's actions are interpreted as empathetic.

Clear and consistent boundaries are essential within a therapeutic relationship. While they can initially be misconceived as rigidity or a lack of caring, boundaries actually improve trust and safety within the therapeutic relationship, model for clients how to set and maintain their own boundaries, and they promote therapist warmth and spontaneity (Borys, 1994). It is important for the therapist to both implement boundaries and respect the boundaries of the client.

***The therapist.*** Within the therapeutic relationship, therapists must be considered a factor in and of themselves. It is, in fact, the factor that is the most robust predictor of

client outcome ever identified. Duncan et al. (2010) state that building an alliance and soliciting client feedback tend to be actions performed by "good therapists." Therapists must be aware of their own "attitudes, feelings, biases, values, and beliefs, and how these affect interactions with each client" (Haller & Capra, 2017). This self-exploration is a crucial element to being a good therapist and cannot be overstated. To facilitate this process, upwards of 80% of therapists have been in therapy themselves (Duncan et al., 2010). In regards to group therapy, Kamioka et al. (2014) state that group facilitators are important to client outcome, so therefore research should focus on their interaction styles and knowledge of therapeutic practices to identify specific facilitator variables that are most effective. Within vocational rehabilitation programs, the most important therapist factor is the therapist's belief that a client working is a benefit, not a burden, to the client (Morris & Lloyd, 2004).

***The therapeutic relationship in nature.*** Jordan (2015) expands the therapeutic relationship to include the natural environment. He states that nature offers a democratizing effect, lessening the power difference between the client and therapist since neither own or control nature (as the therapist owns and controls the therapy room). Jordan (2015) clarifies that some power imbalance is important, such as adhering to boundaries of session length and payment, but reducing that imbalance often benefits the clients. He also posits that nature can act as an intermediary between the therapist and client; for example, he notes that many clients are uncomfortable with sitting and maintaining eye contact, so being in nature gives them a socially acceptable way to avert their gaze or pause a conversation.

***Nature as a therapeutic relationship.*** Furthermore, nature itself can become one of the therapeutic relationships. Jordan (2015) states that people form an attachment to their natural environment and experience the psychological consequences, just as occurs with human attachment. Many people, particularly those who have experienced trauma, do not form secure attachments at a young age and therefore also do not learn emotional regulation. Jordan (2015) shares that many people use time in nature to emotionally regulate by increasing their positive feelings and decreasing their negative ones. This enables people to create a secure attachment with nature, which may, in theory, translate to being able to form secure attachments with people. However, as with any attachment, people are open to heartbreak when the one they love is hurt, meaning that environmental destruction directly impacts people (Jordan, 2015). Practicing therapy in nature shifts from a focus on individual autonomy to a focus on the individual's ability to experience relationship and reciprocity with nature (Davis & Atkins, 2004), providing context and a focus on something bigger for the client.

**Factors impacting client change.** There are several factors beyond the therapeutic relationship that impact whether the client will improve over the course of treatment. These have been divided into four categories: client and extratherapeutic factors, expectancy or placebo effects, the therapeutic relationship, and specific models. Client and extratherapeutic factors account for 40% of the client's outcome (Lampert, 1992), and they include motivation, resources, readiness for change, strengths, level of functioning, social support, and life events (Duncan et al., 2010). While the therapist can work to develop client characteristics (e.g., using motivational interviewing), the therapist's primary role is

to recognize that clients have agency and do not passively receive a treatment and tailor treatment appropriately (Duncan et al., 2010).

Expectancy or placebo effects account for 15% of a client's outcome (Lampert, 1992). Duncan et al. (2010) pose that the therapeutic relationship impacts these, as simply agreeing on goals (a component of therapeutic alliance) affects expectancy effects. Expectancy and placebo effects are impact by the client's perception of the therapist's competency and the intervention (Wichrowski, 2006), and can be as powerful as specific models of intervention (Duncan et al., 2010).

Finally, the fourth factor impacting client outcome involves the specific model and techniques used. These models (i.e., which include empirically supported therapies), subsume much of the attention and training of therapists, yet only account for 15% of client outcome (Lampert, 1992). Duncan et al. (2010) further reduce this by highlighting that a specific ingredient of a model may contribute to less than 1% of client outcome. While models only have a small impact on client outcome, they are needed. They provide explanation, hope, structure, and focus to a therapy session, which in turn increases positive expectations and facilitates the client's participation. Without a model from which to conceptualize a client, the therapist is unable to provide adequate rational and direction for the client to benefit.

**Empirically Supported Components.** Wichrowski (2006) describes skills and theories from the field of counseling psychology that may generalize to horticultural therapy, encouraging therapists to expand their repertoire of treatment options and researchers to further

explore and define therapeutic factors within the horticultural therapy field. He encourages these elements to then be used to unify the currently eclectic field and create therapist competencies.

Wichrowski (2006) recommended that these skills and theories that apply to horticultural therapy be identified and then further researched. Wichrowski (2006) describes determinants of outcomes (e.g., client factors, the therapeutic relationship, placebo and expectancy, and model factors) as well as important basic counseling skills for horticultural therapists to develop (e.g., culturally-appropriate communication skills, information gathering, listening, empathy, genuineness, unconditional positive regard, identifying client strengths). This article is a key step in succinctly describing and linking knowledge from the field of counseling psychology to the field of horticultural therapy. However, it largely falls short in describing *how* to implement these essential skills.

Haller et al. (2019) also began to draw a connection between ESTs and horticultural therapy. They stated, "Program sessions focused on the alleviation and treatment of psychological concerns are best achieved by creating a program that combines recognizable elements from gardens/plants and more traditional psychological treatment. Combining language from a cognitive behavioral therapy (CBT) or dialectical behavioral therapy (DBT) perspective, for example, within horticultural therapy elements can be highly effective." They provide a few examples of how this can be done, such as stating that cognitive distortions can be pointed out by the horticultural therapist in session and mindfulness can be a skill that is taught in session then used independently by the client (Haller et al., 2019). Additionally, within the subsection of Group Therapy, five components are marked with an "*" to indicate that they were highlighted by Haller et al. (2019) as the most applicable to horticultural therapy. Additional

group therapy components were included beyond these five due to the therapist's previous experience applying these at LYG in the summer before this study.

A primary aim of this document is to apply empirically supported counseling components to horticultural therapy and describe how horticultural therapy incorporates those components (often called mechanisms of change or active components). Table 1 identifies specific therapeutic factors for various therapies and provides illustrative examples of how horticultural therapy and the Youth Gardening Program (the program of this study, described within the Methods section) may be able to incorporate these factors, depending on the year's client demographics.

Table 1: Empirically Supported Therapeutic Factors' Implementation in Horticultural Therapy

| **Counseling Psychology Therapeutic Factors** | **Horticultural Therapy Methods of Implementation (examples provided are from YGP experiences)** |
|---|---|
| **Acceptance and Commitment Therapy** | |
| **Psychological Flexibility** *Incorporates acceptance, defusion from rigid thinking patterns, recognizing the self as impacted by larger context, committed action toward and knowledge of values, and attention to the present moment.* (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Zettle, Rains, & Hayes 2011) | The schedule is presented each morning, but due to weather or unforeseen circumstances, the schedule changes. Clients, particularly those diagnosed with Autism Spectrum Disorder, then must practice flexibility by accepting the schedule change, switching tasks, and participating in a new order of events. |
| **Cognitive Defusion** *Alter the function of thoughts by changing how one relates to them, rather than trying to alter their form or frequency* (Hayes et al., 2006) | A client became emotionally dysregulated, screaming and crying, because he knew his mother would be told about his earlier outburst. The cognition behind this thought was, "Telling my mom I was bad will upset her, and if she's upset her health will get worse." The therapist prompted him to recognize this as just a thought by asking him questions (e.g., Do you think part of being a mom is hearing about your kids' behaviors? How did your mom react the last time |

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| | you called about an incident? Can you have this thought and still call her?) |
| **Acceptance**<br>*Actively embracing events without attempting to change their frequency or form*<br>(Hayes et al., 2006) | Horticultural therapy can include horticulture outcomes that are not desired by the client, such as plant death, seeds not sprouting, or pest problems. These provide in vivo exposure to practicing acceptance by noticing with their senses and being okay with the present reality. |
| **Values**<br>*Qualities to move toward through purposeful action*<br>(Hayes et al., 2006) | Many vocational horticultural therapy programs discuss career paths, a conversation which can include identifying personal and vocational values. |
| **Mindfulness**<br>*attention to and awareness of the present moment*<br>(McGeeney, 2016; Zettle et al., 2011) | Mindfulness can be incorporated in nearly any horticultural therapy activity. Clients may be given a specific "mindfulness minute" in which to sit in a favored natural space and tune into their senses. They may weed mindfully, noticing their bodies and the plants as they work. Produce can be harvested and eaten mindfully, savoring the food with all senses. |
| **Cognitive Behavioral Therapy** | |
| **Cognition Changes**<br>*Changing one's unhelpful thoughts to a more functional alternative*<br>(Borkovec, Newman, Pincus, & Lytle, 2002) | Mere participation improves self-efficacy, transitioning from negative thinking patterns (e.g., I am a failure.) to more positive ones (e.g., I can grow plants successfully.) (Haller & Capra, 2017). The horticultural therapist facilitates this change process by pointing out successes and modeling alternative, more helpful cognitions. |
| **Behavioral Therapy** | |
| **Reward**<br>*A valued consequence following the performance of a behavior*<br>*(Overlaps with the concept of positive reinforcement)*<br>(Michie, Johnston, Francis, Hardeman, & Eccles, 2008) | Horticultural therapy naturally provides positive reinforcement, as plants directly respond to the care they received. Manage behavior by giving participants tasks they enjoy, saying "good job," and creating opportunities to interact with customers (Haller & Capra, 2017). |
| **Omission**<br>*A removal of a valued consequence following* | If a client cannot attend a session due to misbehavior, the therapist may not care for the plants, allowing them to show signs of neglect (e.g., overgrown weeds, wilting slightly from lack of water). (Haller & Capra, 2017) |

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| *the lack of exhibiting a behavior (Overlaps with the concept of natural consequences)* (Michie et al., 2008) | |
| **Role play** *Performing a behavior in a simulated situation* (Michie et al., 2008) | Before clients are expected to greet visitors and customers, they practice greetings and short conversations with each other, the therapists, and the volunteers |
| **Desensitization** *Exposure to threating experiences with the intention that they will feel less threatening with increased exposure* (Michie et al., 2008) | Clients often feel negatively about social interactions and public speaking. LYG is designed to require these experiences daily, such as publicly speaking during check in and check-out and interacting with peers when working together on a gardening task (e.g., weeding, mulching, layering compost). |
| **Group Therapy** | |
| **Development of socializing techniques** *Practicing adaptive and effective communication* (Yalom & Leszcz, 2005) * | Sharing one's name, shaking hands, making eye contact, and responding to another person are social skills which are practiced during check in/out, garden tours, and when there's a new guest. When assigned as a small-group leader, they practice communicating clearly and positively with their group members. |
| **Modeling / Imitative behavior** *expanding personal skills by observing other's process and development* (Yalom & Leszcz, 2005) * | The therapist models basic social skills by doing them first (e.g., introducing self to a guest, leading check out each day) |
| **Universality** *recognizing that others share similar feelings, thoughts, and problems* (Yalom & Leszcz, 2005) * | Youth slowly move from seeing themselves as very different from each other to recognizing their same feelings within one another. An example was when one client was dysregulated, crying hysterically, yelling, and pacing. Another client shot him a look, raising her eyebrows and pursing her lips, clearly not approving of how he was acting. The therapist gently reframed, "Yeah, he's really frustrated right now. It's hard to feel like that, isn't it?" The girl recognized that while she showed it differently, she felt those same emotions. During a future escalation, she was empathetic toward the boy. |
| **Altruism** *boosting one's self-concept by helping others* | YGP partners with a community food shelf and the clients take turns bringing unsold produce there to donate. Within the group itself, clients are prompted to help each other throughout the day. If a client's garden is well-maintained, the therapist will ask them to identify another client who could use help on their garden bed. |

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| (Yalom & Leszcz, 2005) * | Clients help each other in a number of ways, including working together on tasks such as shoveling and hauling compost, outlining words and paint<br>ing images on garden stakes, and chopping and stirring produce for a recipe. |
| **Instillation of hope**<br>*Seeing other's successes instills a feeling of optimism about one's own improvement.*<br>(Yalom & Leszcz, 2005) * | The tomato plants, which had to be kept in containers due to compost contamination, were not draining water properly and started to die. Some clients decided to remove their tomatoes from their pots and take the chance of being in the contaminated soil, while others readjusted their water setup. The clients were able to see some plants succeed, then try similar techniques with their own plants. These changes were paralleled with their own abilities to problem solve and nurture the plant. |
| **Imparting information**<br>*Providing or receiving education or advice*<br>(Yalom & Leszcz, 2005) * | Horticultural therapy allows for the sharing of both gardening knowledge and coping skills (Wichrowski, 2006). Clients in YGP pair with younger clients once in the summer and use this time to practice mentorship. Within the regular group, they are asked to provide summaries and how-to explanations to clients who were absent for an activity. After a conflict, one client may describe to another an appropriate way to apologize. Clients have been seen spontaneously offering advice to one another (e.g., "You know, when you get angry, pulling out your plants just ruins your garden. When I'm mad, I take deep breaths or walk over to the lake.") |
| **Corrective recapitulation of primary family experience**<br>*correctively reenact important family dynamics with group members*<br>(Yalom & Leszcz, 2005) | A client once was upset and acting out because he was afraid that the rain would result in his family's camping trip, a rare moment that they could all be together. The therapist asked if rain guaranteed that the trip would be cancelled, and the client wasn't sure. The therapist asked what happened when it rained at the gardens. The client's affect lightened, and he said that they still did the same activities, although they got more drying-off breaks inside. He realized that if he and his peers could have fun and get work done when it rained, so could his family. |
| **Cohesiveness**<br>*Trusting each other and feeling a sense of belonging*<br>(Yalom & Leszcz, 2005)<br><br>*parallels the therapeutic alliance in individual therapy*<br>(Duncan et al., 2010) | Setting treatment expectations, defining group rules, and telling members the skills they will need to participate are linked to increasing cohesion (Duncan et al., 2010). In the first week of YGP, the therapist sets aside time to explain the expectations of the organization. There is also a time for clients to work together to identify "inside" and "outside the circle" behaviors—behaviors that they believe should or should not occur within the gardens.<br><br>Modeling real-time observations and guiding feedback also contribute to cohesiveness, as does facilitating members' responsiveness to each other (Duncan et al., 2010). The therapist at YGP will model interpersonal feedback when appropriate situations arise (e.g., "Thank you for the compliment, that meant a lot!" "I feel frustrated when you take the tool I was using without asking. Can |

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| | you please hand it back so I can finish this task?") and prompt clients to address each other appropriately (e.g., "You look angry, can you tell us what you're thinking and feeling?") |
| **Existential factors**<br>*accept responsibility for decisions*<br>(Yalom & Leszcz, 2005) | Gardening provides concrete feedback to clients. One client wanted to harvest and eat his radishes, as well as allow them to blossom. Despite being told that they would not taste good after blossoming, he waited to harvest. When he harvested and tried to eat his radishes, he was at first sad and angry that all of his nurturing had resulted in something inedible. The therapist noted that he had made the choice to grow flowers instead of vegetables. Instead of following his initial impulse to compost all of the radish plants, the client decided to take responsibility and make the best of the situation, tending to his "flower" garden over the next few weeks. |
| **Catharsis**<br>*Release of strong feelings*<br>(Yalom & Leszcz, 2005) | LYG is considered a supportive work environment, meaning that clients are able to express themselves and their emotions without fearing losing their job, and over time they learn to do so in increasingly work-appropriate manners. |
| **Interpersonal learning-input**<br>*gain insight on interpersonal impact through feedback*<br>(Yalom & Leszcz, 2005) | Clients are encouraged to provide honest feedback to each other. For example, one client made a sexual comment to another client. When the therapist brought the two together, the first client offered an apology, and the second responded, "Thank you, but I'd prefer you just not do it again. It made me really uncomfortable." The client learned that these comments create distance and disapproval in relationships. |
| **Interpersonal learning-output**<br>*interact more adaptively within the therapeutic environment*<br>(Yalom & Leszcz, 2005) | Clients learn, and are encouraged to implement, new methods of interacting and coping. For example, one client did everything for another client. The therapist asked why, and the client said that he was the only one who would be in her school the next year and she wanted to have a friend. The therapist asked if doing everything for him was helpful, and the client said no, but it was a habit of hers. The client later experimented with different ways to connect, such as talking to multiple other clients, sharing stories with the client from her school, and working together. |
| **Self-understanding**<br>*gain insight into the psychological motivation underlying behaviors and emotions*<br>(Yalom & Leszcz, 2005) | The therapist integrates this by pressing clients for the reasons underlying their outbursts. For example, one client took the cash box from the produce stand and ran away with it. Once they reconvened inside, the client said he didn't know why he did it. With some prompting, he then said he thought it would be funny, then later shared that he wanted friends. By finding the true motivation underlying the behaviors, they were able to identify appropriate behaviors to reach that goal. |
| **Positive Psychology** | |

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|---|---|
| **Flow state**<br>*"the state in which people are so involved in an activity that nothing else seems to matter"*<br>(Csikszentmihalyi qtd. in Pitt, 2014) | Gardening is an activity that can create a flow experience, and an experienced horticultural therapist can modify horticulture activities to match a client's skill level in order to increase the likelihood of a flow state occurring (Wichrowski, 2006). Gardening engages the body and disengages cognition, requires a certain level of skill, and has repetitive tasks, all which are necessary for experiencing a flow state. The clients at LYG plant, water, weed, and dig, all of which may induce a flow state. |
| **Meaning making**<br>*Contributing to something bigger than oneself*<br>(Rashid, 2015) | Clients spend their days contributing to the improvement of the facility (e.g., mulching pathways) and the success of the community gardens. Community garden produce is shared, sold, and donated. This process connects clients to each other and the community. |
| **Gratitude**<br>*The condition of being thankful, appreciation, positive recognition of benefits received*<br>(Nelson, 2009) | Clients write a thank you note to every volunteer, guest, and community location visited. Within the note, they are encouraged to add a few personalized sentences about why they, specifically, were grateful. These notes are accompanied with a brief discussion of what gratitude is and why it is important. |

# METHOD

This proof-of-concept study was conducted to evaluate the impact of horticultural therapy on several domains of functioning in youth participants. A second purpose was to examine horticultural therapy from a psychological perspective by beginning to illuminate empirically supported components that may play a role in horticultural therapy outcomes. This study utilized a pre-post design with nine participants and no control group. It totaled 120 hours across a 10-week span in the summer.

## Hypothesis and Aim

The hypothesis was: Participation in the horticultural therapy intervention will result in clinically significant improvement in scores on measures assessing nature relatedness, mindfulness, strengths, resilience, emotion regulation, prevocational skills, gardening skills, social skills, and depression/anxiety.

The aim of this study was: To articulate horticultural therapy in the language of empirically supported therapies.

## Participants

The sample consisted of nine adolescents who participated in Loveland Youth Gardeners' Youth Gardening Program. Twelve adolescents applied and were accepted into the program. All were recruited for the study on "Planting Day" (a day before the official start of the program when all students and guardians are present to plant the gardens); three declined participation. Two of the three who declined participation were cousins; they were Latino, ages 12 and 14, both living in low-income households and without any known mental health diagnoses. One had participated in Loveland Youth Gardeners the summer before. They told the therapist that their

mothers did not want to sign the consent forms (neither mother had attended the meeting during which the research was described). The third was a Caucasian female, age 13, living with a foster family who later became her adoptive family. Income was not indicated on the application form. Her foster/adoptive mother said she believed her daughter did not want to participate because of the word "therapy" in the title and that, in order to build their relationship, she was not going to push her daughter to participate.

The sample consisted of 9 adolescents, 6 male and 3 female. Their average age was 14.6 (*SD* = .53) and 8 of them had an Individualized Education Program (IEP) or engaged in Special Education at their school. Two participants were diagnosed, per guardian report on the application form, with Autism Spectrum Disorder, three with Down Syndrome, two with Attention-Deficit/Hyperactivity Disorder, and one with Bipolar Disorder. One was involved with CPS and all denied involvement with the legal system or substance use. Four lived in low-income households (as indicated by their guardians selecting on their applications that they received free/reduced school lunches), two lived above the threshold to receive free/reduced lunches at school, and three did not report their income. One of the nine participants was absent for Weeks 3-7 due to his difficulty in finding a 1:1 aid to accompany him to the garden. He was a 14-year-old male living with his parents, income not indicated, diagnosed with Down Syndrome. The only pre/post data collected for him was the Youth Gardening Program Performance Assessment which assessed gardening skills. Self-report measures were not collected because he could not understand their content and circled words at random; Prevocational Skills and Social Skills checklists were not completed at the end of the summer due to many weeks of missing observations and lack of clarity of whether he directly improved

in those areas or performed due to the presence of his aid. Parent-report was not collected due to his extensive absence.

The interventionists included the therapist (also titled "instructor"), intern, and volunteers. The therapist was an advanced doctoral student in Counseling Psychology with a certificate in horticultural therapy who worked at LYG for one year before the study's commencement. The intern was a doctoral student in Counseling Psychology with previous experience running a horticultural therapy group with depressed and suicidal in-patient clients. There were approximately ten regular volunteers, ranging in experience from youth mentorship backgrounds to Master Gardeners. One volunteer was a Licensed Marriage and Family Therapist in the community; none of the others had training in psychology or therapy.

**Procedure**

The research took place at Loveland Youth Gardeners (LYG) in Loveland, CO. LYG was a non-profit organization that uses gardening-based interventions to cultivate vocational skills, environmental stewardship, and service. They offered several programs, and the one researched in this study was the Youth Gardening Program (YGP), which worked with at-risk and special needs adolescents (LYG, 2018). The author of this document was the instructor for YGP in the summer of (2018) and the summer prior to this study (2017). All clients participating in YGP were invited to participate in the research study. Exclusion criteria for admission to YGP included significant history or risk of sexual, physical, or verbal aggression; significant physical disability (e.g., needing medications delivered during the program, assistive devices that cannot navigate mulched pathways); ages outside the range of 13-19; and participation in the program for more than two years (after two years, they are typically moved into the next program for older and higher functioning youth and young adults). Exclusion

criteria for self-report measures in this study also included clients with identified reading, verbal, and/or intellectual difficulties who, after attempting the survey(s), expressed they do not understand the majority of the questions or were unable to accurately reiterate what the questions were asking about ($N = 5$).

The researcher read the assent and consent forms to the participants and their guardians and provided them with copies to keep and a copy to sign. Participants were assigned a unique ID number to put on all of their measures so that pre/post tests could be connected at the end of the study. All information was de-identified when reporting results.

**Intervention.** While the program extended from May through September, the bulk of it was offered during a 10-week period during the summer (June 4, 2018 - August 10, 2018). The 10-week period involved meeting Monday through Thursday, 9:00am to noon. Outside of the main 10-week program, the students participated once per week for two hours after school. This study only looked at the 10 weeks during the summer in order to mitigate confounding variables such as school factors. As a 120-hour intervention, the Youth Gardening Program's plan was described below with several examples, but not an hourly break down. Table 2 describes the formatting of a typical day at Loveland Youth Gardeners for the clients, while Table 3 provides specific activity examples. Table 4 describes elements included in each week of the 10-week program. This formatting and activity schedule balanced the needs of the organization (e.g., to provide vocational and educational experiences for clients) as well as the goals of horticultural therapy (e.g., to provide therapeutic benefits). Haller et al. (2019) described horticultural therapy encompassing a basic horticulture curriculum within prevocational training programs, noting that being able to differentiate plants, complete a checklist of work instructions, and build basic job skills can be taught within vocational horticultural therapy programs, ideally at an actual job site.

Specific therapeutic factors and their methods of implementation in this program were described above in Table 1.

A primary focus at the beginning of each summer was for staff and volunteers to build strong relationships with the clients. These relationships were formed by modeling basic social skills (e.g., introductions and asking how the clients are), enforcing and respecting boundaries, being consistent between clients and across situations, and by offering unconditional positive regard.

Table 2: Daily General Overview

| | |
|---|---|
| 8:45 | (While clients are arriving)<br>Therapist shared the plan for the day and any necessary client updates with the volunteers.<br>When they arrive, clients put on their work vest and wrote down the date and time on their clock in/out sheet. |
| 9:00 | Check in with clients, staff, volunteers, and (if applicable) guests<br>• Each day a different client was assigned to lead check in. They introduced the process (share name, number (scale of 1-5 how they are feeling), and answer the daily question) and shared a fun question for everyone to answer.<br>  ○ Some question examples: What country would you like to travel to? If you could be the best at anything, what would it be? If you were a crayon, what would the name of your color be?<br>• The therapist shared the plan for the day with the clients. |
| 9:15 | • Some days, there were three 45-minute activities that the clients rotate through. The clients are broken into three groups, and a volunteer is assigned to work at each activity location as the clients rotate through. They had a 5-10 minute break after the first and second activity.<br>• Other days, there was a whole-group activity for an hour or two, then two smaller 15-30 minute activities to rotate through, with a break around the middle of the morning.<br>• Nearly every day will included time for the clients to spend in their individual garden, time working on a community garden task, and therapeutic and/or vocational skill practice. |
| 11:30 | Clean-Up Rotations<br>Each week, the clients were assigned a chore to complete daily (e.g., sweep kitchen, water compost pile, check grounds for forgotten tools) |
| 11:45 | Check out<br>The entire group reconvened to again share names, numbers, and answer a question. The therapist led check out and came up with a question that was reflective of skills |

| | |
|---|---|
| | learned that day (e.g., Where could you do mindfulness at home? What is one type of food you could add to your diet to be healthier?) |

Table 3: Examples of Daily Activities

| |
|---|
| Time in Own Garden<br>• Completed an observation form (Appendix A) about their garden plot<br>• Weeded<br>• Thinned<br>• Harvested |
| Therapeutic Skills<br>• The therapeutic skills (listed in Table 6) were interwoven into the rest of the activities. Therefore, they will not appear in this table as distinct activities but will rather be implemented during the course of the other activities. |
| Vocational Skills<br>• Enhancing knowledge<br>o Weekly lesson (e.g., soil, insects, plant parts)<br>o Discussed their future career goals, how these skills apply there<br>• Farm Stand<br>o Planned (e.g., discussions of what it takes to run a sales stand, gathering supplies, creating advertisements)<br>o Ran (e.g., harvested produce for the stand, talked with customers, handled money, recorded sales)<br>• General Skills<br>o Discussed character traits (e.g., trustworthiness, fairness, respect, caring, responsibility, citizenship)<br>o Acted as an activity leader, then obtained feedback from group members<br>o Stewardship project: clients brainstormed a project that improved the sustainability of the program (e.g., painted a mural, tested an aquaponics system, created additional compost bins), then planned, implemented, and presented their project.<br>o Clients were regularly encouraged in-vivo to practice vocational skills (e.g., if they were found sitting after completing a task, they were asked how they could take initiative) |
| Site-Specific Activities<br>• Garden Bed Tasks<br>o Mulched<br>o Weeded<br>o Depending on time of season: planted, pruned, harvested<br>o Amended soil (i.e., mixed manure or compost into the top 6” of soil)<br>• Property Tasks<br>o Composted (rotated, layered, added, emptied)<br>o Mulched walking paths<br>o Weeded paths and around patio/perennials<br>• Produce-Related Tasks<br>o Dried herbs, then made tea and spices from them |

- Made food (e.g., kale chips, salad)

Other Activities

- Guest-hosted (a volunteer from the community to share their area of interest or expertise; this was often the reason that there is a whole-group activity with shorter rotations thereafter, so that the guest did not need to repeat the activity three times and could have a period of time longer than 45 minutes)
  - Watercolor painting of something in the garden
  - Creative writing
  - Lesson-based (e.g., check soil temperature under different types of mulches around the property)

Table 4: Weekly Activities

Weekly Activities

Every week, the following activities were included (examples described under "Daily" above)

- Therapeutic skills activity
- Talked about a character trait
- Lesson topic of the week (hands on)
- Individual time with each client (3x this will be evals)
  - In the first, fifth, and last weeks of the summer, the clients were given evaluations of their work (Appendix B). These evaluations were used to promote skills that Loveland Youth Gardeners looks for (Appendix C). Their demonstration of progress was how they received their pay.
  - On mid-summer evaluation day, there was a celebration where clients received their checks and had snacks for approximately 45 minutes. There was a discussion of group-level growth, and clients were asked at check-out to share one growth they saw in the client standing to their left.
- Farm stand
- Leadership opportunities with "pros and grows" feedback from peers
- Stewardship project work time (second half of the summer only)
- Hosting a guest or visiting a community location and following up each encounter with a thank you note.
- Writing and art, incorporated as a garden observation, part of a lesson, and/or a creative endeavor

Every week, volunteers and guardians were sent an e-mail summarizing the previous week and previewing the upcoming week, including any relevant announcements. Volunteers were not uniformly trained outside of a one-and-a-half-hour meeting before the season begins, provided scripts, or asked to follow a manualized treatment plan. At the beginning of each day, volunteers and staff discussed the day's plan, and at the end of the morning's group, they

discussed the clients and how the day went. This level of training of the volunteers was reflective of real-world horticultural therapy interventions and thus was intended to result in the most realistic client outcomes.

**Measures.** There were five self-report measures given to the clients, one "test" of the client's skills overseen by a long-time volunteer, one parent-report measure given to a guardian, and two therapist-report forms completed jointly by the therapist and intern in the first full week of the program (June 4-7, 2018) and in the last full week (August 7-10, 2018) of the program. The researcher obtained consent (Appendix D) and Assent (Appendix E) before the program's full summer programming began. On the first day of the summer programming, the researcher read a brief set of instructions to the clients (Appendix F), then passed out the demographics form (Appendix G) and measure of the day. All clients were given the opportunity to complete all of the measures, but data from the self-report measures of the three clients with Down Syndrome and one of the clients with Autism Spectrum Disorder were not included in analyses due to the therapist, intern, and multiple volunteers agreeing that those four clients did not understand the measure content. Clients were asked to complete one or two (depending on length) measures each day of the first and last week. The clients whose self-report measures were included in analyses completed the measures independently but were sitting next to the intern or therapist so that they could ask for the meaning of a word if needed. The measures include the following:

***The Revised Children's Anxiety and Depression Scale-Parent-Short Version (RCADS-P-Short Version)*** (Appendix H). The RCADS-P-Short Version was created to assess children's levels of anxiety and depression in a way that is briefer than the original version but more valid and reliable than other shortened versions (Ebesutani et al., 2015). This version includes 25

items (15 anxiety, 10 depression), responded to on a 4-point Likert scale (never, sometimes, often, always) with a raw total score ranging from 0-75. This score is compared to grade-level norms within the scoring software. Total-scale reliability was good (α=.86 school sample, α=.90 clinical sample), as was reliability for the anxiety subscale (α=.80 school sample, α=.86 clinical sample) and depression subscale (α=.80 school sample, α=.83 clinical sample). Test-retest reliability was also good (total score *r*=.90, anxiety subscale *r*=.84, depression subscale *r*=.87). Moderate convergent validity existed between parent and child reports on their respective versions of this measure (.18-.21 school sample, .38-.39 clinical sample) (Ebesutani, Korathu-Larson, Nakamura, Higa-McMillan, & Chorpita, 2017).

RCADS scores were examined for whether they meet clinical significance (T-score of 70 or greater; a score of 65-69 is considered borderline). Any change from clinically significant to normal levels was considered a meaningful change. Mean scores were obtained for non-clinical and clinical populations (*M*=20.82, *SD*=11.72; *M*=10.45, *SD*=8.09; respectively). The scoring software further divides these by subscales, grade-level, and gender to compare to community and clinical norms.

This measure was selected because it is a brief, single measure that assesses two areas of interest while also including anxiety questions which are based in a variety of specific anxiety concerns. While anxiety is measured unilaterally, the short scale's maintenance of questions from each of the original version's subscales (i.e., separation anxiety, generalized anxiety, panic disorder, social anxiety, and obsessive-compulsive) can be used as an indicator of specific areas of anxiety that could be further assessed in future studies.

Anxiety and depression were anticipated to decrease over the course of this 10-week program. Lee, Ro, and Lee (2004) found that high school female's state, trait, and social anxiety

scores decreased after 24 horticultural therapy interventions over the course of 12 weeks, but their control group counterparts overall anxiety slightly increased during that time. Lee et al. (2004) cited a study in Korean that also found that horticultural programming reduced anxiety in children. Therefore, as the present study's program was more intensive and with a similar age group, it was expected that anxiety will decrease with intervention. A review of ten papers examining mental health impacts of gardening-based interventions found that several of these studies resulted in reduced depression (Clatworthy, Hinds, & Camic, 2013). It is important to know horticultural therapy's impact on anxiety and depression because these often become reoccurring issues throughout one's life and impact functionality (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2011)

***Emotion Regulation Questionnaire for Children and Adolescents*** (Appendix I). This scale was modified by Gullone and Taffe (2012) from the adult version (Emotion Regulation Questionnaire, ERQ; Gross & John, 2003) to have language more appropriate for children ages 10-18. This 10-item questionnaire examines two strategies of emotion regulation, cognitive reappraisal (CR; reframing one's thoughts about a situation to decrease the resulting emotional charge) and expressive suppression (ES; inhibiting emotion-expressing behavioral responses). Each question is answered on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = half and half, 4 = agree, 5 = strongly agree) and total scores range from 6-30 for CR and 4-20 for ES. Reliability over 12 months for both subscales in the total sample was good (CR = .83, ES = .75). The means and standard deviations for the overall sample were ES = 10.49 (2.91) and CR = 21.53 (3.86) (Gullone & Taffe, 2012).

Emotion regulation was clinically relevant because it correlates with mental health. In a meta-analysis of 212 studies with 80,850 adolescent participants, emotion regulation was

negatively correlated with internalizing and externalizing symptoms (Compas et al., 2017). Another meta-analysis of 48 studies with 21,150 participants examined studies using the ERQ (Hu et al., 2014). Findings indicated that cognitive reappraisal correlated positively with positive indicators of mental health (e.g., life-satisfaction, positive affect) and negatively with negative indicators of mental health (e.g., depression, anxiety, negative affect). Expressive suppression was positively correlated with positive indicators of mental health only in samples with Western cultural values (Hu et al., 2014). This specific measure was selected because it is a short measure designed for adolescents.

***Child and Adolescent Mindfulness Measure (CAMM)*** (Appendix J). This scale assesses mindfulness in children and adolescents via 10 reverse-scored questions on a 5-point Likert scale (0 = never true, 1 = rarely true, 2 = sometimes true, 3 = often true, 4 = always true) (Greco, Baer, & Smith, 2011). Total scores range from 0 to 40 with higher scores indicating higher levels of mindfulness. In a sample of students grades 5-10, the mean was 22.73 with a standard deviation of 7.33 (Greco et al., 2011). Internal consistency was good (α=.81, .84) (Greco et al., 2011; Kuby, McLean, & Allen, 2015). Mindfulness was clinically relevant due to its correlation with increased psychological functioning (e.g., positive affect) and decreased psychological distress (e.g., worrying, emotional and behavioral difficulty, negative affect) (Kuby et al., 2015).

***Nature Relatedness Scale, Short Version (NR-6)*** (Appendix K). This scale is a 6-item version, shortened from the original 21 items, scored on a 5-point Likert scale from "disagree strongly" to "agree strongly." It is scored by averaging the responses to the six items. The six items were chosen based on high discrimination for overall scores, having normal distributions, and correlating well with other related scales (e.g., environmental attitudes) (Nisbet & Zelenski, 2013). The items assess self-identification with nature and the need for, or comfort with,

wilderness. The NR-6 demonstrated good test-retest reliability (.83-.84) and convergent validity with the inclusion of nature in self item (.64-.75) (Nisbet & Zelenski, 2013). The NR-6 was selected due to its short length, as it was created for studies that are using multiple measures.

Nature relatedness was clinically relevant, as it correlates with psychological health and pro-environmental behavior. Psychological health correlates included well-being, positive affect, personal growth, purpose in life, and autonomy, while pro-environmental behavior correlates included environmental concern and behavior, and biospheric and altruistic motives (Nisbet & Zelenski, 2013). Interventions as small as viewing an image of a natural scene (Nisbet & Zelenski, 2013) and activities such as gardening (Lumber, Richardson, & Sheffield, 2017) have increased connectedness to nature, so it seemed likely that the 120-hour horticultural therapy intervention would increase scores on this measure. Lumber et al. (2017) recommend using activities involving contact, meaning, emotional attachment, or a compassionate relationship with nature, and engaging with nature's beauty, to increase connection to nature.

***Prevocational and Social Skills Checklist*** (Appendix L). This scale was completed by the therapist and intern jointly discussing each item and coming to a consensus. It has 46 items scored on a 5-point Likert scale ("never" to "always"). It was created by the author and is largely based on a checklist created by the organization Options for College Success. It was edited somewhat to exclude skills not relevant to the horticultural therapy intervention (e.g., following tipping conventions at a restaurant) and to include additional relevant skills (e.g., clocking in/out, accepting feedback and praise). This checklist was completed because relevant, validated measures do not yet exist. Prevocational skills include a wide range of capacities and behaviors and are the cornerstone for being able to learn more job-specific skills (Haller et al., 2019). Two horticultural therapy-specific scales have been created (Im, Park, & Son, 2018;

Woodward & Holden, 1984), but there were several concerns which excluded them from this study. Woodward & Holden's scoring was unclear and had minimal psychometric validation or relevant behaviors. Im et al. (2018) created a "social scale" with psychometric validity, but it lacked many prevocational skills that are necessary to the vocational program (e.g., dressing appropriately, following rules, adapting to change, accepting responsibility, calling if late/absent, resolving conflict, using manners, etc.) A few items were modeled from this scale onto the created checklist (e.g., shares tools, helps others, engages in conversation).

***Strengths Use and Current Knowledge Scale*** (Appendix M). This scale has 14 items rated on a 7-point Likert scale ("strongly disagree" to "strongly agree"). It demonstrated good internal consistency (α=.94-.97) and test-retest reliability (*r*=.84) (Wood, Bennett, and Noyes, 2011). In a university sample, the average score was 64.83 (*SD*=14.09) (Govindji & Linley, 2007). It was important to assess participant's use of their strengths because the construct correlates positively with self-esteem, vitality, and positive affect, and it negatively correlates with perceived stress (Wood et al., 2011).

***The Brief Resilience Scale (BRS)*** (Appendix N). This scale was designed for adults as a brief measure of their resiliency (Windle, Bennett, & Noyes, 2011). Respondents answer each question on a 5-point Likert scale ("strongly disagree" to "strongly agree") and the total score is the mean of the responses to all items. Mean scores in university samples were 3.53 (*SD*=.68) and 3.57 (*SD*=.76). Test-retest was good (.62-.69) (Smith et al., 2008).

While there are several resilience measures for adolescents (e.g., The Child and Youth Resilience Measure, Youth Resiliency: Assessing Developmental Strengths, Ego Resiliency, Resilience Scale for Adolescents), they were less desirable than the Brief Resilience Scale because they were significantly longer than the BRS's 6 items (i.e., 28-102 items), or because

their psychometric properties were not well established (which was the case for the shortest youth resilience measure, The Child and Youth Resilience Measure) (Windle et al., 2011). The BRS was also desirable because it was created to "assess the ability to bounce back or recover from stress" (Windle et al., 2011) as opposed to assessing the ability to resist the onset of negative stress outcomes, which was relevant to this study's participants since many of them had experienced trauma already. The BRS, while not yet tested on adolescents, reads at a 6th grade reading level (Readable.IO, 2018) and therefore was expected to be appropriate for the participants.

Windle, Bennett, and Noyes (2011) conducted a methodological review of fifteen resilience measures and ranked the BRS among the top three scales in regards to psychometric ratings. The BRS had internal consistency alphas of >0.70 to <0.95 across four different samples. It demonstrated criterion validity with the Connor-Davidson Resilience Scale (0.59) and Ego-Resiliency Scale (0.51). The test-retest reliability was good in two samples ($r$=.62-.69). One noted limitation of this scale is that it only focused on individual-level resilience (Windle et al., 2011).

Zolkoski and Bullock (2012) state that individual-level resilience interventions involve developing social skills, self-efficacy for health-promoting behavior, academic skills, and involvement in extracurricular activities and the community. As YGP is an intervention designed to provide all of these skills and resources, it was expected that resilience would be impacted over the course of the study. It was important to study the intervention's effect on resilience because it protects youth from negative outcomes after facing adversity. Similarly, resilience can be built proactively, while not all risk factors can be mitigated or predicted (Zolkoski & Bullock, 2012).

***Youth Gardening Program Performance Assessment*** (Appendix O). This scale was created by and used for the Youth Gardening Program. It was not created empirically, but it was used internally as a method to assess gardening knowledge at the end of the ten weeks. The clients demonstrated their gardening knowledge one-on-one with a volunteer. The volunteer said the prompts to the client (e.g., "Show me a weed. Show me how to pull it.") and noted whether the client did the skill independently (score of 2), after one prompt (e.g., "Which one of these two plants is a weed?" score of 1), or was unable to do the skill (score of 0). An overall score out of 46 was obtained by summing all items.

***Youth Gardening Program Student Gardener Evaluation*** (Appendix B). This scale was created by and used for the Youth Gardening Program as a method of tracking progress in four key work-related areas (responsibility, communication, working with others, and self-management). The evaluation was used in the first, fifth, and tenth week of the summer and the client's mid-summer and final pay is determined by their improvement in the four areas.

**Additional Tracking Methods**

In addition to obtaining self and guardian reports, the therapist kept track of various data throughout the summer. This data included daily attendance tracking (Appendix P) and daily client notes (Appendix Q). At the end of the summer, these notes will assist the therapist with describing any observed changes in clients that were not captured by the objective measures listed above.

**Data Analysis**

To test the study's hypothesis, unbiased Cohen's *d*, due to a small sample size, for a repeated measure design was calculated to assess the within-subjects effect size of the intervention (Cumming, 2012). The equations are as follows:

$$d_{unbiased} = \left(1 - \frac{3}{4df - 1}\right) \times d$$

$$d = \frac{M_{post} - M_{pre}}{SD_{pooled}}$$

$$SD_{pooled} = \sqrt{\frac{SD_{pre}^2 - SD_{post}^2}{2}}$$

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.

The descriptive statistics of mean and standard deviation for each measure were also calculated. The domains most and least improved upon were described. Confidence Intervals were not included because the sample size of 3-9 was too small to assess precision of point estimates based on confidence intervals (Cumming, 2012).

If a student skipped a question, the therapist prompted them to complete it either the same day or the next day. In the one instance that a missed question was not caught within a day, the average score for all other responses on the measure was used. Mean substitution holds the assumption that missing data is due to random error but can add bias by reducing the variance of the variable (Schlomer et al., 2010). When the therapist asked clients to respond to other missed items, they always explained that they skipped an item on accident, not due to content, so it was likely that this item was also missed at random. Because only one question on one measure was skipped, the risks were determined to be negligible.

On the Social Skills and Prevocational Skills measures, if "n/a" was selected, the score was averaged based on the number of questions that were assigned a Likert Scale rating, as this avoided falsely lowering the averaged score and making the student look less capable than they

were. N/A was never selected on the posttests. It was selected 22 times on the pretests, most commonly on "calls in if going to be late/absent" (n/a selected 9 times) and "if sick, knows how to use Kleenex and not cough on others" (n/a selected 5 times), due to these behaviors not yet being observed.

Absolute values and percentages were reported for the number of clients who had a clinically significant change as calculated by the Standardized Individual Difference (SID) (Estrada, Ferrer, & Pardo, 2019). The SID calculates the degree of discrepancy between two scores to determine whether an individual's change on a measure is reliable instead of due to measurement variability. It is calculated by dividing each individual's pre-post difference by the standard deviation of those differences. For single-group pre-post designs, a cutoff of ±1.645 is recommended (Estrada et al., 2019). SID was selected above similar individual-level change statistics (e.g., Reliable Change Index) because it was found to have low levels of false positives (Ferrer & Pardo, 2014).

Because this was a pilot study and an exploration of horticultural therapy's use of ESTs, a table was included detailing the EST components that were observed to be used most often. While the frequency of each intervention was not recorded, the table is intended to illustrate the EST interventions that were used throughout the intervention. Additionally, a section describing improvements within the clients that were observed but not objectively measured was included. This is to highlight possible areas horticultural therapy may impact. These areas should be studied empirically in the future.

# RESULTS

The results for each measure and EST implementation are described below. The means, standard deviations, effect sizes, and standardized individual differences are also portrayed in Table 5.

Table 5: Statistics for each measure

| **Measure Name and number completed at pretest and posttest** | ***M (SD)*** **Pretest** | ***M (SD)*** **Posttest** | ***d*** | ***SID*** |
|---|---|---|---|---|
| RCADS-P-Short, depression (*N* = 6) | 51.67 (8.38) | 49.67 (10.97) | -.17 | 16.6% |
| RCADS-P-Short, anxiety (*N* = 6) | 53.33 (9.83) | 53.17 (4.92) | -.02 | 0% |
| RCADS-P-Short, combined (*N* = 6) | 53.33 (9.93) | 52.17 (7.76) | -.11 | 0% |
| RCADS-C-Short, depression (*N* = 4) | 52.75 (7.89) | 53.25 (17.73) | . 03 | 0% |
| RCADS-C-Short, anxiety (*N* = 4) | 50.00 (2.45) | 52.50 (5.32) | .43 | 0% |
| RCADS-C-Short, combined (*N* = 4) | 51.50 (1.91) | 53.00 (10.07) | .15 | 0% |
| Strengths Use and Current Knowledge Scale, knowledge (*N* = 5) | 26.60 (4.39) | 26.60 (3.91) | .00 | 0% |
| Strengths Use and Current Knowledge Scale, use (*N* = 5) | 26.60 (4.51) | 25.60 (3.36) | -.20 | 0% |
| ERQ, cognitive reappraisal (*N* = 3) | 19.00 (7.00) | 17.33 (4.73) | -.16 | 33% |
| ERQ, expressive suppression (*N* = 3) | 12.67 (2.31) | 11.00 (5.20) | -.24 | 33% |
| CAMM (*N* = 5) | 23.08 (8.77) | 21.60 (6.35) | -.15 | 0% |
| BRS | 3.09 (0.64) | 3.21 (0.16) | .19 | 0% |
| Youth Gardening Program Performance Assessment (*N* = 9) | 56.00 (33.57) | 91.22 (10.91) | 1.27 | 44% |
| NR-6 (*N* = 4) | 3.71 (0.35) | 3.63 (0.42) | -.16 | 0% |
| Prevocational Skills Checklist (*N* = 8) | 3.85 (0.55) | 4.17 (0.43) | .58 | 25% |
| Social Skills Checklist (*N* = 8) | 3.88 (0.53) | 4.27 (0.40) | .75 | 12.5% |

**Results by Measure**

**The Revised Children's Anxiety and Depression Scale-Parent-Short Version (RCADS-P-Short).** No client ($N$ = 6) scored within the clinical range on the depression subscale of the RCADS-P-Short pretest ($M$ = 51.67, $SD$ = 8.38) nor on the posttest ($M$ = 49.67, $SD$ = 10.97). One client (16.6%), diagnosed with Down Syndrome, showed improvement. The effect size of the decrease in depression scores was trivial ($d$ = -.17).

One client, scored within the borderline clinical range on the anxiety subscale of the RCADS-P-Short pretest ($N$ = 6, $M$ = 53.33, $SD$ = 9.83) and none scored within the clinical range on the posttest ($N$ = 6, $M$ = 53.17, $SD$ = 4.92). One client, diagnosed with Autism Spectrum Disorder, had reported symptom reduction by his parent that moved his score from the borderline clinical range to the non-clinical range, although the SID shows no meaningful change in scores (0%). The effect size for the decrease in anxiety scores was trivial ($d$ = -.02).

No client ($N$ = 6) scored within the clinical range on the combined subscale of the RCADS-P-Short pretest ($M$ = 53.33, $SD$ = 9.93) nor on the posttest ($M$ = 52.17, $SD$ = 7.76). None of the client (0%) demonstrated meaningful change. There was a trivial intervention effect found on the combined scores ($d$ = -.11).

**The Revised Children's Anxiety and Depression Scale-Child-Short Version (RCADS-C-Short).** No client ($N$ = 4) scored within the clinical range on the depression subscale of the RCADS-C-Short pretest ($M$ = 52.75, $SD$ = 7.89), and one (diagnosed with Bipolar Disorder) scored in the clinical range on the posttest ($M$ = 53.25, $SD$ = 17.73), indicating that one client worsened. According to the SID calculation, none (0%) of the clients showed meaningful change. The effect size of the change in depression scores was trivial ($d$ = .03).

No clients ($N$ = 4) scored within the clinical range on the anxiety subscale of the RCADS-C-Short pretest ($M$ = 50.00, $SD$ = 2.45) nor on the posttest ($M$ = 52.50, $SD$ = 5.32).

None (0%) of the clients showed meaningful change in scores. The intervention had a small effect on increasing anxiety scores ($d$ = .43).

No client ($N$ = 4) scored within the clinical range on the combined subscale of the RCADS-C-Short pretest ($M$ = 51.50, $SD$ = 1.91) and one (the same as within the depression subscale) scored within the borderline clinical on the posttest ($M$ = 53.00, $SD$ = 10.07). None (0%) of the clients demonstrated meaningful change. There was a trivial intervention effect found on the combined scores ($d$ = .15).

**Strengths Use and Current Knowledge Scale.** There was no effect found on strengths knowledge subscale ($d$ = 0.0) (pretest: $N$ = 5, $M$ = 26.60, $SD$ = 4.39; posttest: $N$ = 5, $M$ = 26.60, $SD$ = 3.91). There was a small effect ($d$ = -.20) on the strengths use subscale, indicating that strengths use decreased slightly after the intervention (pretest: $N$ = 5, $M$ = 26.60, $SD$ = 4.51) (posttest: $N$ = 5, $M$ = 25.60, $SD$ = 3.36). For both subtests, none (0%) of the clients showed meaningful change in their scores.

**Emotion Regulation Questionnaire for Children and Adolescents.** There was a trivial to small effect size ($d$ = -.16, $N$ = 3) on the Cognitive Reappraisal subscale, (pretest: $M$ = 19.00, $SD$ = 7.00; posttest: $M$ = 17.33, $SD$ = 4.73). One of the clients (33%), diagnosed with an anxiety disorder and experiencing grief, showed a meaningful decrease in the use of cognitive reappraisal.

For the Expressive Suppression subscale, there was a small effect size ($d$ = -.24, $N$ = 3) (pretest: $M$ = 12.67, $SD$ = 2.31; posttest: $M$ = 11.00, $SD$ = 5.20). One of the clients (the same as the other subscale) (33%) showed a meaningful decrease in the use of expressive suppression.

**Child and Adolescent Mindfulness Measure (CAMM).** The effect size was trivial (*d* = -.15, *N* = 5) (pretest: *M* = 23.08, *SD* = 8.77; posttest: *M* = 21.60, *SD* = 6.35) and none (0%) of the clients showed meaningful change.

**The Brief Resilience Scale (BRS).** The effect size was trivial to small (*d*=.19, *N* = 4) (pretest: *M* = 3.09, *SD* = 0.64) (posttest: *M* = 3.21, *SD* = 0.16) and none (0%) of the four clients showed meaningful change.

**Youth Gardening Program Performance Assessment.** The effect size of the intervention was large (*d* = 1.27, *N* = 9) (pretest: *M* = 56.00, *SD* = 33.57; posttest: *M* =91.22, *SD* =10.91) and four (44.4%) of the nine clients showed a meaningful increase in their gardening skills. Two of these clients showing improvement were diagnosed with Autism Spectrum Disorder and two were diagnosed with Down Syndrome.

**Nature Relatedness Scale, Short Version (NR-6).** The effect size of the intervention was trivial (*d* = -.16, *N* = 4) (pretest: *M* = 3.71, *SD* = 0.35, posttest: *M* = 3.63, *SD* = 0.42) and none (0%) of the clients showed meaningful change.

**Prevocational Skills Checklist.** The effect size of the intervention was medium (*d* = 0.58, *N*= 8) (pretest: *M* = 3.85, *SD* = 0.55; posttest: *M* = 4.17, *SD* = 0.43) and two (25%) of the eight clients showed a meaningful increase in their prevocational skills. Of the two clients showing improvement, one was diagnosed with Down Syndrome and one with Autism Spectrum Disorder.

**Social Skills Checklist.** The effect size of the intervention was medium (*d* = 0.75, *N*= 8) (pretest: *M* = 3.88, *SD* = 0.53; posttest: *M* = 4.27, *SD* = 0.40) and one (12.5%) of the eight clients, who was diagnosed with Autism Spectrum Disorder, showed a meaningful increase in their social skills.

**ESTs Applied**

The ESTs that we predicted to be applicable, based on the previous summer's group (see "Empirically Supported Components" section) were different than the ESTs actually used throughout the intervention. The group of students that participated in this study had substantially greater impairments resulting from disabilities and/or trauma histories than those in the last group. Behaviors observed in members of this group frequently resembled those developmentally typical of younger children. This was highlighted when a group of first graders toured the garden: they asked insightful questions, did not interrupt the speakers, and spontaneously thanked the clients providing the tours. These were behaviors that were being targeted for intervention with this group due to their developmental histories. The primary focus of the summer was to use interventions to build social skills, teach prevocational skills, and introduce effective methods of emotion regulation. Based upon anecdotal observation, not quantitative tracking or documentation, interventions that seemed to be used most often and most effectively were nested within Behavioral, Positive Psychotherapy, and Humanistic ESTs (described in Table 6).

Table 6: Commonly used EST interventions

| **Humanistic** | |
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| ***Unconditional Positive Regard** *"a deep and genuine caring for the client as a person […]the caring is unconditional; it is not contaminated by evaluation or judgement of the client"* (Corey, 2001) | After using a tool unsafely, the therapist pulled aside a client to review the rules of safe tool use. The client quickly seemed ashamed, fidgeting and rapidly apologizing. The therapist paused the client and clarified, "*You* are a good kid. You made a mistake and there is a consequence, but I still know and believe that you are a good person. Making a mistake doesn't make you bad." The client processed this for a moment, then shared that he had never heard that distinction before. He seemed lighter after the conversation, and more accepting of the consequence of his behavior without feeling bad about himself. |
| ***Empathetic Understanding** | When Jodie was crying the day after her mother was hospitalized, the therapist spent some time talking with her. The therapist reflected |

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| *"understand clients' experience and feeling sensitively and accurately"* (Corey, 2001) | emotions Jodie seemed to be feeling and listened to Jodie's story and fears. |
| ***Person-centered approach** *"genuine therapist […] respect for each client who is seen holistically, as a unique individual, who possesses a complex array of emotions, behaviors, stories and capacities that can, at times, be viewed as representative of a particular clinical diagnostic category, but never reduced to one"* (Angus et al., 2015) | Volunteers and staff were repeatedly reminded, "The relationship is most important." They were reminded to balance their knowledge of deficits shown by the client with their awareness of the client's strengths, care for the client's stories, and understanding of the client's actions and experiences. They were coached on how to build healthy relationships (e.g., emphasizing praise, maintaining boundaries, consistently enforcing expectations). A person-centered approach often became further emphasized when new volunteers learned a client's diagnosis or a story in their history, as they would sometimes then not hold the client accountable to expectations due to their perception of the client's ability. The therapist would remind the volunteers that accommodations were made when necessary, but clients were always held to a high standard. |
| ***Encouraging Authenticity** *knowing and acting in accordance to one's true self* (Allan, Bott, & Suh, 2014) | "Katie" told stories she had seen in a television show as if it was her own life. To encourage authenticity, the therapist used her knowledge of Katie's life to inquire about real people in Katie's life. The therapist also acted rewardingly when Katie talked about something true by showing engagement in the conversation, asking follow up questions, and providing interpersonal feedback (e.g., "I feel like a good friend of yours when you tell me about your own life!"). |
| ***Genuineness** *"therapists are real […] they are genuine, integrated, and authentic"* (Corey, 2001) | While overall expectations were held consistent, some volunteers and staff members, for example, enjoyed giving hugs after work while others declined hug invitations. Seeing the volunteers and staff show up authentically was important for the clients, as it taught them how to connect with different types of people and how to navigate different interpersonal responses. |
| **Behavioral Therapy** | |
| ***Reinforcement** *"a process in which a response is followed by the presentation of a stimulus […]and the individual is motivated* | Clients received several small reinforcements every day, such as a high-five, praise, or friendly attention. |

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| *to exhibit a desired behavior"*<br>(Corey, 2001) | |
| ***Token Economy**<br>*"clients receive a token when they display the desired behavior [… and] can turn the tokens in for reinforcers"*<br>(Erford, 2015) | If the client had a notably good day, far above their usual performance, they received a "gold star," meaning they were handed a slip of paper that said what they did well and had the signatures of the staff and volunteers that day who had seen their stellar performance, and they were handed that gold star in front of the entire group at check-out.<br>Clients cared deeply about receiving a gold star and were motivated by the opportunity to earn one. This was shown by several clients when they ran to their guardian after group to show off their star. It was also shown by clients who struggled to have a consistently "on" day, as they would ask the therapist and volunteers for feedback and would point out what they were doing well.<br>The star itself was intrinsically rewarding and was also token indicating the client had earned a 10-minute break during chore-time on the next Thursday. |
| ***Punishment**<br>*"stimulus [used to] decrease an undesirable behavior"*<br>(Erford, 2015) | Clients were told the progression of punishments within the program so they would know what to expect. At the first occurrence of an unacceptable behavior, they would receive a verbal warning. Second, they would be asked to sit out for several minutes and the therapist would process their actions and brainstorm solutions with them. If the behavior continued after returning to the group, the client would receive a "strike." A strike was the equivalent to a fire-able offense at another job, and the clients were allowed three strikes before being removed from the program. A strike involved the client processing the behavior with the therapist, the therapist talking with their guardian, and the client going home early. Examples of behaviors that warranted a warning or sit-out included swearing, making an offensive joke, refusing to participate, or taking a break without asking. Examples of behaviors earning a strike included unsafe use of tools and not calling in to tell the therapist about an absence. |
| ***Premack Principle**<br>*"individuals will be motivated to do an undesired task if it is followed by a desired one"*<br>(Erford, 2015) | Within days, weeding became an undesirable chore. Even when asked to weed for a short amount of time (e.g., 10 minutes), clients would often move slowly, only pulling a few handfuls of weeds within that timeframe. Then, the therapist took out a large bucket and told the clients that when the bucket was packed-down and full, they would receive an extra 5-minute break. Even though the bucket took 20 minutes to fill, the clients showed high energy, motivation, and a competitive spirit. Beyond the benefits of increasing motivation, the clients also worked together (e.g., one client would stand in the bucket to flatten the weeds while the others filled it) and practiced |

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| | problem-solving (e.g., finding the largest weeds to fill the bucket quickly). |
| **Desensitization**<br>*Exposure to threating experiences with the intention that they will feel less threatening with increased exposure*<br>(Michie et al., 2008) | "Joe" entered the program with an aversion to being dirty. Nonetheless, he was required to touch dirt daily and was not provided an opportunity to wash his hands for at least several minutes afterwards. As time passed, he would touch dirt without prompting and waited until breaks before asking to wash his hands. |
| ***Extinction**<br>*"withholding reinforcements in order to reduce the frequency of a specific behavior"*<br>(Erford, 2015)<br>Also described in detail in Allen (1973) | Behaviors that were not harmful to another participant or in violation of expectations were often ignored to decrease their frequency. For example, "Jodie" would cry in order to get out of an activity. When she began crying, the therapist would ignore it for a couple of minutes. If her crying did not stop, the therapist would take the client a few steps away from the group and de-escalate the client through the use of a positive punishment. In this case, the client found deep breathing boring, so the therapist would say, "It looks like you need to calm yourself down. How many deep breaths do you need to take?" Then the therapist would slowly demonstrate deep breathing, counting each breath. Invariably, the client would say she was fine to return to the group within three breaths. Upon return to the group, volunteers and members would not discuss the crying or acknowledge that it had happened. |
| **Modeling**<br>*expanding personal skills by observing other's process and development*<br>(Yalom & Leszcz, 2005) | Skills expected of the clients were modeled by the therapist. For example, the therapist introduced herself to visitors with a handshake, eye contact, and the practiced script of, "Hello, my name is Jaime. Welcome to the gardens!" |
| ***Behavioral Rehearsal**<br>*"a form of role play in which the client is learning a new type of behavior to use in response to a certain situation and people outside of the counseling situation"*<br>(Erford, 2015) | Before needing to perform new behaviors in a real-world situation, clients would practice their skills with volunteers and staff. For example, the Farm Stand was open to the public every Thursday to sell produce, so the clients needed to know multiple skills such as greeting, answering questions, recording orders, handling money, and thanking customers. Before the first Farm Stand was open, the clients practiced each skill, received feedback on what they did well and what to change, then practiced it again. This was made into a fun activity by having the clients take turns being the customer (and their enjoyment of coming up with bizarre customer demands for the practicing client to navigate). |

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| ***Response Cost**<br>*"the individual loses points or tokens for performing some undesired behavior […] if possible, costs should be natural or logical consequences"*<br>(Erford, 2015) | The most common application of response cost was to remove tool privileges if a client misused the tools. For example, if a client raised a tool above hip-height (after receiving a warning), they would not be allowed to use any tool for the rest of the day. |
| ***Time Out**<br>*"any form of positive reinforcement is removed […] after a display of maladaptive behavior"*<br>(Erford, 2015) | If a misbehavior (e.g., swearing, not participating) was repeated after receiving a warning, the client was told to "take a break" in a designated chair removed from the activity and located in a boring location (near the building's entry door). |
| ***Overcorrection**<br>*"Overcorrection involves two components: restitution and positive practice. Restitution requires the individual to restore the situation that was disrupted […] and positive practice entails repeated practice of an appropriate behavior for the same situation."*<br>(Erford, 2015) | One client would become triggered by paint, resulting in her ruining anything she was painting (and often nearby items) by using excess paint and scribble-like brush strokes. The "Stewardship Project" for one group was to paint a mural on the garden shed. When this client was asked to help the group by a volunteer unaware of her reactiveness to paint, after about ten minutes the client painted purple across several of the other vegetable shapes and the white background. The therapist waited for the paint to dry, then talked with the client about the next steps. The client agreed she would be able to restore the white background but was open that she was unsure she could fix each vegetable shape without reacting to the paint. For this specific situation, the therapist and client worked together on the restitution component and forwent the positive practice component, as this would allow the client to have a successful painting experience. |
| **Positive Psychotherapy** | |
| ***Strengths**<br>*"characteristics of a person that allow them to perform well or at their personal best"*<br>(Wood et al., 2011) | Clients learned about their strengths when volunteers or staff offered praise (e.g., "You are waiting for your turn patiently"), when the therapist conducted evaluations, and when self-reflecting during a coping skills lesson (e.g., "Write one thing you are good at on each flower petal."). These strengths were then emphasized by having clients do additional tasks that fit their abilities, such as an organized client planning a shared garden, a hard-working client hand-tilling a garden bed, and a horticulture-savvy client helping another client identify the weeds in an overgrown garden bed. |
| **Meaning making**<br>*Contributing to something bigger than oneself* | The clients were often encouraged to identify why their actions mattered. When growing produce for the farm stand, the therapist engaged them in conversation about why it was important to donate produce to the local food bank. When identifying areas of growth, |

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| (Rashid, 2015) | the therapist helped clients understand how those goals would apply to the client's larger goals outside of the garden setting (e.g., making friends, obtaining competitive employment). |
| ***Increase positive emotions**<br>*"include satisfaction, contentment, fulfillment, pride, and serenity […] hope and optimism, faith, trust, and confidence"*<br>(Seligman et al., 2006) | While working in the gardens, particularly when engaging in monotonous tasks like weeding, volunteers and staff shared stories with clients, asked about positive experiences in the clients' lives, joked around, and acted playfully. Clients would often smile, act excited, and laugh during these times. |
| ***Realistic Optimism**<br>*"tendency to maintain a positive outlook within the constraints of the available […] physical and social world"*<br>(Schneider, 2001) | When planning and planting their garden beds, clients were encouraged to pick out seed packets for any herbs, flowers, or vegetables they liked. Then, a volunteer or staff member provided micro-lessons in horticulture to help the clients decide which of their selections were likely to succeed. For example, a client may want to plant corn, so the volunteer or staff would explain the number of corn stalks needed for successful pollination. This allowed the clients to feel as positive about their gardens as possible within a Colorado climate. |
| ***Forgiveness**<br>*"a freely chosen motivational transformation in which the desire to seek revenge and to avoid contact with the transgressor is lessened, a process sometimes described as an altruistic gift"*<br>(Joseph, 2015) | When "Jodie" stepped on another client's plant and killed it, the client was understandably upset. The client was given some time to deescalate, then the therapist empathized with him and talked to him about the fact that each client had something they were working on, and being careful with where she was walking was one of Jodie's areas of improvement. The therapist asked the client if he would be open to Jodie's apology. When Jodie came to apologize, the client shared that he understood it was not intentional and would forgive her. |
| **Gratitude**<br>*The condition of being thankful, appreciation, positive recognition of benefits received*<br>(Nelson, 2009) | Clients wrote a thank you note to anyone who volunteered at or donated to the program. They engaged in discussions about why gratitude is important to express. |
| **Mindfulness**<br>*attention to and awareness of the present moment* | A couple of minutes were given for mindfulness every day, with the first few being guided mindfulness meditations (e.g., focusing with all five senses on one plant). |

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| (McGeeney, 2016; Zettle et al., 2011) | |

* = *term not discussed in Table 1*

**Observed Areas of Improvement Needing Future Empirical Examination**

This section is included in order to acknowledge potential areas of impact for horticultural therapy interventions. The measures included were limited to the number of measures that the participants could complete, so this highlights areas for future empirical examination through qualitative or quantitative methods.

These observed (but unmeasured) improvements are based on written information in a client's application to the program, notes taken for the client's beginning, mid, and end-of-summer work evaluations, daily notes written by the therapist, and clinical judgment. All client's names were changed for confidentiality.

**"Jerry."** Jerry was a 15-year-old male diagnosed with Bipolar Disorder, living with his parents, and receiving an IEP at school. His mother did not indicate an income level on his application. His special education teacher said that he hoped one day to work in a wildlife management-related job and that he loved fishing. The teacher cautioned that his humor could be dark, he sometimes picked on other kids, and he had poor executive functioning that he tried to hide. Per the pre/posttests administered, Jerry self-reported an increase in depression symptoms, moving him from the non-clinical to clinical range of depression.

***Work Motivation.*** Jerry began the summer demonstrating that he was a hard worker, as he could complete a task quickly and at a high quality. However, this hard work was only apparent when Jerry liked the task; if he was not interested in it, he would work slowly or wander off. The therapist implemented the Premack Principle (described in Table 6) by allowing Jerry to work on a project of his choice (e.g., creating a fence around the new raspberry bushes)

after he had completed a required task and had it approved by the therapist as meeting expectations (e.g., fully weeding his garden bed). Jerry responded well to this intervention, as demonstrated by his increased engagement with and completion of undesirable tasks, and by the middle of the summer Jerry had improved on completing tasks he began and staying with the group. Nonetheless, he still struggled to engage with tasks he disliked and participate consistently, sometimes deciding to sit down instead of work for his desired job. It seemed that Jerry's investment in his job and time in the gardens was higher than he portrayed to the therapist, as his mother reported him expressing significant worry and distress when he was unable to attend work for two days when he got in trouble elsewhere. The therapist added a behavioral intervention, reminding Jerry that his low performance would decrease his paycheck. By the end of the summer, Jerry would usually show initiative by asking the therapist or a volunteer, "How can I help?" once he completed his assigned task and stayed with his group more often.

***Engagement within Social Group Work.*** Jerry disengaged from social tasks, such as group presentations, lessons, or discussions, stating that he came to the gardens to work. At the beginning of the summer, he would immediately sit far behind the group with his head down and his arms crossed. If the therapist approached him to inquire what was bothering him, he would either entirely ignore her or say, "I don't want to be here." At one point, upon learning that the day would be spent at a local flower shop making bouquets, Jerry told the therapist that he was going home instead. The therapist told Jerry, "Walking out of work because you don't like the job is not an option. If you walk out, you will not be allowed to return." Jerry grudgingly got into a van, and at the flower shop he looked angry whenever he knew the therapist was looking toward him. However, the therapist noticed Jerry laugh a few times when talking with a friend,

and he offered minimal resistance when the therapist told him to take his bouquet home for his mother. The therapist took a similar approach with Jerry's disengagement from lessons, telling him that sitting outside of the group and showing disrespect was not an option. This statement seemed to resonate with Jerry, as no consequence was applied in order to modify this behavior. By the end of the summer Jerry consistently sat with the group, sat up, and made adequate eye contact with the speaker. While Jerry was initially resistant to helping any other peer in their garden bed, by the end of the summer he accepted that task as a potential job he would receive when wanting to do one of his desired tasks or when he was asking how he could help. His increased willingness to work with others and speak up had a negative side to it, as he often made jokes at another's expense, spoke sarcastically, and took advantage of some of his peers. While his engagement relatively increased, he still shut down most conversation opportunities with staff and volunteers by not responding or only answering with one word.

**"Joe."** Joe was a 15-year-old male with Autism Spectrum Disorder and Attention-Deficit/Hyperactivity Disorder and received an IEP at school. He lived with his parents and lived in a low-income household. Per the pre/posttests administered, Joe's gardening skills improved meaningfully.

***Ritualistic Behavior.*** Joe listened well to feedback. For example, he began the summer asking, "What time is it?" to nearly every staff member several times throughout the three-hour work day. When the therapist told him that he needed to either check the clock inside or wear a watch instead of asking the time, he almost immediately stopped asking the time, only doing so infrequently. He responded well to clear, concrete rules of interaction, such as the therapist telling him, "You asked me one time, you must wait for me to answer. Once I answer, you

cannot ask me again." As a response, he could usually wait until someone else entered the room before asking the question.

Joe often repeated himself and would fixate on something, particularly the presence of insects, any smell, and rule-breaking (e.g., "What's that smell? What's that smell? What's that smell?" "That's a bee. Oh no, it's a bee. There's a bee here!" "She's standing on a rock, we're not supposed to stand on rocks. Standing on rocks is dangerous.") and took a few minutes to redirect. He often wanted a concrete answer or intervention. The therapist often acknowledged his concern ("Yes, that's a wasp."), offered cognitive restructuring ("It won't sting you."), and reminded him of expectations ("We are all sitting and listening right now, so we need you to do the same."). By the middle of the summer, he was more comfortable with ambiguity (e.g., When the therapist said, "I honestly don't smell anything," he waited to repeat his question until someone else entered the room.). By the end of the summer, he would still repeat questions, but they were less loud and pressured compared to the beginning of the summer.

***Following Multi-Step Directions.*** While Joe responded promptly when given a direction, he had a low ability to carry through. For example, when told to weed his garden, he would immediately walk to his garden bed, crouch down, look at it for a moment, then stand up and not move until someone went to him. When asked why he was just standing there, he would reply that he did not know how to weed. At first, he needed tasks broken down into small and specific steps (e.g., every individual weed would need to be pointed to). One volunteer with limited mobility worked well with him, as she sat in a chair and used her cane to point to every weed within reaching distance. When given such specific directions, he followed through well. The therapist slowly increased the complexity and independence of his tasks. By the middle of the summer, he could generalize his skills slightly (e.g., Drawing a circle in the dirt and telling

him, “Weed everything in this circle,” or handing him a specific weed and saying, “Pull all of these that you can find.”). At the beginning of the summer, he would only work for a few seconds at a time when directly supervised, but by the middle of the summer he could work for several minutes between check ins. At his mid-summer evaluation, the therapist encouraged Joe to articulate that he needed help (e.g., say, “Excuse me, can you help?”), and by the end of the summer he would both request help and ask, “How?” if unsure how to carry through. Because of the intensive work put into him learning how to weed, when asked at his mid-evaluation what the therapist said he did well at as a way to check if he understood the feedback, he said, “I do well at pulling weeds!” While the therapist had not quite given this feedback, it was clear that it was an improvement he was aware of within himself.

***Compulsive Behavior.*** Joe began the summer with an aversion to dirt, always wearing gardening gloves, washing his hands after interacting with dirt, and not touching insects. The therapist used exposure techniques, slowly lengthening the time between him getting dirty and being able to wash his hands, and offered cognitive restructuring (e.g., “You’re supposed to get dirty in a garden.” “Dirt is good for us.”). Throughout the summer he was desensitized to dirt through daily exposure. He became increasingly comfortable with dirt, not seeming to worry if it touched his clothing or needing to wash his hands, although he still used a pair of gloves before weeding. He also stopped leaving an area where he saw an insect.

***Initiation and Interaction.*** Joe was not relationship-focused when he first began the program. He would respond to any conversation directed toward him, but never initiated, especially with peers. He rarely showed emotion in his facial expressions or vocal inflections, but in the second week he smiled in response to a joke a staff member made. A few more weeks into the summer, a peer who was returning for his second summer was asked to guide Joe

through a few tasks and work alongside him for the next activity. While it was not immediately apparent whether Joe enjoyed the social interaction, halfway through the summer when the peer was gone for one day, Joe immediately asked where he was, seemingly showing that he had formed a relationship with him. By the end of the summer, Joe was engaging in brief conversations with peers and, when prompted, would help another peer in their garden. He still did not offer tours to visitors or engage with everyone, but the improvement did occur within some of his earlier-formed relationships.

**"Clover."** Clover was a 14-year-old female with Down Syndrome and a visual impairment. She lived with her parents and they reported being above the income level of needing free/reduced school lunches. At school, Clover received an IEP. Per the pre/posttests administered, Clovers' parent-reported depression score decreased meaningfully within the non-clinical range, and her gardening skills and prevocational skills increased meaningfully. Clover did not complete the self-report measures due to a lack of understanding.

***Social Skill: Speaking Volume.*** Clover began the summer speaking so quietly within groups (e.g., the check in/out circle) that it was difficult for the nearest person to hear her. At the beginning of the summer, a few techniques were tried (e.g., modeling by repeating what she said more loudly, affirming her ability to speak more loudly), but she usually would turn into the person nearest her and act shy until the next person did their turn. The therapist then asked volunteers who Clover often stood by to not respond to her when she spoke quietly or looked at them for assistance during the circles; instead, only the instructor would give Clover a brief, impassive reminder ("Clover, speak loudly.") and wait silently until Clover shared her response. Upon sharing at an intelligible level, volunteers and staff were able to respond as they naturally would (e.g., a smile, a brief comment such as, "That sounds fantastic!"). By the end of the

summer, Clover almost always spoke loudly without prompts and did not try to hide behind a volunteer. Slight regression was noticed when Clover's father joined a couple of times to fill in as a volunteer, as Clover looked at him instead of saying her own response. Fortunately, Clover's father prompted her to look at the group instead, and she proceeded to show her newly-formed public speaking abilities.

**"Jodie."** Jodie was a 15-year-old female who lived with her mother in a low-income household and was often cared for by her grandmother. Throughout the summer, Jodie's mother had a few chronic illness relapses that resulted in her being hospitalized. She began the summer with several strengths such as having an upbeat attitude, being quick to laugh, and receiving feedback well. Throughout the summer, she received countless micro-corrections (e.g., "Stand here," "Look at me,") yet never became frustrated or upset. She would simply smile, comply, and continue with her task or conversation. (One improvement of Jodie's is described under the "Extinction" term in Table 6.) Per the pre/posttests administered, Jodie moved from the borderline range of parent-reported anxiety to the non-clinical range and her gardening skills, social skills, and prevocational skills improved meaningfully.

***Stereotyped Behavior.*** Jodie preferred to stand at all times, unable to sit or crouch for more than a moment before standing back up. When standing, she shifted from foot to foot and shuffled her feet, resulting in her drifting away from the place she needed to be. For example, when everyone was in a large circle for check in or check-out, she would end up in the middle of the circle or several yards away in under a minute. The therapist tried having Jodie stand in a circle drawn on the ground or touching a stick with her feet, but the only intervention to keep Jodie from moving away was to have her put her foot against the side of the therapist's foot while in the circle. Any time Jodie moved, the therapist would whisper her name and point at the

therapist's foot. Jodie would jump back to the therapist and put her foot in place. Jodie also stood during lessons, which sometimes made others uncomfortable and made it difficult to her to participate with her small group. Jodie was always offered the option to sit and, when she declined, was showed an appropriate place to stand and something (e.g., the edge of the table) to touch so she did not drift away. When in the gardens, it was hard for Jodie to weed or harvest since she would only stand. The therapist would frequently point out interesting things in the garden bed as a natural incentive for Jodie to crouch down. By the end of the summer, Jodie was able to stay within the circle and would crouch down to weed for a minute or so at a time.

***Body Awareness.*** Another body-oriented struggle for Jodie was being aware of where her body was in relation to the world around her. The primary intervention was simply heightening Jodie's awareness of where her body was. For example, after laying down fresh mulch, Jodie shuffled much of it around, resulting in bare earth. Other clients became upset since she was undoing their work. The therapist got Jodie's attention, pointed to the mulch, and said, "Your feet did that when you moved them around, see how the mulch moved with them? We need to be careful to keep it where it belongs. Let's fix it!" The therapist then handed Jodie and a nearby client a rake, and the other client agreed to help teach Jodie how to rearrange the mulch. Similarly, when working in her garden, Jodie would often receive a quick, "Jodie, stop! Look at your feet!" then look down to see that she was about to step on a plant. The repeated attention-orienting helped Jodie to recognize in which situations she needed to look down. However, a few accommodations needed to be made in the environment, such as placing tomato cages on the outer two corners of her garden bed, as she usually cut the corners too sharply when walking around it. By the end of the summer, Jodie's body awareness had improved somewhat,

as she did not step on plants nearly as often (although, it also undoubtedly helped that most of the plants had grown taller).

**"Walter."** Walter was a 15-year-old male diagnosed with Anxiety, Obsessive-Compulsive Disorder, and an unspecified Mood Disorder. He lived with his mother in a low-income household. He had recently been released from the local youth detention center after serving one year and would be rejoining public school at the end of the summer. He was often described by volunteers and staff as "an old man" due to his interest in discussing history, his possession of a variety of pocket knives, and his curse-laden language. He was eager to please and often sought approval from staff members. Per the pre/posttests administered, Walter did not demonstrate any meaningful change. He did score 100% on the posttest of gardening skills, so he likely experienced a ceiling effect on that measure.

***Prosocial behaviors.*** Walter began the summer struggling to connect with peers. He shared with the therapist that due to past experiences (e.g., being stabbed while in the detention center) he feared opening up to his peers. He struggled to be patient with most of his peers, particularly those with cognitive delays. When interacting, he often talked about age-inappropriate topics (e.g., wars, chemistry of different weapons), made offensive jokes, and became frustrated. When pulled aside by the therapist, he would be able to process his actions and share his internal processes; he came across as a genuinely caring individual who lacked the knowledge of how to show that care. The instructor helped Walter to use his strengths (e.g., if he was frustrated with a peer who was cutting all of the chives instead of just the flowers, he could use his detail-oriented skillset to teach his peers how to only cut the flowers), to stay in the present moment (e.g., focus on the peer he was interacting with rather than generalizing how he typically felt about peers), and to step away when triggered (e.g., to ask for a break instead of

lashing out). By the end of the summer, Walter would help others in their gardens without the therapist prompting him, usually worked patiently with group members, worked cooperatively with a wider variety of peers, and no longer made offensive jokes. Notably, he began offering words of support and compassion toward peers who had originally frustrated him.

***Feedback Orientation.*** After his first evaluation, Walter sought feedback from the volunteers and staff members, particularly surrounding growth areas. At the beginning of the summer, Walter appeared almost desperate for reassurance that he was doing well, yet struggled to carry through with making the suggested improvements. Around the mid-point of the summer, after seeing minimal behavioral changes despite Walter's expressed desire to improve, the therapist sat down with him to establish a plan. The therapist stated where she expected Walter's behaviors to be and where they were now. She then asked how they could create successive approximations to ensure small successes and progress toward their ultimate goals (e.g., When angry: 1. Name the emotion, 2. Ask to step away from the group, 3. Step away from the group and take calming breaths, 4. Stay in the group and take calming breaths). Will expressed excitement at this approach and each day would tell the instructor which step he had gotten to (e.g., "Today when I was angry, I did step 2!"). Will's increasing dedication toward receiving, seeking, and implementing feedback was essential to his successes.

**"Al."** Al was a 14-year-old male diagnosed with an anxiety disorder and experiencing grief. He lived with his mother, and income was not reported. He was generally a friendly and enthusiastic client. He got along easily with peers, followed directions well, and each day he shared how he implemented knowledge from the program into his own garden at home. Per the pre/posttests administered, Al demonstrated a decreased use of Cognitive Reappraisal and

Expressive Suppression (both subscales of Emotion Regulation). He scored 100% on the posttest of gardening skills, so he likely experienced a ceiling effect on that measure.

***Leadership.*** Due to Al's relatively high cognitive functioning, friendly nature, and trustworthiness, he was encouraged early in the summer to begin to work on his leadership skills. The first step for Al was to learn to guide his peers rather than do a task for them. The therapist gave him multiple opportunities to practice this (e.g., teaching a peer to harvest lavender) and had follow-up conversations about what a leader does (e.g., encourages peers, works alongside peers). The therapist helped prompt Al when leadership opportunities arose, and by the end of the summer he would spontaneously offer peers assistance and guidance (e.g., teaching how to sift compost and turning it into a fun task).

**"Michael."** Michael was a 14-year old male diagnosed with Pseudobulbar Syndrome (uncontrollable laughing or crying), Attention-Deficit/Hyperactivity Disorder, and Bipolar Disorder. At the time of beginning his work at LYG, he had lived in a low-income household with his grandparents for two months. On July 31, 2018 (the 9th week of the program), he expressed fear that his grandparents would abuse him like the family that adopted him (but then had their rights revoked), and he left the program after the 10th week (at the end of data collection, but before the work program was over). His grandmother said that he had been placed in a group home and declined any further communication efforts. Michael was an eager, extremely friendly, desperate-to-please client. He was unfailingly enthusiastic and optimistic, and he was willing to take responsibility for his actions. His self-reported mindfulness levels decreased. His

gardening skills score increased, although he experienced a ceiling effect with a 100% posttest score, so the *SID* did not meet the cutoff value.

***Need to Belong.*** Michael began the summer as a respectful, friendly young man. While this made for excellent first impressions, he would quickly become over-friendly to the point that some people would become annoyed or think that he was trying to gain favor. The therapist first gave him feedback on his most problematic behaviors that stemmed from his friendliness (e.g., making himself the center of attention, interrupting, asking multiple staff members the same question until someone approved of his idea). Michael was receptive, apologizing for coming across as distracting or disrespectful. Nonetheless, these behaviors persisted through the middle of the summer, likely because they were reinforced by visitors responding positively to his friendliness and enthusiasm. The therapist continued to point out moments that were not well-received by his peers and described how that was antithetical to his goals of being helpful and making friends. Michael had moderate insight, as it seemed that this feedback was not new. He said at a previous group home he was told that he engaged in "staff splitting" by asking the same question of multiple staff members. By the end of the summer, Michael would wait for his turn to talk at the check in and check out circles, would spend as much time listening as talking, and did not "staff split" as often.

***Impulsivity.*** Michael engaged in many "pet projects" (e.g., making a bridge out of popsicle sticks, making flyers, painting rock row markers, planting pumpkins by the pond). He did them as a way to raise money for the program (e.g., sell at the Farm Stand) and there seemed to be a component of wanting praise and special attention for his ideas. At the beginning of the summer he would often leave a task he was supposed to be working on to

do one of his projects. The therapist explained that he was most helpful when doing what he was asked to do and that his projects often used supplies that were intended for something else. When found engaging in a pet project, the therapist would ask Michael what he was supposed to be doing, and he would usually quickly return to his assigned task. Early on, he would press his idea some, explaining why it would be helpful. While there was not substantial change at the mid-point of the summer, by the end of the summer Michael was typically on task and would ask before engaging in a project of his choice.

**Katie.** Katie was a 15-year-old female with Down Syndrome. She lived with her parents, who indicated that they made an income above the threshold qualifying for free/reduced school lunches. Katie did not complete the self-report measures due to a lack of comprehension, and she did not demonstrate any meaningful changes on the measured variables.

***Wandering.*** Katie struggled to work alone at the beginning of the summer, so when a volunteer or staff member was not working 1:1 with her, she could be found sitting and staring into her garden, taking a break without asking to eat a snack, sitting on a log on the opposite side of the building from the gardens, and/or hiding in the bathroom. The therapist reminded Katie of the expectations at several points (e.g., just before leaving Katie to work independently, when finding Katie sitting alone). In the middle of the summer, Katie continued to take breaks without asking, but would work independently for a few minutes longer before doing so. Her bathroom breaks were also notably shorter. The therapist shortened her reminders to reduce any possible reinforcing effect they had by providing Katie attention, simply saying, "Katie, join the group," anytime Katie was found alone and not working. By the end of the summer, these behaviors were at manageable

levels; she only left the group if she was angry at the therapist or in a self-initiated fight with one of her peers.

# DISCUSSION

Overall, the greatest changes were seen in increased social, prevocational, and gardening skills, particularly for clients with Down Syndrome and Autism Spectrum Disorder. It seemed that behavioral, positive psychotherapeutic, and humanistic ESTs were most commonly used within the sample studied. For future studies, the measures used could be adjusted, some new domains of measurement added, and the therapeutic components could be broken down and studied in more detail.

## Measures

The measures selected were based upon the reading levels and cognitive abilities of the previous year's cohort. Unfortunately, the self-report measures were too difficult for most of the participants in this sample. This reflects a common challenge in measuring therapeutic outcomes; every group of clients is different and these differences cannot always be predicted or mitigated through a use of large sample sizes. Only two participants seemed to fully understand the measures (based upon their reiteration of the topic and consistency in answers), three seemed to understand the majority of the questions on the measures (as shown by them asking for clarification on a question or two on each survey), and four clients did not understand the measures at all (as shown by their random answering, their inability to say what a question meant, and their questioning of the meaning of simple words such as "death"). The four who did not understand the self-report measures were excluded from analyses on the self-report measures. Even so, self-report measure results should be interpreted cautiously due to possible misunderstandings experienced by the clients. Administering only one to two measures

per day seemed effective, as more than ten minutes on any reading or writing task over the summer seemed to demand more cognitive resources than the clients could muster.

The Social Skills Checklist was modified slightly. An "n/a" column was added to account for areas that were not observed. The items "Speaks at an appropriate volume," and, "Wanders off (e.g., leaves the group at inappropriate times" (reverse scored) were added. These additions were based on Clover and Katie's improvements in areas that were not initially measured. Additionally, in their article on creating a rating scale for an HT group, Woodward and Holden (1984) suggested a category of "antisocial behaviors," one of which was "wandering." Other antisocial items (e.g., "stealing") were already captured within this study's social skills measure (e.g., "respects others' belongings"). An item on wandering and speaking volume would be a good addition to the Social Skills Checklist, as multiple students demonstrated problems in these areas.

The Prevocational Skills Checklist was also modified to include two additional items based on Joe's improvement in following multi-step directions. The items added were, "Follows single-step directions," and "Follows multi-step directions." Like many of the items on the checklists, these items do not explain the reasoning behind someone's score (e.g., if it is ability or willingness), but they will highlight an area to further examine if necessary.

**Intervention Effects on Objectively Measured Variables**

The results from the objective measures indicate that the largest positive impacts of the intervention were on clients' prevocational skills, social skills, and gardening skills, as demonstrated by effect size and number of clients that improved. These improvements are likely due to the explicit emphasis on these skills throughout the summer. Improvement

may also have been seen due to the measures all being scored based on an observer's behavioral observations, rather than asking the clients for a self-report.

No change was detected on measures of mindfulness, resilience, nature relatedness, or strengths use. The lack of change on the mindfulness scale initially seemed incongruent with the fact that the students practiced mindfulness for a couple of minutes every day. However, it is possible that they needed guided mindfulness practice, as it is likely that many simply sat in silence and may not have applied mindfulness skills during that time. To increase the likelihood of students using the time for mindfulness, guided prompts could be given each time or students could be engaged in regular discussion to increase buy-in of what mindfulness means to them, how they act mindfully, and how it benefits them. To check whether they are using their time for mindfulness, they could simply be asked on random days how they spent their minute or to respond yes/no to a question such as, "Did you use the time only for mindfulness?" Another possibility for the lack of change in mindfulness scores is that the mindfulness measure may have been too broad to capture changes, as it asked about the participant's experience in a variety of settings. A measure more focused on specific mindfulness skills (e.g. awareness of breath, letting thoughts "float" past) may have picked up on changes. The lack of change in resilience may be because there is no direct effect of HT on resilience or because the topic was not explicitly focused on during the intervention. It is possible that there was not a change in client's relatedness to nature because they associated the term "nature" with wilderness rather than the cultivated property grounds in town. While the students were complimented daily, it could be that they did not report a change in their strengths use and knowledge because the language of "strengths" was not often used explicitly, so they may

not have generalized the compliments to be encompassing of their strengths. It is worth noting that lack of change may be a result of measures being too complex for the students to fully comprehend, indicating that a simpler measure may be necessary.

Results on guardian and child reports of depression and anxiety were small and mixed, as parent reports indicated that one student showed improvement in depression, whereas child reports showed a small worsening in anxiety. "Clover's" depression scores were deemed meaningful by the *SID* statistic, which aligns with her substantial improvements (as shown by *SID*) in prevocational skills and gardening skills. In regard to the small anxiety effect size, this could be due to measurement error, as none of the *SID* calculations met the cutoff for changing beyond that of potential measurement error. Additionally, slightly increased anxiety scores across three of the clients could be indicative of school beginning in one to two weeks. One client ("Joe") struggled with changes in routine, another ("Walter") was starting a new school, and the third ("Jerry") had consistently struggled with depressive symptoms throughout the summer and voiced a strong dislike for school. Finally, the small increase of self-reported anxiety may not be of concern because the anxiety scores at both pretests and posttests were within the non-clinical range, indicating a typical level of anxiety. The anxiety and depression score differences between parent and self-reports may have occurred because students may not show their guardians how they feel and/or because students lack insight or understanding of the measures to report their experience accurately.

A small worsening was seen in the self-report of anxiety and strengths use. These somewhat lower scores are seen within the effect size statistics but may be due to measurement error. Neither measure had a single client meet the cutoff criteria for the SID

calculation, which assesses whether a change went above and beyond anticipated measurement error for each individual.

Both subscales of emotion regulation were shown to worsen within one client, and the expressive suppression subscale worsened enough to result in a small effect. These worsening scores could be due to the intervention needing to be more explicit when teaching coping skills, teaching coping skills that were too complex (e.g., reframing), and/or due to specific circumstances with the client. In this case, the client ("Al") began the summer as friendly, relatively quiet, and obedient (e.g., he was the only student in the first week who willingly helped another student in their individual garden bed upon the therapist's suggestion; he was the first student to earn a "gold star"). Throughout the summer, he became more comfortable in his surroundings and with his peers, resulting in him showing more emotion and being more open about his reactions (e.g., while he continued most of the positive work habits he began with, he also teased a peer, now a friend, for his poor handwriting). These worsening scores could reflect "Al's" process of learning to navigate how emotions show up within new relationships.

When looking at specific client diagnoses, those with Autism Spectrum Disorder (ASD) and Down Syndrome improved across the largest number of categories. Clients with ASD showed improvements in parent-reported anxiety, gardening skills, prevocational skills, and social skills. Clients with Down Syndrome showed improvements in parent-reported depression, gardening skills, prevocational skills, and social skills. The intervention largely focused on enhancing these three key areas, and it is possible that clients with the lowest cognitive functioning had the most room to improve. They also may have simply needed the knowledge in order to enact the skills, so basic skill-building

throughout the summer was effective; in contrast, other students may have had the knowledge but experienced other barriers preventing them from enacting the skills that the intervention did not impact directly (e.g., situational factors, coping skills, more advanced skills within these domains). The measures may have needed to reflect a wider range in skillsets to accommodate the variety of ability levels, particularly the gardening skills assessment. In this study, none of the students with ASD or Down Syndrome experienced comorbid mood or anxiety disorders, and all had parents or grandparents that checked in with the therapist throughout the summer and were responsive to therapist questions or suggestions. These factors may have differentially supported the improvement of these clients.

The diversity within this group of clients (in demographics, diagnoses, and goals) anecdotally seemed to be beneficial in cultivating empathy and skills. Each student had challenges, meaning none of them were alone in their struggles, which was an experience some of them said they felt at school. Their variety of challenges allowed them to appreciate the experiences of others and demonstrate empathy toward students who struggled in areas that they personally did not. The variety also allowed some students to have strengths in areas of other students' weaknesses, meaning that they all were able to step into a leadership or helper role instead of always being the help-receiver (like they tended to be in other settings like school). This could be studied in the future through qualitative interviews to understand the clients' perception of the heterogeneity of the group, or studies could be conducted on homogeneous and heterogenous groups to identify if greater gains are achieved in one over the other.

**Possible Intervention Effects on Unmeasured Variables**

Areas of observed but unmeasured improvement were described for each client. For each area of improvement, a possible measure was identified (Table 7). While few of these measures would be appropriate for this specific sample of clients, they are illustrative of potential areas that horticultural therapy may impact and, if the sample is appropriate, a validated measure that can be administered.

Table 7: Measures for future research

| Measure Name | Authors | Brief Description |
|---|---|---|
| Multidimensional Work Motivation Scale | Gagné et al. (2014) | Assesses six reasons that someone may put effort into their job<br>19 items, self-report, validated on adult workers across 7 languages and 9 countries |
| The Groupwork Engagement Measure | Macgowan (1997) | Assesses 7 dimensions of engagement in groupwork<br>37 items, group member report, validated on members of various work groups |
| Repetitive Behaviors Scale-Revised | Bodfish, Symons, Parker, and Lewis (2000) | Assesses six dimensions of repetitive behavior<br>43 items, parent-report, validated on school-aged youth |
| Body Awareness Questionnaire | Shields, Mallory & Simon (1989) | Assesses sensitivity to normal, non-emotive body processes<br>18 items, self-report, validated on college students and non-student community members |
| Child Behavior Scale | Ladd and Profilet (1996) | Assesses a child's aggressive and prosocial behaviors toward peers<br>17 items, teacher-report, validated on elementary and middle school children |
| Prosocial Tendencies Measure | Carlo and Randall (2002) | Assesses six types of prosocial behaviors<br>23 items, self-report, validated on college students |
| Feedback Orientation Scale | Linderbaum and Levy (2010) | Assesses an individual's receptivity to feedback<br>20 items, self-report, validated on employed college students and manufacturing company adult workers |

| | | |
|---|---|---|
| A structured method of observing initiation and interactions | Lee, Odom, and Loftin (2007) | While not specifically a measure, this study describes a modified approach to counting the number of initiations and interactions a student displays. |
| Urgency, Premeditation (lack of), Perseverance (lack of), Sensation Seeking, Positive Urgency, Impulsive Behavior Scale (UPPS-P), short | Cyders, Littlefield, Coffey, and Karyadi (2014) | Assesses five facets of impulsivity<br>20 items, self-report, validated on college students |
| Student Perceptions of Leadership Instrument (SPLI) | Zula, Yarrish, and Christensen (2010) | Assesses five areas of leadership development<br>18 items, self-report, validated on college students |
| Need to Belong Scale (NTBS) | Leary, Kelly, Cottrell, and Schreindorfer (2013) | Assesses a participant's desire to belong<br>10 items, self-report, validated on college students and adults recruited online |

**EST Interventions Used**

This study and discussion illuminated many potential and actual ways that EST components can be integrated into horticultural therapy interventions. Within this study, the interventions used most frequently and successfully appeared to fall within humanistic, behavioral, and positive psychotherapeutic approaches. It is likely that a wider variety of EST components could be implemented, but as with traditional psychotherapy, the EST interventions selected will depend heavily on client characteristics. Low cognitive functioning, due to disabilities or trauma, made relationship-, strengths-, and behavior-focused approaches most appropriate for this sample. The presence of these EST components indicate that HT may be as effective as EST-based psychotherapy. Future studies can objectively examine which ESTs and/or evidence-based interventions were incorporated most frequently in interventions by completing therapist, observer, or client-

report measures of the Metatheoretical List of Therapeutic Interventions (MULTI) (McCarthy & Barber, 2008). This includes several questions per orientation (behavioral, common factors, cognitive, dialectical-behavioral, interpersonal, person centered, psychodynamic, and process-experiential) and responses are totaled to assess how much of each therapy's style of intervention is being used. The MULTI offers a way to objectively confirm the presence of ESTs and allows horticultural therapists untrained in psychotherapy a place to start by identifying which perspective they naturally align best with. Research should be conducted to examine the most effective methods of incorporating existing ESTs into horticultural therapy and to assess fidelity to treatment methods and progress to ensure maximum efficacy and a seamless integration.

The presence of EST components can also provide structure and increase effectiveness. Very few horticultural therapy manuals have been created and resources that describe activities do not always connect these to any sort of therapeutic benefit. Little research has been done on types of horticultural therapy interventions and which ones are most helpful for various populations or diagnoses. Therefore, the ability to reference existing books, research, and treatment manuals for ESTs will help therapists maintain a consistent approach with their clients across a variety of activities. Due to its research-based and structured processes, EST component use will likely increase the effectiveness of horticultural therapy while specific horticultural therapy factors are still being researched. To conduct therapy responsibly, it is essential to incorporate what is already known about human psychological functioning and healing practices.

Beyond EST components, horticultural therapy has many mechanisms that diverge from traditional psychotherapy, such as the presence of nature, the closer alignment to

indigenous cultural healing practices, and the engagement and integration of the whole person. Research must examine the mechanisms of horticultural therapy that could become an EST of their own. Horticultural therapy has multiple supporting theories to explain its effectiveness, and any one of these introduces a variety of approaches that traditional psychotherapy does not typically examine (e.g., the Biophilia Hypothesis emphasizes the relationship between people and nature). Further examination must be done on how to create and implement practical interventions that are rooted in these theories.

Like any empirical examination of a therapeutic intervention, steps should be taken to not only identify the effective components within the intervention, but to also identify other influential variables. For example, future researchers could attempt to separate the impact of the therapist, therapeutic relationship, spending time in nature, and the actual therapeutic intervention. Group versus individual HT could also be examined to understand the impact that groups have on client's change or lack thereof. Horticultural therapy's infancy in the Western research world means that there are nearly infinite questions about its effectiveness that can be examined from multiple angles to gain a better understanding of the intervention.

While the primary focus of this document has been to elucidate how ESTs can enhance and legitimize horticultural therapy interventions, it is possible that horticultural therapy interventions can in turn impact how ESTs are implemented. While most ESTs work within the biopsychosocial model, many still emphasize the psychological components above biology and social situations and none incorporate an ecological perspective. By using EST components during horticultural therapy interventions,

therapists can expand psychology's understanding of where and how ESTs can be implemented. Adding the holistic focus of horticultural therapy to ESTs may also help shift the field from its disease model focus and into a model that better captures the complexity of human health and healing.

**Can a Work Environment be Considered Psychotherapy?**

Throughout the summer, behavioral and positive psychotherapy interventions stood out as the most applicable to the population represented in this study. As the therapist received supervision and talked with others about this study, three common questions that arose were whether the intervention could be considered therapy when (1) the clients were at a job site, (2) the clients were receiving pay, and (3) the clients were given performance evaluations.

Morris and Lloyd (2004) examined the gap between psychiatric services and supported work environments and the consequences of this gap. They identified work as a protective factor that increases self-esteem, provides an opportunity to socialize, and empowers the client. They noted that many people with psychiatric disabilities lack the necessary social and vocational skills to function in a competitive work environment, and vocational rehabilitation addresses those deficits to improve clients' vocational status and outcomes. Morris and Lloyd (2004) concluded that mental health treatment and vocational rehabilitation should be integrated to provide maximum benefit to the clients. Another study echoed this sentiment, stating that "meaningful integrated employment" that emphasizes vocational and interpersonal skills should be obtained for youth with Autism Spectrum Disorder (Hendricks & Wehman, 2009). In this study, the therapist at Loveland Youth Gardeners did just this; the clients were provided a supportive and accommodative

work training environment while receiving the necessary therapeutic interventions to experience success. The primary therapeutic focus was on building social, prevocational, and coping skills. This aligns well with the distinction made by Haller et al. (2019) between vocational horticulture and vocational horticultural therapy, with the latter more narrowly providing therapeutic elements by a trained professional and clients with goals.

Anecdotally, the clients within the sample seemed to appreciate a work environment (as opposed to therapy) because it lacked the stigma of therapy, they received pay, they saw their friends every day, and there was a tangible connection to their shared goal of obtaining competitive employment in the future. Furthermore, the clients were able to work in a therapeutic environment which offered the intensive support and skill training that they needed. This work environment removed the stigma of typical therapy that can result in clients believing there was something "wrong" with them. This supportive work environment also allowed clients to feel "normal," as they were not the only one in the group in their specific circumstance (e.g., being in foster care). This desire to be "normal" and not need therapy was so strong that one client declined participation in the study because of the word "therapy" on the consent form.

Finally, a work environment allowed for therapy to be conducted in an experiential manner. Chen & Rybak (2018), in their book on conducting group therapy, state that "clients need *direct experiences*, instead of cognitive explanations." They propose that living through an experience is more powerful than abstract conversations about the concept. While they center on emotional experiences, the same can likely be said for the power of any therapeutic lesson—experiencing it directly will have a larger impact than

talking about it. By engaging in a work environment, the clients spend nearly all of their time experiencing and brief conversations are only used to process experiences as needed.

Extensive literature exists that demonstrates the effectiveness of behavioral economics, or providing cash-based rewards and punishments, on health-related behavior (Haff et al., 2015), but little research exists on the impact of these strategies within adolescents with disabilities or trauma histories. Similarly, research exists on the effect of clients paying differential amounts. One such study concluded that there was no difference in improvement between clients who paid for their services and clients who received it for free (Herron & Sitkowski, 1986) and another found that the non-paying clients improved more than the paying clients (Yoken & Berman, 1984). Within these studies, a limitation was noted that the therapist was paid the same regardless, which rarely happens when therapists work on a sliding-scale fee. However, in the case of Loveland Youth Gardeners, the therapist was paid a flat rate for the entire summer, and this pay was not connected to the number of clients or the pay they received for their job performance. Research about behavioral economics and session fees, while conducted on different populations than the ones in this study, indicate that paying clients to engage in therapy may be a beneficial approach.

To determine the pay the clients received, the therapist gave them evaluations in Week 1, Week 5, and Week 10 of the summer. The evaluation was akin to the concept of feedback discussed by Claiborn and Goodyear (2005). They defined feedback as "a response to an action that shapes or adjusts that action in subsequent performance." They explained that feedback has the purpose of being informative and influential and can be done in an evaluative manner by "offering an assessment of behavior in relation to

performance criteria." Change is promoted through interpersonal influence, and resistance to negative (or constructive) feedback can be mitigated by presenting positive feedback first and by having a trusting, collaborative relationship. They recommended that feedback should be unbiased, relate to client goals, and open to discussion (Claiborn & Goodyear, 2005). This article highlights that feedback can be given in a manner consistent with the formalized evaluations conducted at Loveland Youth Gardeners (LYG) and still exist within the realm of psychotherapy. LYG's evaluations are conducted after a relationship is formed between the therapist and the client, they include an equal balance of positive and negative feedback, the therapist engages the clients in a discussion and welcomes their input on the therapist's observations, and the goal of the feedback is to inform the clients of their patterns, highlight how those coincide with work environment expectations, and promote the desired behaviors.

**Future Directions**

**Measures.** If a similar population is being studied, the measures used should be written at an elementary reading level. However, researchers should ensure that when simplifying the reading level they are not using "childish" measures with options such as picking a smiley face, as that may come across as demeaning to the adolescent participants. Even with knowledge of the general population entering the therapy group, it would likely be helpful for the therapist to select the measures after an initial screening process is complete. This screen will allow the therapist to determine the presenting concerns and goals of the client, as well as determine the client's level of functioning.

In similar samples, measures should be administered via one volunteer per one to two clients. This will allow the volunteer to read the questions aloud if necessary or be

present for any questions that arise for students who can read to themselves. Ideally, the same volunteer will administer the questionnaires for consistency in item interpretation. The presence of a volunteer will also likely increase the likelihood of clients taking the measures seriously (e.g., in this study, one participant wrote in his gender as "attack helecopter [*sic*]"), although it is also likely that a relationship will need to be built to fully eliminate such responses.

New measures should be created, or existing measures adapted, so that they work to examine therapeutic effects within a horticultural therapy environment. Two such examples provided within this study were the Social Skills and Prevocational Skills checklists. These were created based on the therapist's previous experience with the skills necessary to succeed at Loveland Youth Gardeners, and they should be empirically examined. To validate these (or other new measures), several standard steps should be taken (outlined in great detail in DeVellis, 2011 and Raykof & Marcoulides, 2010), including creating an operational definition of the construct, doing a content analysis, creating an item domain by consulting with experts, administering the measure, examining the feedback and statistics, making adjustments, and re-administering the measure to check its final version.

Future studies looking at the interaction of ESTs with HT should incorporate the MULTI as one of the objective measures included. This will allow researchers to better explore which ESTs are appearing within an HT intervention or check that the intervention's intended ESTs are being implemented successfully.

**Daily Note Keeping.** The "Daily Student Notes" document worked well for the purposes of tracking behaviors for this large group due to its efficiency. However, to track

information in a higher quality manner for purposes of billing insurances and remembering information beyond behavioral observations, a more thorough note system is recommended. Horticultural Therapy notes could follow "DAP Note" formatting. This means they would include a Data section that describes what the group activity or general discussion encompassed and information on the individual's participation, an Assessment section that describes the therapist's impressions and conceptualizations, and a Plan section that outlines what future sessions may include. Sometimes groups only include group-wide data, but this is not recommended for groups that will meet more than once. While it can be appropriate to capture an individual's attendance at a psychoeducational group or one-time intervention group (e.g., anxiety management skills), more information should be recorded on clients that will be returning to ensure quality of care. Haller et al. (2019) recommend that horticultural therapists use a note format that both follows the policies in place at their place of work and is frequent enough to track client progress or lack thereof. They emphasized the need to write notes that clearly delineate clients' progress toward their goals. The example progress note they provided includes a behavioral observation and clinical impression (Data and Assessment) (Haller et al., 2019).

**Research.** It continues to be essential for Horticultural Therapy to increase its research presence and rigor. This study modeled statistics appropriate for quantitative analysis of small sample sizes (e.g., effect sizes, Standardized Individual Differences), which is an important step beyond individual case studies. This study also demonstrated the utility of using validated measures. Measures are empirically created to ensure that, as much as possible, they are measuring the construct they intend to and doing so in a consistent manner. Validated measures allow researchers to run analyses that rely on

assumptions of the measure's validity and reliability. Researchers can draw conclusions with adequate confidence when the likelihood of results being due to measurement error are minimized. Future studies should continue to use validated measures and quantitative analyses whenever possible.

**One therapist within a smaller group.** Based on the therapist's observation, reducing group size to approximately six clients (or four in a higher-needs group such as this one) and working with one therapist will simplify some of the intervention processes. One therapist in a smaller group will increase the consistency of interventions, will allow the therapist to see all relevant behaviors (rather than rely on reports of other staff and volunteers), and will likely strengthen the therapeutic relationship. If available, a co-therapist would be ideal, as they will provide additional support, such as for times when a client needs 1:1 time.

Advantages of having a larger group and multiple volunteers and staff is the diversity of interpersonal relationships available. All clients were able to find at least one group member to connect with on a deeper level. Having multiple adult figures allowed clients to see behaviors modeled in a variety of ways, associate authority with a range of people, and learn to flexibly navigate diverse interpersonal dynamics. If the intimacy and consistency of a group with one therapist is desired, the benefits of multiple adults can be gained through activities such as the Farm Stand, when once per week the students worked directly with community members. Finally, it is worth noting that the size of the group should determine the size of the horticulture projects, as a garden space should be large and complex enough to keep the group busy, but not overwhelmingly so. Future studies

could examine differential impacts of the number of therapists and group size on a variety of client variables.

# CONCLUSIONS

The interventions in this study were largely grounded within humanistic, behavioral, and positive psychotherapy approaches. In a sample of at-risk youth, the interventions were most effective at improving social skills, prevocational skills, and gardening skills. No effect was observed on measures of resilience, nature relatedness, mindfulness, or strengths use and knowledge. Mixed results were seen on measure of self- and parent-report measures of anxiety and depression, and declines in self-reported emotion regulation were seen within one client.

Horticultural therapy can be described within the frameworks of Empirically Supported Therapies and researched empirically, even when group sizes are small. The specific EST language that is most applicable depends on the client population and their presenting concerns, just as it does with traditional psychotherapy. It is essential to use existing research knowledge to provide the highest quality care possible. Horticultural therapists already integrate many components of ESTs, and making that connection explicit will allow for refinement, expansion, and research of horticultural therapy interventions. Improving the effectiveness of horticultural therapy may build an intervention that can uniquely heal people within cultures around the world that are experiencing unprecedented separation from nature and address their need for connection—connection to the self, connection to others, and connection to our planet.

# REFERENCES


Allan, B. A., Bott, E. M., & Suh, H. (2014). Connecting Mindfulness and Meaning in Life: Exploring the Role of Authenticity. Mindfulness. doi: 10.1007/s12671-014-0341-z

Amel, E. L., and Manning, C. M. (2012). Exploring the effectiveness of ecological principles as a method for integrating environmental content into psychology courses. *Ecopsychology, 4*(2), 127-136. doi: 10.1089/eco.2012.0034

American Horticultural Therapy Association. (2017). *Definitions and Positions*. Retrieved from: http://www.ahta.org/ahta-definitions-and-positions

American Psychological Association. (2018). *Data and behavioral health in the United States*. Retrieved from: http://www.apa.org/helpcenter/data-behavioral-health.aspx

American Psychological Association, Division 34. (2018). *Ecopsychology*. Retrieved from: http://www.apadivisions.org/division-34/interests/ecopsychology/index.aspx

Angus, L., Watson, J. C., Elliott, R., Schneider, K., & Timulak, L. (2015). Humanistic psychotherapy research 1990–2015: From methodological innovation to evidence-supported treatment outcomes and beyond. *Psychotherapy Research, 25(3)*, 330–347. doi: 10.1080/10503307.2014.989290

Aumann, D., Heschong, L., Wright, R., and Peet, R. (2004). Windows and classrooms: Student performance and the indoor environment. *American Council for an Energy-Efficient Economy*. Retrieved from: https://aceee.org/files/proceedings/2004/data/papers/SS04_Panel7_Paper01.pdf

Bodfish, J. W., Symons, F. J., Parker, D. E., & Lewis, M. H. (2000). Varieties of Repetitive Behavior in Autism: Comparisons to Mental Retardation. *Journal of Autism and Developmental Disorders, 30(3)*, 237-243.

Borkovec, T.D., Newman, M.G., Pincus, A.L., and Lytle, R. (2002). A component analysis of cognitive-behavioral therapy for generalized anxiety disorder and the role of interpersonal problems. *Journal of Consulting and Clinical Psychology, 70*(2), 288-298. doi: 10.1037//0022-006X.70.2.288

Borys, D. S. (1994). Maintaining therapeutic boundaries: The motive is therapeutic effectiveness, not defensive practice. *Ethics & Behavior, 4(3)*, 267-273.

Brogan, K. (2015). The role of the microbiome in mental health: a psychoneuroimmunologic perspective. *Alternative and Complementary Therapies, 21*(2), 61-67. doi: 10.1089/act.2015.21204

Bullard, R. D., Mohai, P., Saha, R., Wright, B. (2007). *Toxic wastes and race at twenty: 1987-2007*. Retrieved from: https://www.nrdc.org/sites/default/files/toxic-wastes-and-race-at-twenty-1987-2007.pdf

Carlo, G., & Randall, B. A. (2002). The Development of a Measure of Prosocial Behaviors for Late Adolescents. *Journal of Youth and Adolescence, 31(1)*, 31–44. doi: 10.1023/A:1014033032440

Claiborn, C. D., & Goodyear, R. K. (2005). Feedback in psychotherapy. *Journal of Clinical Psychology, 61(2)*, 209–217. doi: 10.1002/jclp.20112

Chambless, D. L. and Hollon, S. D. (1998). Defining empirically supported therapies. *Journal of Consulting and Clinical Psychology, 66*(1), 7-18.

Chen, M. and Rybak, C. (2018). Group leadership skills: Interpersonal process in group counseling and therapy. London, United Kingdom: Sage Publications.

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

Cohen, S. (2004). Social relationships and health. *American Psychologist, 9*, 676-684.

Compas, B. E., Jaser, S. S., Bettis, A. H., Watson, K. H., Gruhn, M. A., Dunbar, J. P., Thigpen, J. C. (2017). Coping, emotion regulation, and psychopathology in childhood and adolescence: A meta-analysis and narrative review. *Psychological Bulletin*, *143*(9), 939–991. doi:10.1037/bul0000110

Corey, G. (2001). *Theory and Practice of Counseling and Psychology, 6th edition.* Belmont, California: Wadsworth/Thomson Learning.

Cumming, G. (2012). *Understanding the New Statistics: Effect Sizes, Confidence Intervals, and Meta-Analyses*. New York, NY: Taylor & Francis Group.

Cyders, M. A., Littlefield, A. K., Coffey, S., & Karyadi, K. A. (2014a). Examination of a short English version of the UPPS-P Impulsive Behavior Scale. *Addictive Behaviors*, 39(9), 1372–1376. doi: 10.1016/j.addbeh.2014.02.013

Daley, A. (2008). Exercise and depression: A review of reviews. *Journal of Clinical Psychology in Medical Settings, 15*(2), 140–147. doi:10.1007/s10880-008-9105-z

David, D., and Montgomery, G. H. (2011). The Scientific Status of Psychotherapies: A New Evaluative Framework for Evidence-Based Psychosocial Interventions. *Clinical Psychology: Science and Practice, 18(*2), 89–99. doi:10.1111/j.1468-2850.2011.01239.x

Davis, K. M. and Atkins, S. S. (2004). Creating and teaching a course in ecotherapy: We went to the woods. *Journal of Humanistic Counseling, Education, and Development, 43*, 211-218.

DeVelis, R. F. (2011). *Scale Development: Theory and Applications* (3rd ed). Thousand Oaks, CA: SAGE Publications.

Duncan, B. L., Miller, S. D., Wampold, B. E., and Hubble, M.A. (2010). *The heart & soul of change: delivering what works in therapy* (2nd ed). Washington, DC: American Psychological Association.

Dunlap, R. E. and Van Liere, K. D. (2008). The "New Environmental Paradigm." *The Journal of Environmental Education, 40*(1), 19-28. doi: 10.3200/JOEE.40.1.19-28

Ebesutani, C., Korathu-Larson, P., Nakamura, B. J., Higa-McMillan, C., & Chorpita, B. (2017). The Revised Child Anxiety and Depression Scale 25–Parent Version: Scale Development and Validation in a School-Based and Clinical Sample. *Assessment*, *24*(6), 712–728. doi:10.1177/1073191115627012

Ebesutani, C., Reise, S. P., Chorpita, B. F., Ale, C., Regan, J., Young, J., Weisz, J. R. (2012). The Revised Child Anxiety and Depression Scale-Short Version: Scale reduction via exploratory bifactor modeling of the broad anxiety factor. *Psychological Assessment*, *24*(4), 833–845. doi:10.1037/a0027283

Erford, B. T. (2015). *40 Techniques Every Counselor Should Know, 2nd edition*. Hoboken, New Jersey: Pearson Education, Inc.

Estrada, E., Ferrer, E., and Pardo, A. (2019). Statistics for evaluating pre-post change: Relation between change in the distribution center and change in the individual scores. *Frontiers in Psychology, 9(2696)*. doi: 10.3389/fpsyg.2018.02696

Ferrer, R., & Pardo, A. (2014). Clinically meaningful change: False positives in the estimation of individual change. *Psychological Assessment, 26(2),* 370–383. doi: 10.1037/a0035419

Fisher, A. (2013). *Radical Ecopsychology: Psychology in the services of life*. New York, New York: State University of New York Press.

Gagné, M., Forest, J., Vansteenkiste, M., Crevier-Braud, L., van den Broeck, A., Aspeli, A. K., … Westbye, C. (2015a). The Multidimensional Work Motivation Scale: Validation evidence in seven languages and nine countries. *European Journal of Work and Organizational Psychology, 24(2),* 178–196. doi: 10.1080/1359432X.2013.877892

Gonzalez, M. T., Hartig, T., Grindal Patil, 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, 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

Govindkji, R. and Linley, P. A. (2007). Strengths use, self-concordance and well-being: Implications for strengths coaching and coaching psychologists. *International Coaching Psychology Review, 2*(2), 143-153.

Greco, L. A., Baer, R. A., & Smith, G. T. (2011). Assessing mindfulness in children and adolescents: Development and validation of the Child and Adolescent Mindfulness Measure (CAMM). *Psychological Assessment*, *23*(3), 606–614. doi:10.1037/a0022819

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348–362. doi:10.1037/0022-3514.85.2.348

Gullone, E., & Taffe, J. (2012). The Emotion Regulation Questionnaire for Children and Adolescents (ERQ–CA): A psychometric evaluation. *Psychological Assessment*, *24*(2), 409–417. doi:10.1037/a0025777

Haller, R. L. and Capra, C.L. (2017). *Horticultural therapy methods: Connecting people and plants in health care, human services, and therapeutic programs, 2nd edition*. Boca Raton, Florida: Taylor & Francis Group.

Haller, R. L., Kennedy, K. L., and Capra, C. L. (2019) *The practice and profession of horticultural therapy*. Boca Raton, Florida: Taylor & Francis Group.

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and Commitment Therapy: Model, processes and outcomes. *Behaviour Research and Therapy*, *44*(1), 1–25. doi:10.1016/j.brat.2005.06.006

Hoff, N., Mitesh, S. P., Lim, R., Zhu, J., Troxel, A. B., Asch, D. A., and Volpp, K. G. (2015). The role of behavioral economic incentive design and demographic characteristics in financial incentive-based approaches to changing health behaviors: A meta-analysis. *American Journal of Health Promotion, 29(5)*, 314-323. doi: 10.4278/ajhp.140714-LIT-333

Hu, T., Zhang, D., Wang, J., Mistry, R., Ran, G., & Wang, X. (2014). Relation between Emotion Regulation and Mental Health: A Meta-Analysis Review. *Psychological Reports*, *114*(2), 341–362. doi:10.2466/03.20.PR0.114k22w4

Im, E.-A., Park, S.-A., & Son, K.-C. (2018). Developing evaluation scales for horticultural therapy. *Complementary Therapies in Medicine*, *37*, 29–36. doi:10.1016/j.ctim.2018.01.008

Jordan, M. (2015). *Nature and therapy: understanding counselling and psychotherapy in outdoor spaces* (Dual First). New York: Routledge, Taylor & Francis Group.

Joseph, S. (2015). Facilitating Forgiveness Using Group and Community Interventions, in *Positive Psychology in Practice*, (659-680). Hoboken, NJ, USA: John Wiley & Sons.

Kaplan, R. and Kaplan, S. (1996). *The Experience of Nature: A psychological perspective*. New York, New York: Cambridge University Press.

Kellert, S. R., Case, D. J., Escher, D., Witter, D. J., Mikels-Carrasco, J., and Seng, P. T. (2017). The nature of Americans: Disconnection and recommendations for reconnection, National report. Retrieved from: https://www.natureofamericans.org

Kellert, S. R., and Wilson, E. O. (1993). *The Biophilia Hypothesis*. United Kingdom: Shearwater.

Korpela, K. M., Stengard, E., and Jussila, P. (2016). Nature walks as a part of therapeutic intervention for depression. *Ecopsychology, 8*(1), 8-15. doi: 10.1089/eco.2015.0070

Kuby, A. K., McLean, N., & Allen, K. (2015). Validation of the Child and Adolescent Mindfulness Measure (CAMM) with non-clinical adolescents. *Mindfulness*, *6*(6), 1448–1455. doi:10.1007/s12671-015-0418-3

Ladd, G. W., & Profilet, S. M. (1996). The Child Behavior Scale: A Teacher-Report Measure of Children's Aggressive, Withdrawn, and Prosocial Behaviors. *Developmental Psychology, 32(6)*, 1008-1024.

Lambert, M. J. (1992). Psychotherapy outcome research: Implications for integrative and eclectical therapists. In J. C. Norcross & M. R. Goldfried (Eds.), Handbook of psychotherapy integration (pp. 94-129). New York, NY, US: Basic Books.

Leach, A. (2015). *Exporting trauma: can the talking cure do more harm than good?* Retrieved from: https://www.theguardian.com/global-development-professionals-network/2015/feb/05/mental-health-aid-western-talking-cure-harm-good-humanitarian-anthropologist

Leary, M. R., Kelly, K. M., Cottrell, C. A., and Schreindorfer, L. S. (2013). Construct validity of the Need to Belong Scale: Mapping the nomological network. *Journal of Personality Assessment*, 1-15. doi: 10.1080/00223891.2013.819511

Lee, S., Odom, S. L., & Loftin, R. (2007). Social Engagement With Peers and Stereotypic Behavior of Children With Autism. *Journal of Positive Behavior Interventions, 9(2)*, 67–79. doi: 10.1177/10983007070090020401

Lee, Y.-H., Ro, M.-R., and Lee, Y.-S. (2004). Effects of horticultural activities on anxiety reduction of female high school students. *Acta Horticulturae, 639*, 249-251. doi: 10.17660/ActaHortic.2004.639.32

Linderbaum, B. A., & Levy, P. E. (2010). The Development and Validation of the Feedback Orientation Scale (FOS). *Journal of Management, 36(6)*, 1372–1405. doi: 10.1177/0149206310373145

Loveland Youth Gardeners (2018). *Welcome to Loveland Youth Gardeners*. Retrieved from www.lovelandyouthgardeners.org

Lumber, R., Richardson, M., & Sheffield, D. (2017). Beyond knowing nature: Contact, emotion, compassion, meaning, and beauty are pathways to nature connection. *PLOS ONE*, *12*(5), e0177186. doi:10.1371/journal.pone.0177186

Macgowan, M. J. (1997). A Measure of Engagement for Social Group Work: The Groupwork Engagement Measure (GEM). *Journal of Social Service Research, 23(2)*, 17–37. doi: 10.1300/J079v23n02_02

McGeeney, A. (2016). *With nature in mind: the ecotherapy manual for mental health professionals*. London ; Philadelphia: Jessica Kingsley Publishers.

McCarthy, K. S. and Barber, J. P., (2008). The Multitheoretical List of Therapeutic Interventions (MULTI): Initial report. *Psychotherapy Research 19(1)*, 96-113. doi: 10.1080/10503300802524343

Michie, S., Johnston, M., Francis, J., Hardeman, W., & Eccles, M. (2008). From Theory to Intervention: Mapping Theoretically Derived Behavioural Determinants to Behaviour Change Techniques. *Applied Psychology*, *57*(4), 660–680. doi:10.1111/j.1464-0597.2008.00341.x

Nelson, C., 2009. Appreciating gratitude: Can gratitude be used as a psychological intervention to improve individual well-being? *Counseling Psychology Review, 24*(3&4), 38-50.

Nisbet, E. K., & Zelenski, J. M. (2013). The NR-6: a new brief measure of nature relatedness. *Frontiers in Psychology*, *4*. doi:10.3389/fpsyg.2013.00813

Patterson, T. L. and Leeuwenkamp, O. R. (2008). Adjunctive psychosocial therapies for the treatment of schizophrenia. Schizophrenia Research, 100, 108-119.

Pitt, H. (2014). Therapeutic experiences of community gardens: putting flow in its place. *Health & Place*, 27, 84–91. doi:10.1016/j.healthplace.2014.02.006

Rashid, T. (2015). Positive psychotherapy: A strength-based approach. *The Journal of Positive Psychology*, 10(1), 25–40. doi:10.1080/17439760.2014.920411

Raykov, T. and Marcoulides, G. A. (2010). *Introduction to Psychometric Theory*. United Kingdom: Routledge.

Readable.IO (2018). *Measure text readability*. Retrieved from https://readable.io/text/

Relf, D. (2012). Advancing horticultural therapy through research and publishing. *Acta Horticulturae, 954*, 13-20.

Saval, N. (2014). *Cubed: a secret history of the workplace* (First edition). New York: Doubleday.

Schlomer, G. L., Bauman, S., & Card, N. A. (2010a). Best practices for missing data management in counseling psychology. *Journal of Counseling Psychology, 57(1)*, 1–10. doi: 10.1037/a0018082

Schneider, S. L. (2001). In search of realistic optimism: Meaning, knowledge, and warm fuzzies. *American Psychologist, 56(3)*, 250-263. doi: 10.1O37//O0O3-O66X.56.3.250

Seligman, M. E., Rashid, T., and Parks, A. C. (2006). Positive Psychology. *American Psychologist*, 774-788.

Shields, S. A., Mallory, M. E., and Simon, A. (1989). The Body Awareness Questionnaire: Reliability and Validity. *Journal of Personality Assessment*, 803-815. doi: 10.1207/s15327752jpa5304_16

Shoemaker, C. A. and Diehl, E. R. M. (2012). The practice and profession of horticultural therapy in the United States. *Acta Horticulturae, 954*, 161-163.

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine*, *15*(3), 194–200. doi:10.1080/10705500802222972

Son, K.C., Jung, S.J., Lee, A.Y., and Park, S.A. (2016). The theoretical model and universal definition of horticultural therapy. *Acta Horticulturae, 1121*, 70-80. doi: 10.17660/ActaHortic.2016.1121.12

Sussman, R. (2014). Deeper than our differences: the five common factors of ecopsychology. *Ecopsychology, 6*(1), 51-52. doi: 10.1089/eco.2014.0004

Tolin, D. F., McKay, D., Forman, E. M., Klonsky, E. D., & Thombs, B. D. (2015). Empirically supported treatment: recommendations for a new model. *Clinical Psychology: Science and Practice, 22*(4), 317–338. doi:10.1111/cpsp.12122

Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M. A., & Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology, 11*(3), 201–230. doi:10.1016/S0272-4944(05)80184-7

Whear, R., Thompson Coon, J., Bethel, A., Abbott, R., Stein, K., & Garside, R. (2014). What is the impact of using outdoor spaces such as gardens on the physical and mental well-being of those with dementia? A systematic review of quantitative and qualitative evidence. Jamda, 15, 697-705. doi: http://dx.doi.org/10.1016/j.jamda.2014.05.013

Wichrowski, M.J. (2006). Skills and theories to inform horticultural therapy practice. *Journal of Therapeutic Horticulture, 17*, 48-54.

Wilson, E. O. (1984). *Biophilia, 1st edition*. Cambridge, Massachusetts: Harvard University Press.

Windle, G., Bennett, K.M., and Noyes, J. (2011). A methodological review of resilience measurement scales. *Health and Quality of Life Outcomes, 9*(8). Retrieved from: http://www.hqlo.com/content/9/1/8

Wise, J. (2015). *Digging for Victory: Horticultural therapy with veterans for post-traumatic growth*. London: Karnac Books.

Wohldmann, E. L. (2016). An Urban Dweller's Guide to Rewilding. Presentation delivered at TEDxUCLA.

Wood, T. (2013). Re-wilding yourself. Presentation delivered at TEDxTallaght.

Wood, A. M., Linley, P. A., Maltby, J., Kashdan, T. B., & Hurling, R. (2011). Using personal and psychological strengths leads to increases in well-being over time: A longitudinal study and the development of the strengths use questionnaire. *Personality and Individual Differences*, *50*(1), 15–19. doi:10.1016/j.paid.2010.08.004

Woodward, S., & Holden, P. (1984). A Rating Scale for Use in Horticultural Therapy. British Journal of Occupational Therapy, 47(7), 211–214. doi:10.1177/030802268404700706

Yalom, I.D. and Leszcz, M. (2005). *The theory and practice of group psychotherapy*. New York, NY: Basic Books.

Zettle, R.D., Rains, J.C., and Hayes, S.C. (2011). Processes of change in acceptance and commitment therapy and cognitive therapy for depression: A mediation reanalysis of Zettle and Rains. *Behavior Modification, 35*(3), 265-283. doi: 10.1177/0145445511398344

Zolkoski, S.M. and Bullock, L.M. (2012). Resilience in children and youth: A review. *Children and Youth Services Review, 34*, 2295-2303. doi: http://dx.doi.org/10.1016/j.childyouth.2012.08.009

Zula, K., Yarrish, K., & Christensen, S. D. (2010a). Initial assessment and validation of an instrument to measure student perceptions of leadership skills. *Journal of Leadership Studies, 4(2)*, 48–55. doi: 10.1002/jls.20168

## YGP Garden Observations

DATE _____

What do you see in your garden? What plants are growing?

_____
_____
_____

Do your plants look healthy? Which of them is the tallest?

_____
_____
_____

Describe the bugs you see in your garden. Look close! You may have to dig around…

_____
_____
_____

Do you see flowers or fruit in your garden? If so, describe them.

_____
_____
_____

Draw something in your garden:

APPENDIX B: Student Gardener Evaluation

Student Name: _____ Date of Initial: _____

**Loveland Youth Gardeners**

Planting Seeds. Growing Youth. Nourishing Community.

## **Youth Gardening Program:** Student Gardener Evaluation

Initial scores are based on the following scale:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| never (almost never) | rarely | sometimes | often | always (almost always) |

| Critical Skill Development | Scores | Comments/Next Steps |
|---|---|---|
| **Responsibility** *The student is reliable, prepared, active, and accountable.* | Initial:<br>Mid:<br>Final: | |
| **Communication** *The student is an active participant and uses appropriate social skills.* | Initial:<br>Mid:<br>Final: | |
| **Working w/ Others** *The student is respectful, cooperative, and supportive.* | Initial:<br>Mid:<br>Final: | |
| **Self-Management** *The student is self-aware, knowing areas of strength and growth, intentionally choosing (re)actions, and using appropriate self-care.* | Initial:<br>Mid:<br>Final: | |

Initial Evaluation: Instructor Initials _____ Student Initials _____

Mid and final scores are based on the following scale:

| - | o | + |
|---|---|---|
| worse | same | better |

## Midterm Evaluation

Improvement must be shown in at least two areas in order to receive full pay of $100 (the other two areas may be maintained at the midterm point). If improvement is only shown in one area, the student will receive $75, and if improvement is not shown in any area, the student will receive $50. All areas must be maintained at the same score; a $25 deduction will occur for each area that the student did not maintain (with pay going no lower than $0).

Number of categories improved in: _____ Number of days missed: _____

Midterm Pay: _____ Instructor Initials _____ Student Initials _____

## Final Evaluation

Improvement must be shown in at least <u>three</u> areas in order to receive full pay of $150 (the other area may be maintained). If improvement is only shown in two areas, the student will receive $125, and if improvement is not shown in any area, the student will receive $100. All areas must be maintained at the same score; a $25 deduction will occur for each area that the student did not maintain (with pay going no lower than $0). The final paycheck is also impacted by the number of days missed (1 day = 3 hours). For each day over 8 missed, $10 will be deducted from the final pay amount. Hours may be made up by making an arrangement with the instructor to come early or stay late. (Hour example: 12 days missed, 2 days (6 hours) made up = $20 off paycheck)

Number of categories improved in _____

Number of days missed _____, Number of days made up _____ = Total days missed _____

Final pay: _____ Instructor Signature _____ Student Signature _____

APPENDIX C: Evaluation Skills Examples

***Responsibility***

- Takes care of garden
- Is on time and prepared *every day*
- Takes initiative, asks if help is needed and does w/o being asked
- Completes assigned roles/tasks independently
- Follows directions promptly and accurately
- Completes assignments
- Follows rules
- Stays on task and manages time wisely
- Takes responsibility (doesn't blame others) when something goes wrong

***Communication***

- Participates in group discussions
- Has positive verbal/non-verbal interactions with peers and staff
- Demonstrates appropriate greetings during program (good handshake, eye contact, clear voice)
- Observes & pays attention
- Listens effectively
- Asks questions
- Self-discloses appropriately

***Working w/ Others***

- Uses only respectful language
- Respects physical boundaries
- Willingly participates in group work
- Asks others questions
- Shows appreciation and gratitude
- Cooperates in a group
- Respects others' opinions/emotions
- Maintains a positive attitude
- Acts as if in a "work" environment (e.g., not "goofing around")

***Self Management***

- Can ID positive personal achievements
- Can ID positive personal attributes
- Can describe areas in which they can improve
- Takes accountability for actions
- Has positive coping mechanisms for stress
- Reacts appropriately when things go well OR badly
- Thinks before acting
- Demonstrates professional behavior at "work"
- Maintains personal hygiene (e.g., clean body, clean clothing)
- Knows "table manners" (e.g., not talking with mouth full, coughing into elbow)

APPENDIX D: Consent Form

**Consent to Participate in a Research Study**
**Colorado State University**

**TITLE OF STUDY:** Counseling Psychology's Perspective on Horticultural Therapy Practices

**Principal Investigator:** Kathryn Rickard, Ph.D., Associate Professor, Psychology Department, kathryn.rickard@colostate.edu

**CO-Principal Investigator:** Jaime Ascencio, M.S., Graduate Student, Psychology Department, jaime.ascencio@colostate.edu

**WHY IS MY CHILD/AM I BEING INVITED TO TAKE PART IN THIS RESEARCH?**
Loveland Youth Gardeners is a unique program that has a limited enrollment capacity. Because of this, we are trying to learn about the benefits programs like this may provide for their participants. Our hope is that our findings will help Loveland Youth Gardeners to learn more about their program's outcomes, help increase the number of similar programs, and increase the knowledge within the field of horticultural therapy. As a gardener here at Loveland Youth Gardeners, we would like to learn about how your student was impacted by his/her participation.

**WHO IS DOING THE STUDY?**
Jaime Ascencio will be the researcher that you interact with (i.e., when she hands out the surveys). Kathryn Rickard, Ph.D., her advisor and the principle investigator, will be assisting her in designing and interpreting the information within the study.

**WHAT IS THE PURPOSE OF THIS STUDY?**
This study is looking to understand the emotional, vocational, social, and psychological outcomes from participating in Loveland Youth Gardeners.

**WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?**
At the beginning and end of the 10-week summer program, your child will be asked to spend up to one hour completing the surveys and you will be asked to complete one survey. All of the study will take place on-site at Loveland Youth Gardeners.

**WHAT WILL MY CHILD/I BE ASKED TO DO?**
Your child will be asked to complete several short surveys about his/her self-esteem, nature connection, mindfulness, strengths, and emotions. You will be asked to complete one survey about your child's mood, which should take less than 15 minutes. There also may be an undergraduate research assistant who comes once per week to watch everyone and take notes on specific behaviors that they see the students doing (e.g., how many times they ask for a break vs. go on a break without asking).

**ARE THERE REASONS WHY I SHOULD NOT TAKE PART IN THIS STUDY?**
There are minimal risks expected (see below), so participation is a personal preference. If you think that your child would respond unusually negatively to completing surveys or you think your child will not be able to understand the study and provide informed consent, you may choose to not have him/her participate. If you consent, your child will be offered the option of participating. The researcher will explain the study by going over the assent form. Your child will be asked to summarize back parts of the assent form to the researcher to ensure understanding. If your child, after the researcher clarifies a misconception once, still does not understand the study, they will be thanked and not be asked to participate.

**WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?**
There is a slight chance that your child may find some of the questions on the surveys uncomfortable to think about or upsetting in some way. Please note that it is not possible to identify all potential risks in research procedures, but the researchers have taken reasonable safeguards to minimize any known and potential, but unknown, risks.

**ARE THERE ANY BENEFITS FROM TAKING PART IN THIS STUDY?**
There may be no direct benefit to your child, but s/he child may find him/herself being able to better reflect on his/her own abilities and experiences. Your child also may discover areas of growth or continued improvement when he/she complete the surveys again at the end of the summer. Your child will also be contributing to research that may help programs like Loveland Youth Gardeners to grow.

**DO I HAVE TO TAKE PART IN THE STUDY?**
Your and your child's participation in this research is voluntary. If you decide to participate in the study, you or your child may withdraw consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled.

**WHO WILL SEE THE INFORMATION THAT I GIVE?**
We will keep private all research records that identify your child to the extent allowed by law. For this study, only your child's research participation number will be placed on the forms, and the paper linking research number to child name (necessary so that the first week's tests can be linked with the last week's test results) will be stored securely. We may be asked to share the research files for audit purposes with the CSU Institutional Review Board ethics committee, if necessary. When we write about the study to share with other researchers, we will write about the combined information we have gathered. You should know, however, that there are some circumstances in which we may have to show your information to other people. For example, the law may require us to show your child's information to a court OR *to tell authorities if we believe abuse or neglect of a protected population (i.e., child, elder, person with a disability) has occurred or your child poses a danger to him/herself or someone else.*

**WILL I RECEIVE ANY COMPENSATION FOR TAKING PART IN THIS STUDY?**
No tangible compensation will be provided for participation.

**WHAT IF I HAVE QUESTIONS?**
Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions about the study, you can contact the investigator, Jaime Ascencio, at jaime.ascencio@colostate.edu. If you have any questions about your rights as a volunteer in this research, contact the CSU IRB at: RICRO_IRB@mail.colostate.edu; 970-491-1553. We will give you a copy of this consent form to take with you.

Your signature acknowledges that you have read the information stated and willingly sign this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing 3 pages.

**PARENTAL SIGNATURE FOR MINOR**

As parent or guardian I authorize _____ (print name) to become a participant for the described research. The nature and general purpose of the project have been satisfactorily explained to me by _____ and I am satisfied that proper precautions will be observed.

_____
Minor's date of birth

_____
Parent/Guardian name (printed)

_____ _____
Parent/Guardian signature Date

_____ _____
Name of person providing information to participant Date

_____
Signature of Research Staff

APPENDIX E: Assent Form

**Assent to Participate in a Research Study**
**Colorado State University**

**TITLE OF STUDY:**
Counseling Psychology's Perspective on Horticultural Therapy Practices

**Principal Investigator:** Kathryn Rickard, Ph.D., Associate Professor, Psychology Department, kathryn.rickard@colostate.edu

**CO-Investigator:** Jaime Ascencio, M.S., Graduate Student, Psychology Department, jaime.ascencio@colostate.edu

**WHAT IF I HAVE QUESTIONS?**
For questions or concerns about the study, you may contact Jaime Ascencio, at jaime.ascencio@colostate.edu.

For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted, contact the CSU IRB at: RICRO_IRB@mail.colostate.edu; 970-491-1553. We will give you a copy of this consent form to take with you.

**WHAT IS THE PURPOSE OF THIS STUDY?**
We want to learn how Loveland Youth Gardeners (LYG) affects your emotions and self-knowledge. We also want to know how your work skills, social skills, and gardening knowledge change over time.

**WHY AM I BEING INVITED TO TAKE PART IN THIS RESEARCH?**
You are being asked to participate in this study because you are a youth aged 13-19 who is a part of the LYG program.

**WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?**
At the beginning and end of the 10-week-long summer program, we will ask you to fill out some surveys. This will take 45-60 minutes each time. The study will be done here at LYG. Total, your time commitment is about 3-4 hours.

**WHAT WILL I BE ASKED TO DO?**
We will ask you to complete several short surveys about your emotions, knowledge, and skills. There might be a college student who comes once per week. He/she will watch everyone and take notes on what they see all of you doing. For example, he/she might write how many times you ask for a break vs. go on a break without asking.

**ARE THERE REASONS WHY I SHOULD NOT TAKE PART IN THIS STUDY?**
Sometimes guardians or parents do not want their child to participate in research. If your parent or guardian says so, you will do something else during the survey time. If the surveys are too hard for you to read, you will not need to complete the study.

**WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?**
There are no known risks included with this study. While the level of risk is minimal, you may become uncomfortable with some questions on the surveys. You can skip any questions that you do not want to answer.

**ARE THERE ANY BENEFITS FROM TAKING PART IN THIS STUDY?**
There may be no direct benefit to you as a participant in this study. However, we hope that you may discover areas of growth or improvement. We also hope that this will help programs like Loveland Youth Gardeners grow.

**DO I HAVE TO TAKE PART IN THE STUDY?**
Your participation in this study is voluntary. You may refuse to participate in this study or any part of this study. Whether you participate in this research or not will have no impact on your position with the LYG program.

**WHO WILL SEE THE INFORMATION THAT I GIVE?**
We will keep all research records that identify you private, to the extent allowed by law. For this study, we will give you a number instead of putting your name on the surveys. We might be asked to share the research files with the CSU Institutional Review Board ethics committee. When we write about the study, we will write about all of the students together. Sometimes we may have to show your information to other people. For example, the law may require us to show your information to a court OR *tell authorities if we believe abuse or neglect of a protected population (i.e., child, elder, person with a disability) has occurred or you may be a danger to him/herself or someone else.*

**WILL I RECEIVE ANY COMPENSATION FOR TAKING PART IN THIS STUDY?**
You will not be compensated for participating in this research.

Your signature confirms that you read this information and willingly sign this consent form. Your signature also says that you have received a copy of this document containing 2 pages.

_____ _____
Signature of person agreeing to take part in the study Date

_____
Printed name of person agreeing to take part in the study

_____ _____
Name of person providing information to participant Date

_____
Signature of Research Staff

PARENTAL SIGNATURE FOR MINOR

As parent or guardian I authorize _____ (print name) to become a participant for the described research. The nature and general purpose of the project have been satisfactorily explained to me by _____ and I am satisfied that proper precautions will be observed.

_____
Minor's date of birth

_____
Parent/Guardian name (printed)

_____ _____
Parent/Guardian signature Date

## APPENDIX F: Instructions for Measures

Researcher's script to read to participants before they take the measures:
"Thank you all for agreeing to take these surveys. Please take your time, read it carefully, and raise your hand if you have any questions. Please answer as honestly and accurately as you can. It is really important for you to be honest and not go too quickly. That way, we can understand how this program affects its students. If you go too quickly or just circle random answers, the information will not be helpful."

APPENDIX G: Demographics

Please fill in the blank or circle the response that best describes you.

Age: _____

Grade in School (in the fall): _____

Gender: male female other: _____

Ethnicity: (you may select more than one)
Caucasian African or African American Asian or Asian American
Latino/a Native American or American Indian
Native Hawaiian or Pacific Islander Other: _____

Do you receive an IEP or special education at school?
Yes No

Do you have a disability?
Yes No
If yes, what is it? _____

Do you have a mental health diagnosis (e.g., depression, ADHD, Autism)?
Yes No
If yes, what? _____

Have you ever been involved with the legal system (e.g., been arrested)?
Yes No

Have you ever been involved with Child Protective Services (e.g., CPS interviewed you or your family, you were removed from your home)?
Yes No

Have you ever used any substances (e.g., alcohol, cigarettes, other drugs)?
Yes No
If yes, what? _____
If yes, how often? _____

Note: SES and guardian information was obtained from the application form. Students were identified as "low-income" or "not low-income" based on whether their parent

endorsed them receiving free/reduced school lunches. Guardian titles were obtained as reported by the student (e.g., “grandmother,” “foster parent,” “father”).

APPENDIX H: The Revised Children's Anxiety and Depression Scale-Parent-Short Version (RCADS-P-Short)

Please put a circle around the word that shows how often each of these things happen to you. There are no right or wrong answers.

| | | | | |
|---|---|---|---|---|
| 1. My child feels sad or empty | Never | Sometimes | Often | Always |
| 2. My child worries when he/she thinks he/she has done poorly at something | Never | Sometimes | Often | Always |
| 3. My child feels afraid of being alone at home | Never | Sometimes | Often | Always |
| 4. Nothing is much fun for my child anymore | Never | Sometimes | Often | Always |
| 5. My child worries that something awful will happen to someone in the family | Never | Sometimes | Often | Always |
| 6. My child is afraid of being in crowded places (like shopping centers, the movies, buses, busy playgrounds) | Never | Sometimes | Often | Always |
| 7. My child worries what other people think of him/her | Never | Sometimes | Often | Always |
| 8. My child has trouble sleeping | Never | Sometimes | Often | Always |
| 9. My child feels scared to sleep on his/her own | Never | Sometimes | Often | Always |
| 10. My child has problems with his/her appetite | Never | Sometimes | Often | Always |
| 11. My child suddenly becomes dizzy or faint when there is no reason for this | Never | Sometimes | Often | Always |
| 12. My child has to do some things over and over again (like washing hands, cleaning, or putting things in a certain order) | Never | Sometimes | Often | Always |
| 13. My child has no energy for things | Never | Sometimes | Often | Always |
| 14. My child suddenly starts to tremble or shake when there is no reason for this | Never | Sometimes | Often | Always |
| 15. My child cannot think clearly | Never | Sometimes | Often | Always |
| 16. My child feels worthless | Never | Sometimes | Often | Always |
| 17. My child has to think of special thoughts (like numbers or words) to stop bad things from happening | Never | Sometimes | Often | Always |
| 18. My child thinks about death | Never | Sometimes | Often | Always |
| 19. My child feels like he/she doesn't want to move | Never | Sometimes | Often | Always |
| 20. My child worries that he/she will suddenly get a scared feeling when there is nothing to be afraid of | Never | Sometimes | Often | Always |
| 21. My child is tired a lot | Never | Sometimes | Often | Always |
| 22. My child feels afraid that he/she will make a fool of him/herself in front of people | Never | Sometimes | Often | Always |
| 23. My child has to do some things in just the right way to stop bad things from happening | Never | Sometimes | Often | Always |
| 24. My child feels restless | Never | Sometimes | Often | Always |
| 25. My child worries that something bad will happen to him/her | Never | Sometimes | Often | Always |

APPENDIX I: Emotion Regulation Questionnaire for Children and Adolescents (ERQ)

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one
another, they differ in important ways. For each item, please answer using the following scale:

1----------2----------3----------4----------5
strongly disagree disagree half and half agree strongly agree

1. ____ When I want to feel happier, I think about something different.
2. ____ I keep my feelings to myself.
3. ____ When I want to feel less bad (e.g., sad, angry, or worried), I think about something different.
4. ____ When I am feeling happy, I am careful not to show it.
5. ____ When I'm worried about something, I make myself think about it in a way that helps me feel better.
6. ____ I control my feelings by not showing them.
7. ____ When I want to feel happier about something, I change the way I'm thinking about it.
8. ____ I control my feelings about things by changing the way I think about them.
9. ____ When I am feeling bad (e.g., sad, angry, or worried), I'm careful not to show it.
10. ____ When I want to feel less bad (e.g., sad, angry, or worried) about something, I change the way I'm thinking about it.

APPENDIX J: Child and Adolescent Mindfulness Measure (CAMM)

We want to know more about how you think, how you feel, and what you do. **Read** each sentence. Then, circle the number that tells **how often each sentence is true for you.**

| | Never True | Rarely True | Some-times True | Often True | Always True |
|---|---|---|---|---|---|
| 1. I get upset with myself for having feelings that don't make sense. | 0 | 1 | 2 | 3 | 4 |
| 2. At school, I walk from class to class without noticing what I'm doing. | 0 | 1 | 2 | 3 | 4 |
| 3. I keep myself busy so I don't notice my thoughts or feelings. | 0 | 1 | 2 | 3 | 4 |
| 4. I tell myself that I shouldn't feel the way I'm feeling. | 0 | 1 | 2 | 3 | 4 |
| 5. I push away thoughts that I don't like. | 0 | 1 | 2 | 3 | 4 |
| 6. It's hard for me to pay attention to only one thing at a time. | 0 | 1 | 2 | 3 | 4 |
| 7. I get upset with myself for having certain thoughts. | 0 | 1 | 2 | 3 | 4 |
| 8. I think about things that have happened in the past instead of thinking about things that are happening right now. | 0 | 1 | 2 | 3 | 4 |
| 9. I think that some of my feelings are bad and that I shouldn't have them. | 0 | 1 | 2 | 3 | 4 |
| 10. I stop myself from having feelings that I don't like. | 0 | 1 | 2 | 3 | 4 |

**SHORT FORM VERSION OF THE NATURE RELATEDNESS SCALE (NR-6)**

**Instructions**: For each of the following, please rate the extent to which you agree with each statement, using the scale from 1 to 5 as shown below. Please respond as you really feel, rather than how you think "most people" feel.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| **Disagree strongly** | **Disagree a little** | **Neither agree or disagree** | **Agree a little** | **Agree strongly** |

1. My ideal vacation spot would be a remote, wilderness area.
2. I always think about how my actions affect the environment.
3. My connection to nature and the environment is a part of my spirituality.
4. I take notice of wildlife wherever I am.
5. My relationship to nature is an important part of who I am.
6. I feel very connected to all living things and the earth.

APPENDIX L: Prevocational and Social Skills Checklists

| Prevocational and Social Skills Checklist | Never | Rarely | Sometimes | Often | Always | N/A |
|---|---|---|---|---|---|---|
| **Prevocational Behavior** | **1** | **2** | **3** | **4** | **5** | |
| attends work regularly | | | | | | |
| on time | | | | | | |
| takes initiative | | | | | | |
| dressed appropriately | | | | | | |
| comes prepared | | | | | | |
| demonstrates proper hygiene | | | | | | |
| can communicate strengths and disabilities/areas of improvement | | | | | | |
| follows schedule | | | | | | |
| follows safety expectations | | | | | | |
| follows directions immediately with no reminders | | | | | | |
| follows rules | | | | | | |
| follows directions as given | | | | | | |
| stays on task without supervision | | | | | | |
| completes tasks in a timely manner without reminders | | | | | | |
| accepts authority | | | | | | |
| flexible and adapts to change | | | | | | |
| asks questions as needed | | | | | | |
| accepts responsibility | | | | | | |
| accepts feedback in a positive manner | | | | | | |
| accepts praise appropriately | | | | | | |
| asks before taking a break | | | | | | |
| calls in if going to be late/absent | | | | | | |
| clocks in/out without reminders | | | | | | |
| participates in group work | | | | | | |
| work is done well | | | | | | |
| cleans up after self | | | | | | |
| follows single-step directions | | | | | | |
| follows multi-step directions | | | | | | |

| **Social Skills** | | | | | | |
|---|---|---|---|---|---|---|
| works cooperatively with others | | | | | | |
| respects others' personal space | | | | | | |
| respects others' belongings | | | | | | |
| demonstrates basic social courtesies (e.g., greeting, responding) | | | | | | |
| treats others with respect | | | | | | |
| shares personal information appropriately | | | | | | |
| makes eye contact | | | | | | |
| waits for turn to talk (does not interrupt) | | | | | | |
| says please and thank you | | | | | | |
| expresses emotions appropriately | | | | | | |
| resolves conflicts appropriately | | | | | | |
| uses appropriate manners when eating | | | | | | |
| controls inappropriate bodily functions | | | | | | |
| if sick, knows how to use Kleenex and not cough on others | | | | | | |
| speaks loudly enough for an entire group to hear | | | | | | |
| interacts with peers positively (e.g., no teasing, inappropriate language) | | | | | | |
| shares common tools | | | | | | |
| helps others | | | | | | |
| able to engage in a conversation | | | | | | |
| respects plant life | | | | | | |
| speaks at an appropriate volume | | | | | | |
| wanders off (e.g., leaves the group at inappropriate times) | | | | | | |

APPENDIX M: Strengths Use and Current Knowledge Scale

The following questions ask you about your strengths, that is, the things that you are able to do well or do best.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| strongly disagree | | | | | | strongly agree |

1. I am regularly able to do what I do best.
2. I always play to my strengths.
3. I always try to use my strengths.
4. I achieve what I want by using my strengths.
5. I use my strengths everyday.
6. I use my strengths to get what I want out of life.
7. My work gives me lots of opportunities to use my strengths.
8. My life presents me with lots of different ways to use my strengths.
9. Using my strengths comes naturally to me.
10. I find it easy to use my strengths in the things I do.
11. I am able to use my strengths in lots of different situations.
12. Most of my time is spent doing the things that I am good at doing.
13. Using my strengths is something I am familiar with.
14. I am able to use my strengths in lots of different ways.

30

# Brief Resilience Scale

Please indicate the extent to which you agree with each of the following statements.

1 = strongly disagree
2 = disagree
3 = neutral
4 = agree
5 = strongly agree

1. I tend to bounce back quickly after hard times _____
2. I have a hard time making it through stressful events * _____
3. It does not take me long to recover from a stressful event _____
4. It is hard for me to snap back when something bad happens * _____
5. I usually come through difficult times with little trouble _____
6. I tend to take a long time to get over set-backs in my life * _____

**Total** _____

APPENDIX O: Youth Gardening Program Performance Assessment

# Youth Gardening Program
## Performance Assessment

**Name:**

2 = Able to do independently
1 = Able to do with a prompt
0 = Unable to do even with a prompt

---

1. Tool Use Safety
   _____ _____ _____
   _____ _____ _____

2. ____ Which are flowers? ____ Name one.
   ____ Which are vegetables? ____ Name one.
   ____ Which are herbs? ____ Name one.

3. ____ Show a weed. _____ Show how to pull it.

4. ____ Show how to water.

5. ____ Show how to mulch around a plant.

6. ____ Show how to harvest a vegetable.

7. ____ Demonstrate how you introduce yourself to someone.

8. ____ Find two insects. Tell if they are helpful or harmful.

9. ____ Name the three safety rules we follow at the garden.

10. ____ Show one way you can motivate a co-worker.

11. ____ If you had a conflict with a co-worker, what would you do first?

12. ____ Show how to give a complement to a co-worker.

Total: _____ out of 46 = _____ %

90% and up - advanced
80% - 89% - proficient
70% - 79% - partially proficient
Below 69% - not proficient

APPENDIX P: Daily Attendance Log

| Daily Attendance Log | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Week 1 | | | | Week 2 | | | | Week 3 | | | | Week 4 | | | |
| Name | M | T | W | T | M | T | W | T | M | T | W | T | M | T | W | T |
| | | | | | | | | | | | | | | | | |
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Key

| | |
|---|---|
| x | attended |
| L# | arrived # minutes late |
| \ | excused absence |
| E | left early |
| H | present half of the day |

APPENDIX Q: Daily Student Notes

| | Week 1 | | | |
|---|---|---|---|---|
| Name | Monday | Tuesday | Wednesday | Thursday |
| | Pro: | | | |
| | Grow: | | | |
| | Pro: | | | |
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