

Antioch University

## AURA - Antioch University Repository and Archive

---

Antioch University Full-Text Dissertations &  
Theses

Antioch University Dissertations and Theses

---

2022

### **Web-based therapeutic horticulture intervention: An online program development study**

Dana Ludmer

Follow this and additional works at: <https://aura.antioch.edu/etds>



Part of the [Clinical Psychology Commons](#)

---

WEB-BASED THERAPEUTIC HORTICULTURE INTERVENTION: AN ONLINE  
PROGRAM DEVELOPMENT STUDY

Dissertation

Presented to the Faculty of  
Antioch University New England

In partial fulfillment for the degree of

DOCTOR OF PSYCHOLOGY

by

Dana Ludmer

ORCID Scholar No. 0000-0003-3536-9556

August 2022

WEB-BASED THERAPEUTIC HORTICULTURE INTERVENTION: AN ONLINE  
PROGRAM DEVELOPMENT STUDY

This dissertation, by Dana Ludmer, has  
been approved by the committee members signed below  
who recommend that it be accepted by the faculty of  
Antioch University New England  
in partial fulfillment of requirements for the degree of

DOCTOR OF PSYCHOLOGY

Dissertation Committee:

Theodore Ellenhorn, PhD, ABPP, Chairperson

Katherine Evarts, PsyD

Gina Pasquale, PsyD

Copyright © 2022 by Dana Ludmer  
All Rights Reserved

## **ABSTRACT**

### **WEB-BASED THERAPEUTIC HORTICULTURE INTERVENTION: AN ONLINE PROGRAM DEVELOPMENT STUDY**

Dana Ludmer

Antioch University New England

Keene, NH

The pandemic has become a nationwide psychological trauma, posing a serious mental health risk in the United States. As the pandemic increases social disconnection and depression, amongst other psychological concerns, the need for accessible therapeutic interventions has become imperative. The purpose of this dissertation was to evaluate the interest and preferences in a web-based therapeutic horticulture intervention for connectedness and well-being. This study utilized a mixed methods approach, including both qualitative and quantitative data collection and analysis. A needs assessment surveyed American Horticulture Therapist Association (AHTA) members as well as gardening hobbyists. Quantitative data was evaluated through descriptive statistics, while qualitative data was evaluated through a thematic analysis. The results indicated that there is an interest in the development of an online gardening resource and indicated directions for such a development. Directions included the importance of navigational ease and facilitation to increase likelihood of participation. Additionally, it emphasized the importance of previewing the website before enrollment. Results of the needs assessment were considered in the proposal of an initial prototype of the online gardening resource. The primary user flow of the website is detailed, as well as a plan to launch the web-based therapeutic horticulture intervention and future opportunities for research. This dissertation

is available in open access at AURA (<https://aura.antioch.edu>) and OhioLINK ETD Center (<https://etd.ohiolink.edu>).

*Keywords:* web-based therapeutic intervention, therapeutic horticulture, needs assessment, thematic analysis

## **Acknowledgements**

This dissertation would not have been possible to write without the generosity of so many people. First, to Maxwell Levis, PhD, thank you for your endless compassion. My degree and this dissertation literally could never have been completed without you. I am so blessed that you see me in strength. To my parents and sisters, your love is the base from which I grow. Thank you for taking care of me, as I try to take care of you. And to Quynh Tran, PsyD, completing this doctorate would not have been nearly as fun without your friendship. I am so grateful you were on this journey with me! I would also like to extend my gratitude to my dissertation committee. Gina Pasquale, PsyD, thank you for your time and feedback throughout the dissertation process. Kate Evarts, PsyD, for being a continual source of support and encouragement throughout my doctoral degree, and to Ted Ellenhorn, PhD, for creating space for me to reflect, evolve, and realize my potential as a psychologist since my first year at Antioch.

Table of Contents

List of Tables ..... x

List of Figures ..... xi

CHAPTER I: INTRODUCTION..... 1

CHAPTER II: LITERATURE REVIEW ..... 2

    Mental Health During Coronavirus Pandemic..... 2

    Coronavirus Pandemic: Novel Mental Health Interventions ..... 4

    Web-Based Therapeutic Interventions..... 5

A Web-Based Therapeutic Horticulture Intervention..... 7

    Definition of Therapeutic Horticulture ..... 7

    1. Well-being..... 9

        Well-being: Positive Emotion..... 9

        Well-being: Engagement / Flow ..... 10

        Well-being: Relationships..... 11

        Well-being: Meaning ..... 11

        Well-being: Accomplishments..... 13

    2. Interaction ..... 13

        Interaction: The Human Connection to Nature..... 13

        Interaction: The Community Garden and the Connection to Social Change..... 15

    3. Personalized Care..... 15

        The Four Quadrants of Integral Theory ..... 16

Synthesis: A Web-Based Therapeutic Horticulture Intervention ..... 17

    Conceptualization of a Web-Based Therapeutic Horticulture Intervention ..... 18

    Architecture of a Web-Based Therapeutic Horticulture Intervention..... 19

    Content of a Web-Based Therapeutic Intervention ..... 19

        Interior Collective Quadrant ..... 20

        Exterior Collective Quadrant ..... 21



Interior Individual Quadrant .....	21
Exterior Individual Quadrant .....	22
Research Questions .....	22
CHAPTER III: METHOD .....	23
Overview of Research Methods .....	23
Rationale and Personal Assumptions in Research Methodology .....	23
Participants and Design .....	24
Procedure .....	26
Data Analysis .....	27
Verification Strategies .....	28
CHAPTER IV: RESULTS .....	30
Online Gardening Resource .....	30
Greenhouse Group .....	31
Quantitative Results .....	31
Qualitative Findings .....	31
Life Cycling .....	33
Quantitative Results .....	33
Qualitative Findings .....	34
Seed Share .....	36
Quantitative Results .....	36
Qualitative Findings .....	36
How-To Gardening Instruction .....	38
Quantitative Results .....	38
Qualitative Findings .....	38
Virtual Group Meeting .....	40
Quantitative Results .....	40

Qualitative Findings.....	40
Across Platforms: Qualitative Themes of Participation and Facilitation.....	41
CHAPTER V: DISCUSSION.....	44
Development and Launching of the Initial Prototype.....	44
Structure and Functionality of Initial Prototype .....	44
Facilitation on the Initial Prototype .....	47
Content of Initial Prototype .....	47
Implementation .....	48
Ongoing Research.....	49
Limitations .....	50
CHAPTER VI: CONCLUSION .....	52
References.....	53
APPENDIX A: NEEDS ASSESSMENT QUESTIONS .....	59
APPENDIX B: RECRUITMENT LETTERS .....	67
APPENDIX C: TABLES.....	69
APPENDIX D: FIGURES .....	77

List of Tables

Table C.1 Website Component’s Integral Theory Quadrants.....72

Table C.2 Continuous Scale Items: Likelihood of Recommending or Participating in a  
Web-Based Therapeutic Horticulture Intervention Website Component.....73

Table C.3 Checkbox Items: Endorsed Aspects of Each Website Component.....74

Table C.4 Categories, Themes, and Raw Data Across Open-Ended Needs Assessment  
Survey Items..... 75

List of Figures

Figure D.1 The Four Quadrants of Integral Theory.....80

Figure D.2 User Flow: Architecture of a Therapeutic Horticulture Web-Based Intervention.... 81

Figure D.3 User Flow: Architecture of the Initial Prototype of the Therapeutic Horticulture  
Web-Based Intervention..... 82

## CHAPTER I: INTRODUCTION

This dissertation is a response to the coronavirus pandemic and the large ill effects it has had on American adults. In order to address these surging mental health needs, and provide support long after the coronavirus pandemic has resolved, this study conceptualizes an online gardening resource to be used as an adjunctive therapeutic tool to promote connectedness and well-being. In recent years, there has been a dramatic increase in web-based therapeutic interventions (Philippe et al., 2022). Interventions with strong research basis feature: (a) well-being promotion (Gál et al., 2021; Lehtimaki et al., 2021), (b) interactive engagement (Borghouts et al., 2021; Ebert et al., 2018), and (c) personalized care (Taylor et al., 2021). The following study proposes a web-based therapeutic horticulture intervention based on incorporation of these priorities, and administered a needs assessment to determine user interest and preferences.

Utilizing a pragmatic paradigm and a mixed methods design, the study gauges the interest level and specific preferences for the development of an online gardening resource. To this end, a needs assessment survey was directly emailed to American Horticulture Therapy Association members that publicized an interest in mental health as well as posted on online forums to target hobbyists. Following data collection, quantitative responses were analyzed using descriptive statistics. Open-ended responses were analyzed with thematic analysis methods (Braun & Clarke, 2006). The results of the study were used to conceptualize an initial prototype for the web-based therapeutic intervention to foster connectedness and well-being.

## CHAPTER II: LITERATURE REVIEW

### **Mental Health During Coronavirus Pandemic**

Since March 2020 when the United States classified COVID-19 as a national emergency, the country has undergone unprecedented changes. Policies such as social distancing, quarantine, mask mandates, and vaccination requirements have had a widespread impact on American daily life (Beland et al., 2022; van Gelder et al., 2020). Additionally, an impending economic recession, political fracturing, alarming increases in national murders, and a global shortage in the food supply chain, all pose serious mental health challenges around the country (Fang et al., 2021; Matsubayashi et al., 2022; Schmitz et al., 2022). As the pandemic's effects on mental health are largely unknown and still evolving, statistics and literature about the current era quickly becomes outdated; however, this mass occurrence has had, and will continue to have, large ill-effects.

The coronavirus pandemic has contributed to social disconnection, depression, powerlessness, and fear, among others mental health concerns (van Gelder et al., 2020). According to the belongingness hypothesis, well-being is fundamentally impacted by social connection (Allen et al., 2021; Baumeister & Leary, 2017); human beings have an innate need to develop and sustain positive interpersonal relationships. In order to satisfy this need, people require frequent pleasant interactions that endure overtime. The absence of these interactions contributes to human anxiety, purposelessness, and irritability (MacDonald & Leary, 2005).

Relationship strain related to the pandemic have had negative mental health repercussions. In a 2022 survey of Americans, half of respondents reported that they have significant relationships that they have not seen in person since the onset of the pandemic (American Psychological Association, 2022, March 10). Furthermore, most respondents

endorsed that they have been without in person contact from loved ones longer than they ever have been in their entire lives due to the coronavirus. Notably, over half of the respondents stated that, because of the pandemic, they have experienced a strain or end of a relationship. Reasons for these relationship changes included the cancelation of events and differing opinions about pandemic policy.

Much of social behavior is an effort to improve one's sense of inclusion (Allen et al., 2021; Baumeister & Leary, 2017). Accordingly, a spectrum of negative emotions may arise when perceived inclusion is diminished. It has been found that depression is inversely related to the degree to which one feels connected and accepted by others (Hames et al., 2013). Not surprisingly then, there are consistently higher rates of depression among lonely adults when compared to the general population (Choi et al., 2013; Du et al., 2022; Farhang et al., 2022), a finding that emphasizes the depressive consequences of quarantine and social distancing policies on American citizens.

During the pandemic era, depressive symptoms have also been aggravated by the drastic and unprecedented closing of businesses and prolonged fear about the building economic crisis (Chen, 2021; Mojtahedi et al., 2021; Park & Kim, 2021). Over 40 million people filed for unemployment benefits in 2020 (Raifman et al., 2020). The KFF Tracking Poll conducted in April 2020 revealed that 54% of individuals who became unemployed and lost income during the pandemic reported "negative" impacts on their mental health, including worry and stress, with 25% of people reporting "major" negative impacts (Hamel et al., 2020). Continuing into 2022, stress about money was the highest recorded since the early 2000s (American Psychological Association, 2022, March 10).

Inactivity, the limited ability to engage in varied activity, and lack of environmental control during the coronavirus pandemic are increasing the mental health concerns of Americans. Since people are experiencing unemployment and have more limited access to public and/or communal spaces there has been a decrease in a sense of agency in people's lives, as well as a lack of environmental stimulation (Choi et al., 2013; Keller et al., 2020). Control is "the belief that one has at one's disposal a response that can influence the aversiveness of an event" (Thompson, 1981, p. 89). When people perceive that their actions are unable to affect an outcome, powerlessness ensues. As such, mental health treatments with homebound individuals encourage the planning and participation in daily activities (however mundane or ordinary) to restore a sense of control (Folden, 1989). Treatments also pay attention to the stimulation, variation, and arousal in activities to combat the negative effects of idleness and restlessness.

It is important to mention that while the impacts of the pandemic and the economic crisis are ubiquitous, communities of color have been particularly vulnerable. Black, Latino/a/x, and People of Color have been disproportionately affected by the results of the pandemic due to systemic inequities in all national sectors, including education, health care, employment, and housing (Tai et al., 2021). These communities have consistently reported higher rates of stress than White individuals in the United States and have been more likely to endorse the need for emotional support (American Psychological Association, 2022, March 10).

### **Coronavirus Pandemic: Novel Mental Health Interventions**

In response to the pandemic, there had been a burgeoning of mental health treatment innovations. From novel drug therapies to gains in predictive analytics, the coronavirus pandemic has forced the country to face the rising mental health challenges with urgency and creativity (Shakeel et al., 2022). Notably, digital care options have seen an explosive evolution



since 2020 (Shakeel et al., 2022). With the onset of the pandemic, there has been an extraordinary shift to reliance on digital care to satisfy public health needs (He et al., 2021). For example, since the pandemic was declared, tele-therapy appointments for outpatient mental health clinics rose in 2019 to close to 0% to over 40% in the mid-2020s (Lo et al., 2022). Online services fill the gaps created by COVID-19 health policy by reaching the homebound, maintaining social distancing and/or in quarantine, while expanding health care to the remote regions that otherwise lack access. Additionally, they reduce treatment costs (e.g., travel and overhead expenses) as they offer convenience and get around the stigma associated with visibly seeking mental health treatment (Lehtimaki et al., 2021).

### **Web-Based Therapeutic Interventions**

A rapidly growing offering since the onset of the pandemic is the web-based therapeutic intervention (Philippe et al., 2022). Used by individuals seeking physical and mental health related assistance, the web-based intervention “attempts to create positive change and/or improve/enhance knowledge, awareness, and understanding” via websites to convey health related material (Barak et al., 2009, p. 5). The web-based therapeutic intervention offers a way to exponentially expand mental health services, support, and education to the vast number of people able to connect to the internet (Philippe et al., 2022).

In the original publication by Barak et al. (2009), the authors clarify web-based interventions to further research and development in the digital care field. According to the publication (Barak et al., 2009), there are four components to a web-based therapeutic intervention. The first is the program content. This is a basic and necessary component that allows information to be disseminated for educational and directive purposes. The second intervention component is the use of multimedia. The purpose of multimedia is to convey

program content in an engaging and effective fashion, for example, with the use of images or videos. The third component is engaging online activities. This active component provides users opportunities to interact within the program, increasing participation with the material and, possibly, other users. Finally, the last component is the provision of guidance and support. This mechanism allows participants to obtain information and/or feedback about their participation in the intervention.

According to Barak et al. (2009), the self-guided web-based therapeutic intervention is a subtype of the web-based therapeutic intervention. It is intentionally created for users to use by themselves, at their own pace and liking. In the self-guided web-based therapeutic intervention the content is structured in a comprehensive and easy-to-follow manner so that users can participate without additional human support.

Increasingly, during the coronavirus pandemic, the demand for mental health services greatly outpaces the number of mental health clinicians available to provide services (American Psychological Association, 2022, March 10). While data suggest that more person-to-person contact can be helpful for certain conditions, such as depression, arising during the COVID era (van der Vaart et al., 2014), online interventions that have internal support structure and clear assignments have been shown to offer comparable benefit to in-person interventions (Andersson & Titov, 2014). Self-guided interventions can broaden access to mental health services by offering mental health support that does not depend on a limited number of trained professionals.

In recent years, there has been a dramatic increase in web-based therapeutic interventions (Philippe et al., 2022). That being said, many of these interventions lack validation (Garrido et al., 2019). Interventions with strong research basis feature: (a) well-being promotion (Gál et al., 2021; Lehtimäki et al., 2021), (b) interactive engagement (Borghouts et al., 2021; Ebert et al.,

2018), and (c) personalized care (Taylor et al., 2021). Moving forward in designing and refining web-based interventions, it is useful to incorporate these domains for intervention development.

### **A Web-Based Therapeutic Horticulture Intervention**

The pairing of gardening and the internet is not obvious. Gardening is an applied practice that requires real world materials and the internet is a digital platform that is certainly not animate. However, as the mental health impacts of the coronavirus pandemic mount, and the need for web-based therapeutic interventions that are accessible increase, particularly for those who are homebound or socially isolated, the internet is an accessible and flexible tool that can prompt wide ranging participation in tangible life while offering an online community of resources and support (Xiang et al., 2021).

Therapeutic horticulture has long existed as a treatment modality (Detweiler et al., 2012), however, it has yet to be developed as an online intervention. The following section introduces therapeutic horticulture and addresses how, when delivered in a web-based format, therapeutic horticulture could incorporate well-being promotion, interactive engagement, and personalized care to offer mental novel health resources during this critical juncture.

#### **Definition of Therapeutic Horticulture**

According to the American Horticulture Therapy Association (AHTA), “Therapeutic horticulture is the process through which participants enhance their well-being through active or passive involvement in plant and plant-related activities” (AHTA, 2022). Therapeutic horticulture is typically encompassed under the domain of nature-based therapies (Moeller et al., 2018). Existing alongside interventions such as wilderness therapy and eco-therapy, the distinguishing feature of therapeutic horticulture is its use of the garden. A garden is a “human-influenced space, in harmony with nature, yet cultured, nurtured, and managed” (Haller

et al., 2019, p. 34). Horticulture refers to the specific act of cultivating within a gardening space. While the term garden often recalls images of outdoor growing spaces, a garden can also refer to an indoor container with a singular plant.

The healing potential of horticulture has been known for centuries (Detweiler et al., 2012). At the dawn of civilization, inspiring fields in the fertile crescent led to humanity's first gardens. Dating back to the fifth century BC, Persian gardens were being used as a therapeutic space to recuperate from disease and a sacred place of connection to the divine (Detweiler et al., 2012). In medieval times, monastic communities systematically integrated herbs into prayer, and frequently designed cloistered gardens for contemplation (Horn, 1973). In the United States, the therapeutic benefits of horticulture have long been understood (Wise, 2015). In 1812, America's first Surgeon General established the first hospital-based garden program, implementing "digging in a garden" as an intervention for psychiatric presentations (Wise, 2015). Over time, this modality spread, and during the first World War, veterans experiencing shell shock were sent to therapeutic farms for clinical treatment (Detweiler et al., 2012).

Today, therapeutic horticulture is a treatment modality that facilitates human participation in plants, including their actual cultivation to the simple enjoyment of their sensory experience (AHTA, 2022). In therapeutic horticulture, the intensity and type of engagement in a garden is structured to be dependent on the needs of the population involved. For example, children with developmental disabilities may benefit from therapeutic horticulture that stimulates sensory and motor skills (Simson & Straus, 1997), whereas individuals diagnosed with terminal cancer may benefit from therapeutic horticulture that encourages respite and supportive reflection (Blaschke, 2017). Since the intended goal of therapeutic horticulture is well-being,

implementation is diverse and can be supportive physically, cognitively, emotionally, and socially (Haller et al., 2019).

## **1. Well-being**

When considering well-being promotion as a quality of online interventions (Gál et al., 2021; Lehtimäki et al., 2021), therapeutic horticulture offers great potential. According to positive psychology, well-being is the mechanism through which individuals flourish (Seligman, 2012). Through a positive psychology lens, well-being is defined by, and achieved through, five interrelated, yet distinct elements in human life, collectively referred to as PERMA: (a) Positive Emotion, (b) Engagement/Flow, (c) Relationship, (d) Meaning, and (e) Accomplishment. In recent research, horticultural activities and participation in nature have been found to increase positive psychological outcomes (Haller et al., 2019; Simson & Straus, 1997). These include increased self-esteem and self-confidence, decreased stress, restoration of social connections, reduction in depressive symptoms, improved cognition, and enhanced sensory stimulation (Haller et al., 2019; Harris, 2017; Sempik et al., 2014; Ulrich et al., 1991). The following section will explore in detail the ways in which therapeutic horticulture advances PERMA objectives, thereby promoting well-being and offering a foundation for an acceptable web-based therapeutic intervention.

### ***Well-being: Positive Emotion***

The first component of PERMA in the promotion of well-being is positive emotion. Since all life consists of highs and lows, positive psychology urges individuals to focus on the elements of life that bring a sense of joy and pleasure to increase well-being (Seligman, 2012). Therapeutic horticulture has great potential to increase positive emotions. Studies investigating the affective impact of experiences with nature consistently find that nature improves mood

(Haller et al., 2019). According to the biophilia hypothesis, humans have a biological dependency on nature as a result of evolutionary history. The hypothesis suggests that humans instinctively connect to nature because of an innate psychological affiliation with life, and that which is alive (Keller et al., 2020). This affiliation has the ability to reduce stress and elicit positive emotional response (Ulrich et al., 1991), perhaps contributing to the pleasurable, and oftentimes relaxing, experience of being in a garden.

***Well-being: Engagement / Flow***

The second component of PERMA to promote well-being is engagement or flow. In the PERMA model, flow, or the absorbing engagement in a task or activity, helps individuals feel motivated and activated, yet simultaneously relaxed and satisfied (Seligman, 2012). According to flow theory, all activities require skills and present challenges (Nakamura & Csikszentmihalyi, 2014); however, when a person is “in flow” their “skills are adequate to cope with the challenges at hand” without resulting in boredom (Haller et al., 2019, p. 160). This creates conditions for a satisfying concentration that intrinsically motivates individuals to continue to engage without self-consciousness or over analysis.

The foundational activity of therapeutic horticulture is the task of gardening. The gardener is using their body and all its faculties to participate in, and collaborate with, nature. Depending on the skill level of the gardener, gardening activities can be adjusted to require more or less skillful participation to increase the likelihood of finding flow (Haller et al., 2019). While all gardening presents challenges, the size of the garden or the extent of the gardening project can be adjusted so that the challenges are not too demanding or too easy for an individual’s skill set, thus increasing the conditions for flowing engagement (Haller et al., 2019).

***Well-being: Relationships***

Therapeutic horticulture has great potential to promote the third component of PERMA, which is relationships. Social connection is a fundamental need for human well-being (Seligman, 2012). According to the belongingness hypothesis, human beings have an innate drive to develop and sustain positive interpersonal relationships (Baumeister & Leary, 2017). While nature is often regarded as the primary therapeutic mechanism in therapeutic horticulture, the social dimension of the intervention is also of benefit (Sempik et al., 2014). When individuals are gardening together there are opportunities for social engagement, prompting communication, collaboration, and social bonding.

Even when gardening takes place alone, it provides ample opportunities for belonging and social connection. According to Yuqing et al. (2007), individuals can form meaningful communities around common interests. Common identity theory explains that people attach to groups for a variety of reasons, including social categorization and interdependence (Yuqing et al., 2007). In other words, individuals may feel belongingness when they can identify with groups through defining objective (i.e., organizational membership) or subjective (i.e., environmental values) criteria as well as through a common sense of purpose (i.e., increasing knowledge about gardening or discussing experiences within gardening). It should be noted that while primary research on common identity theory is based on face-to-face social patterns, research demonstrates that the theory is relevant in online community dynamics as well (Fujita et al., 2018).

***Well-being: Meaning***

The fourth component of PERMA to promote well-being is meaning. Finding meaning is an important part of well-being (Seligman, 2012). According to positive psychology, meaning

making is the process of seeking understanding and cultivating purposefulness. Meaning can be found through daily experiences that reflect, and connect, a person to something bigger than the self (Nisbet et al., 2011). When an individual is aware of an order and coherence beyond their singular life, they are able to more clearly understand the human condition as well as their responsibility and purpose in an arising situation.

Horticultural activities provide many opportunities to find meaning. The garden, embedded within, and reflective of, nature, is a powerful space to witness the vast interrelatedness of our planet. Whether the gardener is thinking about elemental nutrients in the soil or the weather patterns of the week, these considerations expose a grand ecosystem that transcends, yet includes, our human selves. In *The Nonhuman Environment*, Searles (1960) argued that nature is of primary importance to the human psyche. Searles articulated that human personality matures in the midst of the “total matrix” including “trees, clouds, stars, landscapes... and so on ad infinitum” and when humans ignore their fundamental relationship to these elements, there are psychological repercussions (Searles, 1960, p. 53). Searles argues that a healthy relationship to nature helps an individual “gain a deeper sense of personal identity, of individuality; it helps him [sic] to develop his creative capacities; and it helps him to gain a fuller realization of the extent of his abilities and of the limitations upon those abilities” (Searles, 1960, p. 127). Searles highlights the profound importance of nature in identifying, exploring, and deepening one’s own potential. This potential acknowledges both the heights of individual creativity and capability, and the natural fallacy of omnipotence.

More practically, meaning can be derived from the fundamental responsibility of taking care of a plant. Similar to any caretaker, those that care for plants find purpose and meaning in their commitment to the life of another living entity (Relf, 2005).



### ***Well-being: Accomplishments***

The fifth and final component of PERMA to promote well-being is accomplishments. The element of accomplishment in the PERMA model refers to the “persistent drive to master or achieve personal goals” (Seligman, 2012, p. 18). The ability to identify an objective and put forth effort towards accomplishing that objective, despite challenges and failures, increases a sense of well-being.

Therapeutic horticulture is abundant with opportunities for accomplishments. While some accomplishments can be immediate, such as the watering of the plants or transplanting seedlings, other tasks may be more long term, such as the blooming of a flower, the eating of a homegrown vegetable, or the overall flourishing of a garden. Regardless of the time frame of the accomplishment, when a goal is achieved, it increases self-belief which perpetuates, and motivates, efforts for further engagement and yet another objective (Seligman, 2012).

## **2. Interaction**

Interactive engagement has been found to be an important aspect of online interventions (Borghouts et al., 2021; Ebert et al., 2018). A recent large meta-analysis found that online interventions were more acceptable to users when they prompted users to engage in “real-world” settings, applying information being learned and increasing users’ sense of connectedness, for example, being socially connected to peers (Ebert et al., 2018). Horticulture, and engagement with nature, has potential to promote interactivity and connectivity. This potential is explained in the following section.

### ***Interaction: The Human Connection to Nature***

As described above, therapeutic horticulture is a multifaceted experience that can involve simple to complex interactions with objects in a garden and with other gardeners. In addition to

the interactivity previously explored, therapeutic horticulture can broaden personal engagement with nature, a domain that is rarely incorporated within online interventions. Activities such as soil preparation, planting, watering, weeding, harvesting, and seed collection allow mechanisms to enhance this engagement (Haller et al., 2019). When leveraged alongside social interactions with peers and facilitators, benefits from these activities can be further enhanced to promote connectedness.

At the heart of therapeutic horticulture, there is an effort to broaden the scope of health care practices. The frame challenges traditional psychotherapy models which privilege Western individualism and intellectualism by offering communal and activity-based therapy instead (Chung et al., 2011; Wise, 2015). While speaking one-one-one to a therapist can be highly beneficial, different cultures and individuals with ranging diagnoses may derive increased benefits from alternative therapeutic modalities (Chung et al., 2011). Therapeutic horticulture can be viewed as a response to traditional psychotherapy, shifting away from static-individualism to dynamic-communalism.

According to ecopsychology, or the psychological field exploring the intersection of ecosystems and human health, Western culture systematically dismisses the human connection to the earth (Dunn, 2019). Urban-industrial society communicates to humans that they are somehow “above” and “separate” from nature’s ecology. Dislodged from their place “amongst” and “within,” humans suffer. As described by Searles (1960), since the non-human environment is paramount to our sense of selves in the world, when humans are estranged from the environment, they cannot fully know themselves or others. It is therefore crucial to establish practices, such as horticulture therapy programs, that support human-nature connection.

### ***Interaction: The Community Garden and the Connection to Social Change***

Community gardening is an approach to collective food-growing that has taken root in the 20<sup>th</sup> century (Nettle, 2016). A community garden is a piece of shared land that is collectively cultivated (Nettle, 2016). While gardening is the main activity of the space, the community garden is also a place of active social connection and change. According to Nettle et al. (2016), community gardens enable new forms of cooperation that present “tangible examples of the possibility of things being otherwise” (Nettle, 2016, p. 199). Practically speaking, the community garden addresses food security, providing an alternative space for sustainable food production and distribution. Typically, the community garden encourages ecological sound growing practices that bring people closer to healthy and culturally appropriate food. However, the garden produces more than just food. The garden also generates “hope, possibility, and collective imagination” (Nettle, 2016, p. 204). Community gardens are visionary spaces that re-imagine social order. The community garden challenges isolationism, and through a responsiveness to the collective voice, promotes connection through mutuality and equality. This idea of a community garden could be used as a model for developing a web-based horticulture intervention.

### **3. Personalized Care**

Online interventions that include personalized care tend to offer increased therapeutic benefit (Ebert et al., 2018; Taylor et al., 2021). Personalized care is a mechanism to deliver relevant person-specific or population-specific care resources. Ideally, these resources are accessible, personally relevant, and culturally appropriate (Bevan Jones et al., 2018). Ken Wilber’s Integral theory (Wilber & Wachowski, 2017) offers a framework to personalize care (Darcy, 2021) by comprehensively considering the dimensions of individuals’ perspectives, improving care accessibility, personal relevance, and cultural appropriateness.

Integral theory centers on human experience, allowing sensitive representation of the multifaceted nature of identity and relationships. It organizes states of being into four quadrants associated with different experiential dimensions (See Figure D.1). These quadrants map interior and exterior, individual and collective experiences (Wilber & Wachowski, 2017). Mapping is meant to bring awareness to, and ensure, the comprehensive nature of an event, relationship, or system. By addressing these four dimensions within online interventions, care can be made more accessible, allowing people to connect in different ways, maximizing care engagement and boosting user experience (Darcy, 2021). The four quadrants are addressed below.

### ***The Four Quadrants of Integral Theory***

The interior of the collective is where the cultural dimension, or the inside awareness of a group or relationship, manifests (Wilber & Wachowski, 2017). These are collective experiences of values, feelings, and aspirations. The exterior of the collective is where group behavior manifests (Wilber & Wachowski, 2017). This is the social experience of exterior form and behavior, for example, in systems. The interior of the individual is where immediate thoughts, feelings, and sensations manifest (Wilber & Wachowski, 2017). These are experienced in first person terms, including personal states of “self and consciousness” (Wilber & Wachowski, 2017). Finally, the exterior of the individual is where physical and material components of an experience manifest (Wilber & Wachowski, 2017). These are experienced in third person terms, including physical behavior and concrete matter and objects.

Integral theory has been applied to clinical practice, grounding more holistic offerings of medical and mental health care services and understandings of patient conditions (Darcy, 2021). For example, when a physician meets a patient, the physician can utilize the four quadrants to comprehensively address diverse aspects of therapeutic services. First, through the interior of the

collective, the physician can attend to the relationship and therapeutic bond between themselves and the individual in need. The physician can attend to the power imbalances in the relationship and sensitively approach the patient to maintain a good working alliance. Second, through the exterior of the collective, the physician can place the patient in the wider social context, acknowledging how their care inherently fits into the larger economic and political systems of the hospital. Through this lens, the physician might attend to the medical note for insurance purposes. Additionally, the physician might consider a biopsychosocial model to explain systemic causes of patient symptoms. Third, the interior of the individual can be addressed by the physician. To do so, the physician may notice the patient's emotional state and ask how the patient feels about and understands their own illness. Last, through the exterior of the individual, the physician might diagnose the individual through a disease-based biomedical orientation.

By drawing attention to individuals' interior and exterior, personal and collective experience, integral theory allows for a nuanced sensitivity to the many aspects of needs and lived experience (Darcy, 2021; Wilber & Wachowski, 2017). In this way, integral theory bolsters cultural sensitivity and supports multicultural care. Rather than relying on rigid assumptions or a single mindedness on one aspect of care, integral theory acknowledges that individuals can be approached through different perspectives such that services are comprehensively person-centered (Darcy, 2021).

### **Synthesis: A Web-Based Therapeutic Horticulture Intervention**

The current study anticipates that an online gardening resource utilizing integral theory design could support connectedness and well-being. To the writer's knowledge a web-based therapeutic intervention centered on gardening for the specific purpose of supporting mental health currently does not exist. The following study proposes such a program based on

incorporation of well-being promotion, interactive engagement, and personalized care and administers a need assessment to determine users' interest and preferences.

### **Conceptualization of a Web-Based Therapeutic Horticulture Intervention**

Following the goals of therapeutic horticulture practice (Haller et al., 2019), this web-based therapeutic intervention is designed to support overall mental well-being. Promoting PERMA objectives, this website functions as a self-guided intervention (Barak et al., 2009), addressing negative states, such as lack of engagement, feelings of meaninglessness, decreased senses of accomplishment, and decreased social connectedness that are arising during the pandemic era, and may continue to do so after the pandemic is resolved. It also serves as a preventative tool, supporting and enhancing positive qualities in users' lives.

The website's architecture is modeled on the self-guided web-based intervention as defined by Barak et al. (2009). In alignment with this model, the intervention links interactive, audiovisual, and educational content to guide users to participate in therapeutic horticulture from their own homes while engaging in a remote community of others doing the same. This intervention will not be intended to replace other psychological interventions in users' lives, but could serve as an adjunctive therapeutic service (Berger et al., 2018).

Furthermore, this therapeutic offering will follow the American Psychological Association (APA) guidelines for telepsychology, which includes "self-help websites" (APA, 2013). Following these guidelines, users will be required to complete an Informed Consent document that clearly indicates that the web-based intervention has not been subject to outcome-based research, however, there is current evidence that the intervention is appropriate for individuals seeking connectedness and well-being. The Informed Consent document will also

articulate the professional identity of the psychologists and website host involved, and note the inherent risks surrounding confidentiality and security that arise when using an internet platform.

### **Architecture of a Web-Based Therapeutic Horticulture Intervention**

The architecture of the web-based therapeutic horticulture intervention was designed so that it is easy to navigate and be inclusive of varied levels of technological savviness (see Figure D.2). In user flow, the main web address directs users to a welcome home page. This main landing page is accessible to members and non-members alike, and describes the purpose of the online gardening resource while briefly outlining the contents of the intervention. From this page, the user could either login to their user profile or sign up for entry. This stage accounts for the users and maintains security by only allowing entry to those that have gone through sign up procedures, such as agreeing to Informed Consent (Bevan Jones et al., 2018).

Once a user is logged into their account, the user flows deeper into the architecture of the platform, and lands directly into a page called, “Greenhouse Group,” which is a shared virtual space. While there are multiple “Greenhouse Groups” on the website, a user will always be directed to the same “Greenhouse Group” page, as these are closed groups that form the basis of the user’s communal experience. From the “Greenhouse Group,” the user has the option to flow to four pages, each containing a specific website component (see Figure D.1). Three of the four website components are group specific, meaning users are only interacting with their other group members on the page. One of the website components is not group specific, meaning users can interact with any member that has an account on the website at large.

### **Content of a Web-Based Therapeutic Intervention**

Prior research suggests that online interventions have increased efficacy when they are personalized (Ebert et al., 2018; Taylor et al., 2021), by allowing users to experience

person-centered care that comprehensively acknowledges varied lived experiences. Following this recommendation, this intervention leverages integral theory, a model that increases accessibility, relevancy, and cultural appropriateness to enhance site personalization, both in regard to scaffolding engaging site architecture and promoting PERMA objectives (Edwards, 2016; Wilber, 2007). The website conceptualization considers each quadrant so that the web-based intervention applies PERMA objectives to comprehensively build the site's architecture and engage the user. Website content is explained below and are referenced in terms of primary quadrants that they satisfy. It should be noted that there are many ways in which one website component can satisfy quadrant dimensions (see Table C.1).

### ***Interior Collective Quadrant***

The website is conceptualized to consider the interior of the collective by offering opportunities for users to create, and share, meaningful experiences and stories. When participants go into their "Greenhouse Groups," or shared virtual spaces of members, each participant will "take up" space through a profile (image and text) representing themselves. In addition to shared virtual space, the website will foster communal meaning through two main features. The first feature is called "Life Cycling," a platform for growers to post updated photos of their gardens. This will be an embedded image carousel that users can individually update so that other greenhouse members can see how each other's plants are cycling through life and death. Users will have the capability of commenting on each other's images, facilitating a shared virtual narrative about each other's growth. The second feature is called "Seed Share." This feature will be a collective forum, where participants can request seeds or share seeds of their own. This will be offered as an embedded template, which allows users to describe their experiences with their seeds and any other information they would like to provide about planting.



This will further encourage the sharing of experiences, while also allowing users to be openly supportive and generous with one another.

### ***Exterior Collective Quadrant***

The website is conceptualized to consider the exterior of the collective by offering directive “How-To Gardening Instructions” and advice. In this aspect of the website, audiovisual and textual content will be offered to provide users basic and simple sustainable gardening instructions. This aspect of the website will benefit from including a forum for users to post and answer each others’ gardening information questions. Similarly, in the “Seed Share” feature, a forum for users will be used to post and answer each others’ seed saving, distributing, and planting questions.

### ***Interior Individual Quadrant***

The website is conceptualized to consider the interior of the individual by promoting the actual experience of gardening. While the website will offer a variety of gardening content to increase knowledge and social community, the main activity of the website is the cultivation of plants. Leveraged by the natural way horticulture engages personal emotional states, stimulates sensory experiences, and shifts mental outlooks, this aspect of experience will be inherently encouraged throughout all of the website’s content.

More concretely, the interior of the individual will be considered in a “Virtual Group Meeting” website component. This aspect of the platform is conceptualized as a regularly scheduled tele-therapy group session. Similar to an in-person process group, the “Virtual Group Meeting” will facilitate self-reflection through a sense of belonging and engagement in the group dynamic (Levi et al., 2017).

### ***Exterior Individual Quadrant***

The web-based therapeutic intervention is conceptualized to consider the exterior of the individual by asking all participants to make a profile of themselves to share with the rest of the community. Participants will be prompted to answer questions to their comfort level. Profile questions will include, profile alias name, location of garden (i.e., U.S. state), type of garden growing (i.e., indoors, outdoors, garden bed, container), and personal experience with gardening (i.e., beginner, intermediate, advanced). Answers will be made public to other website users.

### **Research Questions**

The writer has conceptualized a web-based therapeutic horticulture intervention with the intention to support connectedness and well-being during the pandemic, and for those that remain homebound or socially isolated long after the pandemic has been resolved. While literature might indicate the usefulness of such an online gardening resource, it is important to evaluate the need and preferences for its development. The present study conducts a needs assessment to address the following questions: 1) Is there interest in the creation of an online gardening resource to support connectedness and well-being? and 2) If an online gardening resource was created to support connectedness and well-being, what would be helpful to include on the platform? The results of this needs assessment are intended to inform the program development of a web-based therapeutic horticulture intervention.

## **CHAPTER III: METHOD**

### **Overview of Research Methods**

This study utilized a pragmatic paradigm and a mixed methods design to answer the research questions, which included both descriptive statistics and thematic analysis of survey data. This methodology was deemed appropriate for the current study because of its ability to extend the breadth and range of inquiry. Purposive sampling was used to recruit lay gardeners and American Horticulture Therapy Association (AHTA) members. A link to a needs assessment survey was directly emailed to AHTA members that publicized an interest in mental health. Additionally, a needs assessment survey link was posted on online forums to target hobbyists. Following data collection, quantitative responses were analyzed using descriptive statistics. Open-ended responses were analyzed with thematic analysis methods (Braun & Clarke, 2006). Altogether, the study's design was implemented in pursuit of developing an understanding of respondents' interest level and preferences for the creation of a web-based therapeutic horticulture intervention. Results of the study were considered for their implications in program development and future research.

### **Rationale and Personal Assumptions in Research Methodology**

A pragmatic approach to the current study was chosen based on the purpose of the research as well as the researcher's assumptions. The current study is intended to inform the development of a web-based therapeutic horticulture intervention to support connectedness and well-being. A pragmatic paradigm is an action-oriented framework commonly utilized in research that is consequence-oriented, problem-centered, and pluralistic (Mertens, 2019). Given the intention to develop a novel intervention that evaluates interest and preferences in an online gardening resource, a mixed methodology was determined appropriate.

It is inherent to research that the researcher's perspectives and assumptions impact the course of study. Therefore, it is important to consider such biases in order to bring awareness to subjective influences (Mertens, 2019). Researcher's personal biases inform the methodological choice. Perhaps, not surprisingly, I am a gardener. And as a gardener, I blend the abstract qualities of a "wonderer" with the very practical and task-oriented qualities of a "doer." I hold a constructivist, postmodern understanding of reality, yet I am also committed to practicality. As such, I believe both that reality can be constantly reinterpreted as well as (temporarily) determined. The pragmatic paradigm aligns with this personal bias.

As a gardener, I engage in gardening for personal mental health benefits. I have the assumption based on experience that gardening is a beneficial tool for well-being. Additionally, this research is based on a therapeutic horticulture program that I initiated and led at the White River Junction Veteran Affairs Medical Center in Vermont. I had initially intended this project to be based on my experiences and questions about the in-person program; however, the COVID-19 pandemic altered my plans and transitioned the study's focus to online interventions. Notwithstanding, veteran interest and participation in the in-person programming guided my conceptualization of this web-based intervention.

In summary, my own views as well as the needs of research warrant a pragmatic approach for mixed methods research. Acknowledging that research outcomes have subjective influence, I proceeded in the research mindful of subjectivity and employed an auditor in data analysis to limit the effects of biases.

### **Participants and Design**

The current research administered a needs assessment survey that appraised interest in the creation of an online therapeutic horticulture-based website, and preferences for the intended

platform. Purposive sampling intends to answer research questions through selected participants (Mertens, 2019). Because the current study requests information about the intersection between horticulture and mental health, it was important to include participants who have insight into such topics. Purposive sampling was used in order to reach potential users of the online resource, and professionals that may recommend the platform to appropriate clientele. In order to garner responses from interested hobbyists and professionals, the study targeted members of the American Horticulture Therapy Association (AHTA, 2022). AHTA is a national organization advocating for the use of horticulture as a therapeutic and rehabilitative practice (AHTA, 2022). Association members have ranging interests, including mental health. While a portion of these individuals may be lay gardeners, others publicly identify as professionals that implement horticulture as a therapeutic intervention for psychological concerns on their AHTA member profile. To further collect responses from lay gardeners, the study also targeted respondents that were members of gardening interest forums online.

Two versions of the needs assessment survey were designed in order to appropriately address professionals and hobbyists. Since all survey responses were intended for program development, Institutional Review Board (IRB) approval was not necessary and no demographic information was collected. The two versions of the survey were largely identical, yet had adjusted language to adapt to the intended targeted population. For example, in the survey targeting AHTA professionals, the survey posed questions about the “likelihood to recommend.” In contrast, in the survey targeting lay gardeners, the survey posed questions about the “likelihood to participate” (see Appendix B).

Both surveys were designed to gauge interest in proposed ideas about a web-based therapeutic horticulture intervention, as well as collect open forum responses that may raise new

considerations. This required both qualitative and quantitative survey questions. For qualitative questions, free-text box items were used to allow open-ended responses. For quantitative questions, checkboxes and continuous scales items were used to best collect numerical data. Checkbox items allowed respondents to endorse zero to several responses from a group of choices. Continuous scale items allowed respondents to endorse an object by moving a marker along a line from zero to 100, representing no endorsement to extremely high endorsement.

The surveys had 17 questions in total. In order to give participants freedom and space to provide unique information, five out of the 17 questions were open-ended. Question ordering was carefully considered in the surveys' design (Mertens, 2019). Open-ended questions were positioned at the beginning of the questionnaire in order to avoid influencing the respondents with prompted ideas. There were no required fields.

### **Procedure**

Respondents were recruited through two methods. First, the American Horticulture Therapy Association (AHTA) survey link was directly emailed to AHTA members that specifically publicized an interest in the intersection of gardening and mental health on their AHTA member profile. The link was sent to 120 AHTA members. Second, the Hobbyist survey link was posted to five highly active online gardening forums. Data was collected between July and August 2021.

When considering sample size, qualitative research relies on researchers to make informed choices (Mertens, 2019). For this qualitative study, statistical power was not necessary to analyze responses (Button et al., 2013). In the current study, 40 respondents were originally desired in order for themes to emerge in the coding process.

## **Data Analysis**

This study utilized a mixed methods approach, including both qualitative and quantitative data collection and analysis. For the quantitative portion of the study, data were analyzed using descriptive statistics from the sliding scales and checkbox assessment responses. For sliding scales responses, means and medians were calculated. For checkboxes, distribution percentages were calculated. Descriptive statistics were used to summarize response patterns, highlighting relationships between variables.

For qualitative data, the study utilized thematic analysis to organize respondents' open-ended responses (Braun & Clarke, 2006). Thematic analysis is a widely used qualitative approach that yields rich descriptions of raw data. Thematic analysis allows for the identification of patterns within the free text, thus, illuminating its relationship to the research's area of focus.

In alignment with Braun and Clarke (2006), thematic analysis in the current study required a multi-phased process. The first phase of the process is defined by the familiarization of the researcher to the data set (Braun & Clarke, 2006). This begins when the researcher takes notice of the data, whether during data collection or the reading and re-reading of the data for the purpose of immersion. During this phase, the researcher starts to generate their initial ideas. From this starting place, the second phase of thematic analysis emerges when preliminary groupings, known as codes, are identified. Codes gather together data in a preliminary systematic fashion. In the next phase, the organized codes are then reviewed for potential themes. Themes describe the data within the codes with more specificity. Phase four occurs when the themes are checked in relation to the coded data in order to refine the themes and ensure that they are providing effective representation of the data. The last two phases of thematic analysis include

the ongoing process of defining themes, naming themes, and ultimately the production of a final scholarly report of the analysis.

The current research implemented the approach described above. First, I immersed myself into the data. This entailed multiple, thorough readings of the open-ended responses. Through this process, I decided to assign each website component as a category to keep the data organized. As I immersed myself into each category, I grouped similar raw data items together to refine the category data into codes. At this stage, I began to notice emerging themes that captured more specific patterns. I organized all the raw data into potential themes, which I then continued to analyze to ensure the themes captured the emerging narrative of the data. The ongoing process of analysis ended, when I felt satisfied with how the analysis represented the raw data. In order to limit the effects of subjective biases, an auditor checked the categories and themes against the raw data. All feedback from the auditor was incorporated.

### **Verification Strategies**

In order to assess the current study, it is necessary to critically analyze the qualitative approach used. This is achieved by exploring quality indicators (Mertens, 2019). The following section explores the quality indicators of credibility and dependability as they relate to the current research.

Credibility is a means to address internal validity in a qualitative research study. Mertens (2015) suggests that credibility is based on the “deep and close involvement of researchers in the community of interest combined with sufficient distance from the phenomenon” (Mertens, 2019, p. 269). In other words, credibility relies on a balance between a sustained, sufficient immersion into data with appropriate boundaries to effectively record what has been observed. Given my background in gardening and therapeutic horticulture, as well as the weeks that I have dedicated



to data collection and analysis, I have been able to deeply and ongoingly engage with the research topic and data. Mertens (2015) further suggests that peer debriefing and progressive subjectivity are used throughout qualitative analysis. In the current research, peer debriefing was used by working with another researcher to check the technicalities of my work and collaborate about my changing attitudes of the data throughout the study's process. This ensured that I appropriately distanced myself from my observations to limit the effects of any biases. Additionally, I used progressive subjectivity by documenting my own process of change from the beginning of the study until the end. By writing notes about my reactions to the data, I challenged myself to keep an open mind and flexibility with the data observed.

Dependability is a means to address reliability in qualitative research. Dependability suggests that the study maintains stability over time (Mertens, 2019). From a constructionist standpoint, it is expected that change occurs within the process of research. Dependability indicates that even with change, a researcher can strive for consistency. A dependability audit was used to attest to the quality and appropriateness of the process of this research. This monitored the relationship between the approach and purpose of the current study. Additionally, I tracked all iterations of my qualitative analysis. This ensured that I was effectively adhering to qualitative procedures as described above well as helped me consistently organize my changing understanding of the data. Ultimately, these notes were used to guide my data collection, immersion, and interpretation of results.

## CHAPTER IV: RESULTS

This study investigated the interest and preferences in the development of an online therapeutic horticulture intervention through the use of a needs assessment. The needs assessment intended to include 40 respondents to allow for rich themes to emerge from the data. Respondents were recruited through two methods. First, the American Horticulture Therapy Association (AHTA) survey link was directly emailed to AHTA members that specifically publicized an interest in the intersection of gardening and mental health on their AHTA member profile. Second, the Hobbyist survey link was posted to five highly active online gardening forums. Thirty-five AHTA members and seven hobbyists completed the needs assessment. The survey was closed after 42 respondents participated.

While the assessment sought an equal number of professionals and hobbyists respondents, a majority of professionals that are familiar with the topic of therapeutic horticulture responded. Since there were relatively few hobbyist respondents as compared to AHTA respondents, the two surveys' data were analyzed together. Outstanding differences between the data sets were minimal and are reported in the data analysis. Results of data analysis are presented below.

### **Online Gardening Resource**

Data suggests that there is an interest in an online gardening resource to support connectedness and well-being. On survey item #1, "How likely would you be to recommend participation/participate in an online gardening resource that supported connectedness and well-being?" (see Appendix A), respondents endorsed a likelihood to recommend participation or participate in such a resource on a continuous scale ranging from 0 to 100 (Mean = 74.63, Median = 81.00, N = 42).

There were varying levels of interests and preferences for each proposed website component: Greenhouse Group, Life Cycling, Seed Share, How-To Gardening Instruction, and Virtual Group Meeting. The following section will present results for each website component.

## **Greenhouse Group**

### ***Quantitative Results***

On survey item #3, “If there were “Greenhouse Groups”- shared virtual spaces to convene with other individuals interested in gardening to support well-being- how likely would you be to participate/recommend individuals to participate?” (see Appendix A), respondents reported a likelihood to recommend or participate in such a component on a continuous scale ranging from 0 to 100 (Mean = 70.79, Median = 77.00, N = 42; see Table C.2). Based on checkbox survey items, respondents endorsed that specific features in the Greenhouse Group would be helpful to increase the likelihood to recommend participation or participate (see Table C.3): Informational forums (61.90%), supportive community forums (50.00%), participation of licensed psychologist in group activity (47.62%), opportunity to share images of personal gardens (47.62%), weekly virtual meetings to discuss well-being through gardening (38.10%), and profiles that shared participant's basic information, such as gardening background, age, state of residence (33.33%).

### ***Qualitative Findings***

Based on the open-ended survey item #4, “What might be helpful to increase your likelihood to recommend participation/participate in the Greenhouse Group?” (see Appendix A), responses yielded data that is helpful while considering the development and direction of the Greenhouse Group component. Through thematic analysis, “Greenhouse Group” came to represent a data category that encompassed resultant themes. Five themes emerged from the data

category: (a) Respondents had preferences about participation; (b) respondents had preferences about the platform's informational content; (c) respondents had preferences about platform's participant incentives; (d) respondents supported usage given adequate facilitation; and (e) respondents wanted the platform to be beneficial (see Table C.4).

In the data category, responses clustering around the theme "respondents had preferences about participation" raised important issues surrounding users' engagement in the Greenhouse Group. Some responses centered on commitment to participation. For example, one respondent suggested the groups were noncommittal and on an "as-interest basis" while another desired an "ability to observe before actively engaging." For those recommending the website component, responses indicated a desire to experience the group before offering it to a client. For example, one respondent stated that they "would like to see what it's like in order to recommend it" and another suggested "being able to participate first to see if it is suitable for my client base."

Naturally, users are concerned about the goodness of fit between their needs (or client's needs) and the platform. In order to assess goodness of fit, users may be assessing the culture of the group. One response indicated that a "welcoming attitude for non-experts" was important. Another emphasized that they wanted the group to be a "supportive community." Other respondents were more concerned with the structure of the group. One respondent stated that their likelihood to recommend participation in the Greenhouse Group would increase if there were "safety features for security and/or some commonality for groups." Another respondent reported that "small groups" would increase their likelihood to recommend participation while another suggested that the groups take place with "meetups online and in person."

Responses that clustered around the theme "Respondents supported usage given adequate facilitation" also raised important data surrounding the culture and structure of the group.

Respondents stated that their likelihood to recommend participation would increase if there was adequate administration to monitor group dynamics. Respondents reported particular concern that without a moderator dominant individuals would overwhelm the group.

Interest in facilitation also seemed to dovetail with desire for the platform to be beneficial. Two respondents reported specifically that their likelihood to recommend participation would increase if the group was led by a Registered Horticulture Therapist and/or another professional. Respondents wanted the website component to have “mental health benefits,” “verifiable benefits,” and “be helpful.” Several respondents expressed that their likelihood to recommend participation/participate would increase if the “benefits” of the website component were clearly indicated.

Responses that clustered around the theme “respondents had preferences about platform’s participant incentives” were all from hobbyist respondents. These potential users indicated that their likelihood to participate in the website component would increase if they were given actual horticultural items. Respondents indicated that they were interested in “free food,” “monthly shares,” and “starter packs.” Thus indicating an increased likelihood of participation if there were concrete incentives.

## **Life Cycling**

### ***Quantitative Results***

On survey item #6, “If the online resource offered a platform called “Life Cycling”- a place for participants to post photos of the garden/plants over the course of the garden/plants’ life cycle - how likely would you be to participate/recommend participation?” (see Appendix A), responders reported a likelihood to participate or recommend participation in such a component on a continuous scale ranging from 0 to 100 (Mean = 67.02, Median = 75.00, N = 42; see Table

C.2). Based on checkbox survey items, respondents endorsed that the inclusion of specific features in Life Cycling would be helpful to increase the likelihood to recommend or participate (see Table C.3): Ability to view other participant's photos (90.48%), ability to write comments on personal photos (66.67%), ability to write comments on other participants' photos (57.14%), and ability to update photos daily (50.00%).

### ***Qualitative Findings***

Based on the open-ended survey item #7, “What might be helpful to increase your likelihood to recommend participation/participate in Life Cycling?” (see Appendix A), responses yielded data that is helpful while considering the development and direction of the “Life Cycling” component. Through thematic analysis, “Life Cycling” came to represent a data category that encompassed resultant themes. Four themes emerged from the data category: (a) respondents had preferences about participation; (b) respondents supported usage given adequate facilitation; (c) respondents supported usage given specific content; and (d) respondents endorsed usage given website component’s accessibility (see Table C.4).

In the data category, responses that clustered around the theme “respondents endorsed usage given website component’s accessibility” raised important considerations regarding navigational ease. Respondents were concerned with “easy operation,” “easy photo uploading,” “user friendl[iness],” and “ease of use.” One respondent highlighted that accessibility warranted “multiple ways to access based on equity.” This response may be suggestive of a “low cost” platform to increase accessibility and/or possibly an accessible culture where “someone need not be an expert photographer to participate.”

The responses that clustered around the theme “respondents supported usage given specific content” highlighted platform features that may increase the likelihood of use.

Suggestions included, “add a nature journaling component” and “hands on tasks.” Several respondents wanted the content to demonstrate a link between the personal and the natural. For example, one respondent shared that they wanted the platform to have “some connection to our personal life cycle” while another suggested a “short blurb about connection between plant and human seasons and cycles.” It appears respondents were considering the relationship between the non-human and human, which could be emphasized with “more information about the benefits in participating in such groups.”

Within the themes “respondents had preferences about participation” and “respondents supported usage given adequate facilitation,” similar themes arose in comparison to the data category “Greenhouse Group.” Respondents were interested in being able to “try it out to see what it is like” with “no participation requirement.” The culture of the website component was additionally important. One respondent wanted “non-competitive sharing” while another believed “sharing pictures and seeing those of others is supportive.” Notably, a respondent clearly articulated that it was “really important” that the platform had a “balance of seeing/learning from the work of others AND getting out to do it ourselves.”

Responses that clustered around the theme “respondents supported usage given adequate facilitation) raised issues of moderation. Respondents were interested in “good administrators,” “good and attentive administration,” “guidelines,” and “facilitation by psychologist or therapist.” Facilitation appeared to be important for comfortable participation. One respondent warned that guidelines were important “so content isn’t diluted with dogs, neighbors, etc.”

## **Seed Share**

### ***Quantitative Results***

On survey item #9, “If the online resource offered a “Seed Share”- a collective forum where participants exchange seeds- how likely would you be to recommend participation/participate?” (see Appendix A), respondents reported a likelihood to recommend participation or participate in such a component on a continuous scale ranging from 0 to 100 (Mean = 76.46, Median = 90.00, N = 41; see Table C.2). Based on checkbox survey items, respondents endorsed that specific features in the Seed Share would be helpful to increase the likelihood to recommend or participate (see Table C.3): Ability to request free seeds from other participants (80.95%), informational forum to learn how to save seeds (78.57%), and opportunity to list free seeds to share with other participants (78.57%).

### ***Qualitative Findings***

Based on the open-ended survey item #10, “What might be helpful to increase your likelihood to recommend participation/participate in the Seed Share?” (see Appendix A), responses yielded data that is helpful while considering the development and direction of the Seed Share component. Through thematic analysis, “Seed Share” came to represent a data category that encompassed resultant themes. Six themes emerged from the data category (see Table C.4): (a) respondents had questions about the platform; (b) respondents demonstrated support for platform; (c) respondents demonstrated lack of support for platform; (d) respondents had suggestions for about seeds shared; (e) respondents had suggestions for information provided about the seeds; and (f) respondents had suggestions of exchanging seeds with others.

The Seed Share data category was the only data category in the thematic analysis that garnered responses in the form of questions. Questions that were raised about the website



component included, “Where is it located,” “Will it be in-person,” “How would it work? Mail?” These questions seem to highlight that the Seed Share website component requires more complex organization than the other website components on the platform. Several respondents had concerns about this, including “too complicated,” “concern of cost (shipping),” and “giant pain.”

Responses that clustered around “suggestions for information provided about the seeds” noted specific resources that would increase likelihood of use. For example, “resources on how to save seeds and share them ... have way for people in local communities to connect,” and “guidelines for how to prepare seeds, qty, etc.” Several respondents suggested that the Seed Share utilize photos, such that users can see “what worked, what didn’t.” Additionally, one respondent suggested “maybe education, tips.” This respondent continued to suggest “photo linked to life cycling group.” While one respondent warned that “huge hours need to instruct people on seed saving,” it is important to consider that particular user information could reduce organizational burden.

Responses also raised suggestions about the type of seeds shared on the website component. Respondents expressed an increased likelihood to recommend participation or participate with the inclusion of “native seeds,” and “flower seeds that provide unique and interesting plant material.” However, it is important that regardless of seed type, users may be more likely to use the website component if “everything [is] labeled for each variety” and there is an “accuracy of seed types.”

Finally, responses that clustered around the theme “respondents had suggestions of exchanging seeds with others” highlighted important issues to consider in the physical exchange of plant material. First, one respondent suggested “exchange with colleagues from other

countries” while other respondents suggested “local/regional connections.” Depending on the type of exchange occurring, there will be a “need to clear any state/federal regulations” for mailing seed material.

## **How-To Gardening Instruction**

### ***Quantitative Results***

On survey item #12, “If the online resource offered “How-To Gardening Instruction,” how likely would you be to recommend participation/participate?” (see Appendix A), respondents reported a likelihood to recommend participation or participate in a How-To Gardening Instruction website component on a continuous scale ranging from 0 to 100 (Mean = 81.38, Median = 92.50, N = 40; see Table C.2). Through checkbox responses, responders endorsed that specific features of the How-To Gardening Instructions component would be helpful to increase the likelihood to recommend or participate (see Table C.3): Presentation of information through video format (78.57%), forum for participants to share gardening questions and answers (71.43%), and instructions that supported organic gardening (69.05%).

### ***Qualitative Findings***

Based on the open-ended survey item # 13, “What might be helpful to increase your likelihood to recommend participation/participate in the How-To Gardening Instruction?” (see Appendix A), responses yielded data that is helpful while considering the development and direction of the How-To Gardening Instruction component. Through thematic analysis, “How-To Gardening Instruction” came to represent a data category that encompassed resultant themes (see Table C.4). Four themes emerged from the data category: (a) respondents supported usage given specific content; (b) respondents were supportive given specific participation conditions; (c)

respondents endorsed given competent facilitation; and (d) respondents shared their criticism about the platform.

In the data category, responses that clustered around the themes “respondents supported usage given specific content” raised respondents’ interest in multimedia content. Several respondents stated that their likelihood to recommend participation/participate would increase if there were “well done videos.” One respondent suggested that the videos featured “competent gardeners on very specific topics.” Another suggested “new videos depending on the season. Or an archive of old ones based off of seasons... [and] Resource lists for each video.” Another respondent suggested that photos be used to demonstrate “step by step” instructions. Several other respondents sought “real time” instruction with someone with “expertise,” including “plant disease and pest experts” as well as “someone with a 4 year or more horticulture therapy degree.”

Responses that clustered around the theme “respondents had preferences about participation” raised similar issues as in previous data categories. For example, respondents stated that their likelihood to recommend participation/participate would increase if there was a “judgment free space,” “variety of engagement levels,” and if the website component were “organized simply.”

Importantly, criticisms were raised in response to this website component. The criticism centered around the availability of this type of resource at “many” other sites and organizations. However, one respondent acknowledged that YouTube may offer how-to gardening instruction, yet they would be more likely to recommend participation in this website component if instructions were “not [from] a lay person.”

## **Virtual Group Meeting**

### ***Quantitative Results***

On survey item #15, “If the online resource offered live virtual group meetings to support connection and well-being through gardening, how likely would you be to participate/recommend participation?” (see Appendix A), respondents reported a likelihood to recommend participation or participate in such a component on a continuous scale ranging from 0 to 100 (Mean = 67.29, Median = 80.00, N = 39; see Table C.2). Based on checkbox survey items, respondents endorsed that specific features of the Virtual Group Meeting component would be helpful to increase the likelihood to recommend or participate (see Table C.3): Regular scheduled meetings (61.90%), group members stay the same week to week (54.76%), and presence of a licensed psychologist (52.38%).

### ***Qualitative Findings***

Based on the open-ended survey item #16, “What might be helpful to increase your likelihood to recommend participation/participate in the Virtual Group Meeting?” (see Appendix A), responses yielded data that is helpful while considering the development and direction of the Virtual Group Meeting component. Through thematic analysis, “Virtual Group Meeting” came to represent a data category that encompassed resultant themes. Four themes emerged from the data category (see Table C.4): Respondents acknowledged participation on the platform; respondents supported usage given specific content; respondents preferred convenient meeting times; respondents supported usage with competent facilitation.

In the data category, responses that clustered around the theme “respondents preferred convenient meeting times” highlighted that schedule would impact engagement in the Virtual Group Meeting. Responses suggested regular meetings, such as “same time each week,”

“weekly,” and “monthly group meetings.” The frequency of group meetings was also raised. One respondent suggested “multiple times” while another suggested “less frequen[t] like once a month.”

Respondents additionally noted that they were more likely to engage in the Virtual Group Meeting given adequate facilitation. While several respondents highlighted the desire for professional leadership, other respondents emphasized their desire for “monitoring” of the group to moderate “comments” and “members.” It appeared with these comments, facilitation was important to support healthy group dynamics. One notable respondent suggested that “weekly seasonally appropriate activities could keep people on the same page, give them direction, and supply conversation topics.” This respondent was noting the usefulness of structure to engage and connect group members in a potentially productive manner.

Concerns were raised in regards to Virtual Group Meeting. One respondent noted that they were “burnt out on virtual group meetings” while another stated they were “hesitant to join a discussion group of people they do not know.” One respondent suggested a “small group” may “help people feel more connected and valued.”

### **Across Platforms: Qualitative Themes of Participation and Facilitation**

Consistent themes were raised across four out of five website components: Respondents supported usage given adequate facilitation, respondents had preferences about participation, and respondents supported usage given specific content (see Table C.4). The consistency of these themes indicate that facilitation, participation, and content are particular areas of the online intervention that need thoughtful attention. This finding is aligned with prior research that identifies support provision (facilitation), interactive online activities (participation), and

program content (content) as three key qualities of internet-supported interventions (Barak et al., 2009).

Within the themes that emerged related to facilitation, respondents consistently endorsed “quality” facilitation that potentially monitors forums and provides evidence-based information. A consideration of what facilitation means on this platform raises an important question about the type of program being developed. While the researcher conceptualized the web-based intervention to be a self-guided intervention that operated with very minimal human involvement, respondents may be more likely to engage in a platform that integrates more human-supported web-based therapeutic intervention strategies. For example, several responses suggested that the “Greenhouse Group” be led by an experienced professional, with some requesting active and ongoing moderation. Similar responses were found in the raw data of “How-To Gardening Instructions.” While each website component may demand different forms of facilitation (i.e., virtual meetings will necessarily have facilitators in active attendance), users may be indicating that they would be more likely to engage if there is substantive human presence across the platform.

Within the themes that emerged related to participation, respondents consistently endorsed a supportive environment to increase the likelihood of website use. Concerns about participation are in line with prior research (Benlian & Hess, 2011). Users of online communities significantly increase participation when there is a trusting online atmosphere that signals a reliable environment to engage in. Website features, including usability, transparency, quality-assured content, security and privacy, have been shown to greatly impact trust and participation in online communities, as well as enhance interpersonal engagement across the platform (Benlian & Hess, 2011). In this light, respondents’ suggestions for participation dovetail with the

program's technological simplicity. The results of the needs assessment indicate that the online gardening resource's navigability and ease of use is of primary importance. While the website's content was of conceptual importance, results of the needs assessment indicate that if the website is not fairly straightforward to technologically operate, there will be a decreased likelihood of usership.

## CHAPTER V: DISCUSSION

### **Development and Launching of the Initial Prototype**

The results of this needs assessment endorse the development of a web-based therapeutic horticulture intervention to support connectedness and well-being, while also illuminating key considerations for that development. Based on descriptive statistics of all respondents, there was a likelihood (Mean = 74.63, Median = 77.00, N = 42; see Table 2) to participate or recommend such a website. While the research did not query on the reasons respondents were interested in the program, the endorsement of the web-based intervention is consistent with prior research that individuals experience connectedness and well-being through horticultural activities and find benefit in online mental health platforms that promote such qualities (Chung et al., 2011; Ebert et al., 2018; Haller et al., 2019; Harris, 2017; Sempik et al., 2014; Taylor et al., 2021).

The results of this needs assessment raise important considerations for the development of the web-based therapeutic intervention. In the following sections, a preliminary outline for the initial prototype will be presented. This initial prototype is based on the quantitative and qualitative data collected from the needs assessment in conjunction with the literature reviewed.

### ***Structure and Functionality of Initial Prototype***

The prototype of the web-based intervention will be designed so that it can be delivered across multiple operating systems, including app delivery. As suggested by respondents, compatibility with wide ranging servers will increase website accessibility. For this reason, the web-based intervention will be created, in partnership with a website designer, using SquareSpace—a web builder that allows the purchase of a domain name for ~\$50 per year. In order to potentiate user friendliness, the website will have a Flesch reading score of 90.0-70.0, making it “easy” to “fairly easy” to read (Kulkarni et al., 2022). Inherently, users will need to be



familiar with internet use; however, the website design will be considerate of simplicity and navigational ease of use (Bevan Jones et al., 2018).

Security and confidentiality were also key considerations from the needs assessment and will be taken into account in the development of the prototype. In line with American Psychological Association (APA) guidelines for telepsychology, an Informed Consent document will be required to explain and obtain consent for terms of use. First, the Informed Consent document will address the procedures of how users will interact on the platform. For example, when creating an account, users will indicate their responsibility to post “constructive” content (Johnsen et al., 2002). While forum activity is incredibly difficult to monitor (Smith & Urbas, 2022), forums will benefit from real-time surveying by the website’s host to encourage the appropriateness of postings; however, the Informed Consent will state that the host is ultimately not legally liable. Additionally, the Informed Consent will clearly define the limitations of confidentiality in the web-based intervention (APA, 2013). In order to mitigate confidentiality concerns, a password protected login will be required for entry into the online resource. This will increase confidentiality and maintain user privacy since account holders will create a username which will de-identify their website activity and add a layer of confidentiality.

The primary user flow of the online gardening resource provides an overall framework for the web-based therapeutic intervention (see Figure D.3). The website will be structured so that user flow can be personalized for recommending professionals and participants. The initial prototype will be designed such that users can view the contents of the web-based therapeutic horticulture intervention prior to making an account. Respondents in the needs assessment consistently endorsed the ability to “see” what the intervention was like before recommending or participating. This will be facilitated by building a “Browse” section into the main home page.

This section will provide images and text descriptions of the online resource's website components, such that users can determine if the web-based intervention fits their needs or the needs of their clientele. Since respondents consistently articulated that their likelihood to participate or recommend would increase if they knew the online gardening resource was beneficial, the text descriptions of the website components will highlight evidence basis. Additionally, the main web page will include a link to more general information about horticulture as a therapeutic mechanism.

Once a user has created an account or has logged in, the user is directed to a "Greenhouse Group" page. As per respondents' suggestions, this page will be specific to a small group of users to facilitate a warm, supportive culture. On the "Greenhouse Group" page, users will have the option of flowing into the three main website components ("Life Cycling," "How-To Gardening Instruction," and "Virtual Group Meeting"). These components will display on the "Greenhouse Group" dashboard and will be structured in a similar manner, such that the online resource looks cohesive and enables users to become familiar with its display (Bevan Jones et al., 2018). The "How-To Gardening Instruction" will be the only website component that is not group specific. In other words, in the "How-To Gardening Instruction" users will be able to interact with other members outside of their closed "Greenhouse Group."

It should be noted that based on the data collected, the "Seed Share" was removed from the website's architecture. While the "Seed Share" may facilitate exchange of information and materials between group members, the needs assessment illuminated that the "Seed Share" requires complex organizational efforts. Since navigability and ease of use is a forefront consideration, the "Seed Share" was removed from the initial prototype. It may be important to

consider the “Seed Share” in future iterations of the website’s development, when the website design has been proven capable of integrating a more cumbersome website component.

### ***Facilitation on the Initial Prototype***

Facilitators will be present on the online gardening resource. As suggested by needs assessment respondents, facilitation is key consideration in the likelihood of users to engage in the web-based intervention. The professional identity of the facilitators will be publicized on the “About Us” section on the main home page, and will be detailed in the Informed Consent document. While facilitator engagement in some areas of the platform is fairly dominant (i.e., facilitators will lead the “Virtual Group Meeting”), the other website components will have less facilitator presence. The asynchronous, multimedia environments of “Life Cycling” and “How-To Gardening Instruction” poses issues related to facilitator integration. The degree to which a professional is able to be involved in these components depends on how much time the professionals are willing to dedicate to their involvement on the website and developers’ financial ability to pay for that degree of support. Additionally, it depends on usership. The larger the number of accounts active on the website, the more “Greenhouse Groups” created and therefore, the more demand for professional oversight. In the initial prototype, when usership is relatively small, it may be possible to articulate how much time and what time of the day a facilitator will be active on the forums. This may motivate users to use the forum during those times and will ensure a regular monitoring of the forum postings.

### ***Content of Initial Prototype***

The content of the website components remain largely as conceptualized before the needs assessment. First, the “Life Cycling” website component will be created as a collection of embedded image carousels, such that users can upload daily pictures of their gardened plants.

The feature will provide the opportunity to comment on one's own uploads, as well as the uploads of other group members. An example carousel will be shared to demonstrate to users that they need not be an expert photographer nor gardener to participate. Second, the "How-To Gardening Instruction" will be created as a collection of multimedia resources that range in skillset, created by facilitators and/or sourced from public video databases (i.e., YouTube). Depending on the financial resources available to developers, this website component may benefit from partnership with previously established website/apps, such as Candide, to exponentially broaden information sharing. Last, the "Virtual Group Meeting" will be an embedded Zoom room. This will allow the meetings to be HIPPA compliant, furthering priorities of confidentiality and security. The meeting will be regularly held by a licensed psychologist. Depending on financial resources available to developers, meetings will be weekly or monthly.

### **Implementation**

Once the initial prototype of the web-based therapeutic intervention is created, implementation is the next phase of development. Researchers and clinicians, prospective users, technological facilitators, and funding sources can all be approached for their unique perspectives, usage, and resources. First, researchers and clinicians can be contacted to further garner professional feedback on the developed intervention. The American Horticulture Therapy Association (AHTA) members that responded to the needs assessment survey are likely to be interested in implementation, and may provide valuable considerations in the form of focus groups. Second, prospective users will be contacted directly. Based on clinician feedback, specific clientele may be identified as particularly important to outreach to. These individuals can be approached directly or through telecommunication. Since the online forums that the needs assessment was posted on for this study did not garner extensive response, alternative gardening

forums can also be explored to promote the web-based intervention. Third, technological facilitators, such as web developers and UX designers, may be approached to advance the technological outfitting of this web-based intervention. Individuals involved in this domain will be helpful to further implementation success in terms of the relationship between the product and the user. Finally, funding partnerships will be explored. There are financial expenses associated with the development and implementation of this website. Funding partners could support the project financially as well as increase its visibility by monetarily supporting wider reaching promotional campaigns.

### **Ongoing Research**

Ongoing research of the implemented web-based therapeutic intervention will increase its acceptability, usability, and effectiveness (Bevan Jones et al., 2018). The platform can be developed through an interactive approach, going through phases of development that accommodates the perspectives of users. This approach could benefit from the utilization of formative qualitative data that would continually inform the platform's design and development. This can include requesting anonymous feedback about user experiences as well as a sensitive monitoring of the website's forum conversations that may indicate users' ongoing needs.

In addition to formative data, summative data can be collected in order to evaluate the website's intended goal. Data collection will prioritize implementation benchmarks and outcome measurements. Towards this end, data gathering can track how many individual site visitors there are on a daily, weekly, and monthly basis, how long visits last, how frequently users return to the site, and how often users upload content. Additionally, users can be invited to complete the PERMA Profiler scale before and after website utilization (Butler & Kern, 2013). This scale would measure well-being through the positive psychology perspective that guides the design of

the website. This measure is an accessible tool that can easily be completed online (Butler & Kern, 2013). Data collected from this scale can be utilized to further refine and improve the website's structure, functionality, content and design so that it achieves the website's intended goal to increase connectedness and well-being.

### **Limitations**

The primary limitation of this study is related to issues of generalizability. Implications drawn from the results are only reflective of the sample collected. Participants of the current study were overwhelmingly professionals associated with AHTA. Though they were selected because of their understanding and interest in the study's area of focus, they represent a small percentage of those that may recommend and/or participate in the potential platform. Furthermore, their presence in the study's sample skews the results towards the priorities and values of the AHTA, which may not extend to other populations. Therefore, while broader speculations can be inferred from the data, generalizable conclusions are beyond the scope of this needs assessment.

The findings of this assessment are also limited by its qualitative nature. As previously mentioned, the methodology sought to reduce the effects of bias, however, it is impossible to completely eliminate my own subjectivity. The thematic analysis is inherently impacted by the questions I decided to pose in the survey, and what drew my attention in the coding process. Similarly, the conceptualization of the prototype is influenced by my own subjectivity and imagination.

Lastly, results of this study are limited by elements in the research design. In the study's survey, conceptualized website components were presented to respondents through one sentence descriptions. These brief descriptions related essential information, but did not provide refined

details of the researcher's ideas. Therefore, respondents may have held very different concepts of the website components they were providing feedback for. This is not problematic per se, however, it does qualify implications that are drawn from this study's process. Additionally, it is of note, that it was beyond the scope of this dissertation to explore payment options for potential users.

## CHAPTER VI: CONCLUSION

The pandemic has become a nationwide psychological trauma, posing a serious mental health risk in the United States. As the pandemic increases social disconnection and depression, amongst other psychological concerns, the need for accessible therapeutic interventions has become imperative. This study conceptualized a web-based therapeutic horticulture intervention to support connectedness and well-being during the pandemic era and for those who can benefit from an accessible, at-home intervention long after the pandemic is resolved. While literature review supports the usefulness of such an intervention, the study's research asked, 1) Is there interest in the creation of an online gardening resource to support connectedness and well-being? and 2) If an online gardening resource was created to support connectedness and well-being, what would be helpful to include on the platform?

Findings of the study confirm that there is an interest in the development of a web-based therapeutic horticulture intervention, and indicated preferences for the online resource that would increase usership. Respondents highlighted the importance of facilitation, participation, and content across the web-based platform. Considering the foundational results of the current study, it is suggested that a prototype of the website be created. The platform can be developed through an interactive approach, going through phases of development that utilize formative and summative data to accommodate the perspectives of users. Ultimately, this website would have the potential to expand access to adjunctive mental health interventions while leveraging the healing power of engaging in the natural world.



## References

- Allen, K.-A., Kern, M. L., Rozek, C. S., McInerney, D. M., & Slavich, G. M. (2021). Belonging: A review of conceptual issues, an integrative framework, and directions for future research. *Australian Journal of Psychology*, *73*(1), 87–102. <https://doi.org/10.1080/00049530.2021.1883409>
- Andersson, G., & Titov, N. (2014). Advantages and limitations of internet-based interventions for common mental disorders. *World Psychiatry*, *13*(1), 4–11. <https://doi.org/10.1002/wps.20083>
- American Psychological Association. (2013). *Guidelines for the practice of telepsychology*. American Psychological Association. <https://www.apa.org/news/press/releases/2022/03/inflation-war-stress>
- American Psychological Association. (2022, March 10). *Inflation, war push stress to alarming levels at two-year COVID-19 anniversary*. Press Release. <https://www.apa.org/news/press/releases/2022/03/inflation-war-stress>
- Barak, A., Klein, B., & Proudfoot, J. G. (2009). Defining internet-supported therapeutic interventions. *Annals of Behavioral Medicine*, *38*(1), 4–17. <https://doi.org/10.1007/s12160-009-9130-7>
- Baumeister, R. F., & Leary, M. R. (2017). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. In B. Laursen & R. Žukauskienė (Eds.), *Interpersonal development* (pp. 57–89). <https://doi.org/10.4324/9781351153683-3>
- Beland, L., Brodeur, A., Mikola, D., & Wright, T. (2022). The short-term economic consequences of COVID-19: Occupation tasks and mental health in Canada. *Canadian Journal of Economics/Revue Canadienne d'économique*, *55*(S1), 214–247. <https://doi.org/10.1111/caje.12543>
- Benlian, A., & Hess, T. (2011). The signaling role of IT features in influencing trust and participation in online communities. *International Journal of Electronic Commerce*, *15*(4), 7–56. <https://doi.org/10.2753/JEC1086-4415150401>
- Berger, T., Krieger, T., Sude, K., Meyer, B., & Maercker, A. (2018). Evaluating an e-mental health program (“deprexis”) as adjunctive treatment tool in psychotherapy for depression: Results of a pragmatic randomized controlled trial. *Journal of Affective Disorders*, *227*, 455–462. <https://doi.org/10.1016/j.jad.2017.11.021>
- Bevan Jones, R., Thapar, A., Rice, F., Beeching, H., Cichosz, R., Mars, B., Smith, D. J., Merry, S., Stallard, P., Jones, I., Thapar, A. K., & Simpson, S. A. (2018). A web-based psychoeducational intervention for adolescent depression: Design and development of MoodHwb. *JMIR Mental Health*, *5*(1), e13. <https://doi.org/10.2196/mental.8894>
- Blaschke, S. (2017). The role of nature in cancer patients’ lives: A systematic review and qualitative meta-synthesis. *BMC Cancer*, *17*(1), 370. <https://doi.org/10.1186/s12885-017-3366-6>

- Borghouts, J., Eikey, E., Mark, G., De Leon, C., Schueller, S. M., Schneider, M., Stadnick, N., Zheng, K., Mukamel, D., & Sorkin, D. H. (2021). Barriers to and facilitators of user engagement with digital mental health interventions: Systematic review. *Journal of Medical Internet Research*, 23(3), e24387. <https://doi.org/10.2196/24387>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Butler, J., & Kern, M. (2013). *The PERMA profiler*. University of Pennsylvania.
- Button, K. S., Ioannidis, J. P. A., Mokrysz, C., Nosek, B. A., Flint, J., Robinson, E. S. J., & Munafò, M. R. (2013). Power failure: Why small sample size undermines the reliability of neuroscience. *Nature Reviews Neuroscience*, 14(5), 365–376. <https://doi.org/10.1038/nrn3475>
- Chen, J.-H. (2021). State containment measures, living arrangements, and mental health of U.S. older adults during the COVID-19 pandemic. *Aging & Mental Health*, 1–12. <https://doi.org/10.1080/13607863.2021.2021142>
- Choi, N. G., Marti, C. N., Bruce, M. L., & Hegel, M. T. (2013). Depression in homebound older adults: problem-solving therapy and personal and social resourcefulness. *Behavior Therapy*, 44(3), 489–500. <https://doi.org/10.1016/j.beth.2013.04.002>
- Chung, R. C.-Y., Bemak, F., & Bemak, F. P. (2011). *Social justice counseling: The next steps beyond multiculturalism*. SAGE Publications. <https://doi.org/10.4135/9781452240503>
- Darcy, S. J. (2021). Integral metatheory in the time of COVID: Implications for medical and nursing teaching and practice. *International Journal for Human Caring*, 26, 40–51. <https://doi.org/10.20467/HumanCaring-D-20-00027>
- Detweiler, M. B., Sharma, T., Detweiler, J. G., Murphy, P. F., Lane, S., Carman, J., Chudhary, A. S., Halling, M. H., & Kim, K. Y. (2012). What is the evidence to support the use of therapeutic gardens for the elderly? *Psychiatry Investigation*, 9(2), 100. <https://doi.org/10.4306/pi.2012.9.2.100>
- Du, S., Ma, Y., & Lee, J. Y. (2022). Workplace loneliness and the need to belong in the era of COVID-19. *Sustainability*, 14(8), 4788. <https://doi.org/10.3390/su14084788>
- Dunn, P. A. (Ed.). (2019). *Holistic healing: Theories, practices, and social change*. Canadian Scholars' Press, Inc.
- Ebert, D. D., Van Daele, T., Nordgreen, T., Karekla, M., Compare, A., Zarbo, C., Brugnera, A., Øverland, S., Trebbi, G., Jensen, K. L., Kaehele, F., & Baumeister, H. (2018). Internet- and mobile-based psychological interventions: Applications, efficacy, and potential for improving mental health: A report of the EFPA e-health taskforce. *European Psychologist*, 23(2), 167–187. <https://doi.org/10.1027/1016-9040/a000318>

- Fang, D., Thomsen, M. R., & Nayga, R. M. (2021). The association between food insecurity and mental health during the COVID-19 pandemic. *BMC Public Health*, *21*(1), 607. <https://doi.org/10.1186/s12889-021-10631-0>
- Farhang, M., Miranda-Castillo, C., Behrens, M. I., Castillo, E., Mosquera Amar, S., & Rojas, G. (2022). Impact of social isolation and coping strategies in older adults with mild cognitive impairment during the COVID-19 pandemic: A qualitative study. *Aging & Mental Health*, *26*(7), 1395–1416. <https://doi.org/10.1080/13607863.2021.1958145>
- Folden, S. L. (1989). Caring for older homebound adults: A chronic illness perspective. *Journal of Home Health Care Practice*, *2*(1), 57–62. <https://doi.org/10.1177/108482238900200108>
- Fujita, M., Harrigan, P., & Soutar, G. N. (2018). Capturing and co-creating student experience in social media: A social identity theory perspective. *Journal of Marketing Theory and Practice*, *26*(1–2), 55–71. <https://doi.org/10.1080/10696679.2017.1389245>
- Gál, É., Ștefan, S., & Cristea, I. A. (2021). The efficacy of mindfulness meditation apps in enhancing users' well-being and mental health related outcomes: A meta-analysis of randomized controlled trials. *Journal of Affective Disorders*, *279*, 131–142. <https://doi.org/10.1016/j.jad.2020.09.134>
- Garrido, S., Millington, C., Cheers, D., Boydell, K., Schubert, E., Meade, T., & Nguyen, Q. V. (2019). What works and what doesn't work? A systematic review of digital mental health interventions for depression and anxiety in young people. *Frontiers in Psychiatry*, *10*, 759. <https://doi.org/10.3389/fpsy.2019.00759>
- Haller, R. L., Kennedy, K. L., & Capra, C. L. (Eds.). (2019). *The profession and practice of horticultural therapy*. CRC Press. <https://doi.org/10.1201/9781315143101>
- Hames, J. L., Hagan, C. R., & Joiner, T. E. (2013). Interpersonal processes in depression. *Annual Review of Clinical Psychology*, *9*(1), 355–377. <https://doi.org/10.1146/annurev-clinpsy-050212-185553>
- Hamel, L., Kearney, A., Kirzinger, A., Lopes, L., Muñana, C., & Brodie, M. (2020, July 27). *KFF Health Tracking Poll – July 2020*. Kaiser Family Foundation. <https://www.kff.org/coronavirus-covid-19/report/kff-health-tracking-poll-july-2020/>
- Harris, H. (2017). The social dimensions of therapeutic horticulture. *Health & Social Care in the Community*, *25*(4), 1328–1336. <https://doi.org/10.1111/hsc.12433>
- He, Z., Muhlert, N., & Elliott, R. (2021). Emotion regulation of social exclusion: A cross-cultural study. *Humanities and Social Sciences Communications*, *8*(1), 173. <https://doi.org/10.1057/s41599-021-00857-z>
- Horn, W. (1973). On the origins of the medieval cloister. *Gesta*, *12*(1/2), 13–52. <https://doi.org/10.2307/766633>

- Johnsen, J. K., Rosenvinge, J. H., & Gammon, D. (2002). Online group interaction and mental health: An analysis of three online discussion forums. *Scandinavian Journal of Psychology*, 43(5), 445–449. <https://doi.org/10.1111/1467-9450.00313>
- Keller, A. C., Meier, L. L., Elfering, A., & Semmer, N. K. (2020). Please wait until I am done! Longitudinal effects of work interruptions on employee well-being. *Work & Stress*, 34(2), 148–167. <https://doi.org/10.1080/02678373.2019.1579266>
- Kulkarni, A., Wong, M., Belsare, T., Shah, R., Yu Yu, D., Coskun, B., Holschuh, C., Kakar, V., Modrek, S., & Smirnova, A. (2022). Quantifying the quality of web-based health information on student health center websites using a software tool: Design and development study. *JMIR Formative Research*, 6(2), e32360. <https://doi.org/10.2196/32360>
- Lehtimäki, S., Martić, J., Wahl, B., Foster, K. T., & Schwalbe, N. (2021). Evidence on digital mental health interventions for adolescents and young people: Systematic overview. *JMIR Mental Health*, 8(4), e25847. <https://doi.org/10.2196/25847>
- Levi, O., Shoval-Zuckerman, Y., Fruchter, E., Bibi, A., Bar-Haim, Y., & Wald, I. (2017). Benefits of a psychodynamic group therapy (PGT) model for treating veterans with PTSD: Benefits of PGT model for PTSD war veterans. *Journal of Clinical Psychology*, 73(10), 1247–1258. <https://doi.org/10.1002/jclp.22443>
- MacDonald, G., & Leary, M. R. (2005). Why does social exclusion hurt? The relationship between social and physical pain. *Psychological Bulletin*, 131(2), 202–223. <https://doi.org/10.1037/0033-2909.131.2.202>
- Matsubayashi, T., Ishikawa, Y., & Ueda, M. (2022). Economic crisis and mental health during the COVID-19 pandemic in Japan. *Journal of Affective Disorders*, 306, 28–31. <https://doi.org/10.1016/j.jad.2022.03.037>
- Mertens, D. M. (2019). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods* (5th ed.). SAGE Publications, Inc.
- Moeller, C., King, N., Burr, V., Gibbs, G. R., & Gomersall, T. (2018). Nature-based interventions in institutional and organisational settings: A scoping review. *International Journal of Environmental Health Research*, 28(3), 293–305. <https://doi.org/10.1080/09603123.2018.1468425>
- Mojtahedi, D., Dagnall, N., Denovan, A., Clough, P., Hull, S., Canning, D., Lilley, C., & Papageorgiou, K. A. (2021). The relationship between mental toughness, job loss, and mental health issues during the COVID-19 pandemic. *Frontiers in Psychiatry*, 11, 607246. <https://doi.org/10.3389/fpsy.2020.607246>
- Nakamura, J., & Csikszentmihalyi, M. (2014). The concept of flow. In M. Csikszentmihalyi (Ed.), *Flow and the foundations of positive psychology* (pp. 239–263). Springer Netherlands. [https://doi.org/10.1007/978-94-017-9088-8\\_16](https://doi.org/10.1007/978-94-017-9088-8_16)

- Nettle, C. (2016). *Community gardening as social action*. Routledge.  
<https://doi.org/10.4324/9781315572970>
- Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2011). Happiness is in our nature: Exploring nature relatedness as a contributor to subjective well-being. *Journal of Happiness Studies*, 12(2), 303–322. <https://doi.org/10.1007/s10902-010-9197-7>
- Park, J., & Kim, B. (2021). Associations of small business closure and reduced urban mobility with mental health problems in COVID-19 pandemic: A national representative sample study. *Journal of Urban Health*, 98(1), 13–26.  
<https://doi.org/10.1007/s11524-020-00511-0>
- Philippe, T. J., Sikder, N., Jackson, A., Koblanski, M. E., Liow, E., Pilarinos, A., & Vasarhelyi, K. (2022). Digital health interventions for delivery of mental health care: Systematic and comprehensive meta-review. *JMIR Mental Health*, 9(5), e35159.  
<https://doi.org/10.2196/35159>
- Raifman, J., Bor, J., & Venkataramani, A. (2020). *Unemployment insurance and food insecurity among people who lost employment in the wake of COVID-19* [Preprint]. Health Economics. <https://doi.org/10.1101/2020.07.28.20163618>
- Relf, P. D. (2005). The therapeutic values of plants. *Pediatric Rehabilitation*, 8(3), 235–237.  
<https://doi.org/10.1080/13638490400011140>
- Schmitz, R. M., Gomez, G., Propst, A., Tabler, J., & Charak, R. (2022). Queer politics of a pandemic: LGBTQ + people’s conceptions of COVID-19’s politicization. *Sexuality Research and Social Policy*. <https://doi.org/10.1007/s13178-022-00719-6>
- Searles, H. F. (1960). *The nonhuman environment: In normal development and in schizophrenia*. International Universities Press.
- Seligman, M. E. P. (2012). *Flourish: A visionary new understanding of happiness and well-being*. Simon and Schuster.
- Sempik, J., Rickhuss, C., & Beeston, A. (2014). The effects of social and therapeutic horticulture on aspects of social behaviour. *British Journal of Occupational Therapy*, 77(6), 313–319.  
<https://doi.org/10.4276/030802214X14018723138110>
- Shakeel, T., Habib, S., Boulila, W., Koubaa, A., Javed, A. R., Rizwan, M., Gadekallu, T. R., & Sufiyan, M. (2022). A survey on COVID-19 impact in the healthcare domain: Worldwide market implementation, applications, security and privacy issues, challenges and future prospects. *Complex & Intelligent Systems*. <https://doi.org/10.1007/s40747-022-00767-w>
- Simson, S., & Straus, M. (1997). *Horticulture as therapy: Principles and practice*. CRC Press.
- Smith, M., & Urbas, G. (2022). Evolving legal responses to social media: Litigation, legislation, and system architecture. *ANU Journal of Law and Technology*, 3(1), 24.

- Tai, D. B. G., Sia, I. G., Doubeni, C. A., & Wieland, M. L. (2021). Disproportionate impact of COVID-19 on racial and ethnic minority groups in the United States: A 2021 update. *Journal of Racial and Ethnic Health Disparities*.  
<https://doi.org/10.1007/s40615-021-01170-w>
- Taylor, C. B., Graham, A. K., Flatt, R. E., Waldherr, K., & Fitzsimmons-Craft, E. E. (2021). Current state of scientific evidence on Internet-based interventions for the treatment of depression, anxiety, eating disorders and substance abuse: An overview of systematic reviews and meta-analyses. *European Journal of Public Health*, *31*(Supplement\_1), i3–i10. <https://doi.org/10.1093/eurpub/ckz208>
- Thompson, S. C. (1981). Will it hurt less if I can control it? A complex answer to a simple question. *Psychological Bulletin*, *90*(1), 89–101.  
<https://doi.org/10.1037/0033-2909.90.1.89>
- 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. [https://doi.org/10.1016/S0272-4944\(05\)80184-7](https://doi.org/10.1016/S0272-4944(05)80184-7)
- van der Vaart, R., Witting, M., Riper, H., Kooistra, L., Bohlmeijer, E. T., & van Gemert-Pijnen, L. J. (2014). Blending online therapy into regular face-to-face therapy for depression: Content, ratio and preconditions according to patients and therapists using a Delphi study. *BMC Psychiatry*, *14*(1), 355. <https://doi.org/10.1186/s12888-014-0355-z>
- van Gelder, N., Peterman, A., Potts, A., O'Donnell, M., Thompson, K., Shah, N., & Oertelt-Prigione, S. (2020). COVID-19: Reducing the risk of infection might increase the risk of intimate partner violence. *EClinicalMedicine*, *21*, 100348.  
<https://doi.org/10.1016/j.eclinm.2020.100348>
- Wilber, K. (2007). *The integral vision: A very short introduction to the revolutionary integral approach to life, God, the universe, and everything*. Shambhala Publications.
- Wilber, K., & Wachowski, L. (2017). *A brief history of everything* (20th anniversary ed.). Shambhala.
- Wise, J. (2015). *Digging for victory: Horticultural therapy with veterans for post-traumatic growth*. Karnac.
- Xiang, X., Kayser, J., Sun, Y., & Himle, J. (2021). Internet-based psychotherapy intervention for depression among older adults receiving home care: Qualitative study of participants' experiences. *JMIR Aging*, *4*(4), e27630. <https://doi.org/10.2196/27630>
- Yuqing, R., Kraut, R., & Kiesler, S. (2007). Applying common identity and bond theory to design of online communities. *Organization Studies*, *28*(3), 377–408.  
<https://doi.org/10.1177/0170840607076007>

## APPENDIX A: NEEDS ASSESSMENT QUESTIONS

### American Horticultural Therapy Association (AHTA) Needs Assessment

1. If there was an online resource that supported connectedness and wellbeing, what elements would you hope to find?

- |   |   |
|---|---|
| <input type="checkbox"/> Supportive community forums            | <input type="checkbox"/> Opportunity to share images of personal gardens                  |
| <input type="checkbox"/> Organic gardening instructional videos | <input type="checkbox"/> Connections to gardening materials (i.e., seeds, soil, planters) |
| <input type="checkbox"/> Gardening mindfulness prompts          | <input type="checkbox"/> Weekly Telehealth group check-ins                                |

2. How likely would you be to recommend an online gardening resource that supports connectedness and wellbeing?

0 100

3. If there were “Greenhouse Groups” - shared virtual spaces to convene with other individuals interested in gardening - how likely would you be to recommend individual to participate?

0 100

4. What might be helpful to increase your participation in a greenhouse group?

5. Would any of the following be helpful to increase your likelihood to recommend an online greenhouse group?

- |  |  |
|--|--|
| <input type="checkbox"/> Profiles that shared participant's basic information, such as gardening background, age, state of residence | <input type="checkbox"/> Informational community forums                                  |
| <input type="checkbox"/> Opportunity to share images of personal gardens   | <input type="checkbox"/> Weekly virtual meetings to discuss well-being through gardening |
| <input type="checkbox"/> Supportive community forums   | <input type="checkbox"/> Participation of licensed psychologist in group activity        |

6. If the online resource offered a platform called “Life Cycling” - a place for participants to post photos of the garden/plants over the course of the garden/plants’ life cycle - how likely would you be to recommend participation?

0 100

7. What might be helpful to increase your likelihood to recommend participation in “Life Cycling”?

8. Would any of the following be helpful to increase your participation in the “Life Cycling”?

- Ability to update photos daily
- Ability to view other participant's photos
- Ability to write comments on personal photos
- Ability to write comments on other participant's photos

9. If the online resource offered a “Seed Share” - a collective forum where participants request seeds or share seeds of their own - how likely would you be to recommend participation?

0 100

10. What might be helpful to increase your likelihood to recommend in the “Seed Share”?

11. Would any of the following be helpful to increase your likelihood to recommend participation in the “Seed Share”?



- Informational forum to learn how to save seeds
- Ability to request free seeds from other participants
- Opportunity to list free seeds to share with other participants

12. If the online resource offered “How-To Gardening Instructions”, how likely would you be to recommend participation?

0 100

13. What might be helpful to increase your likelihood to recommend participation in the “How-To Gardening Instructions”?

14. Would any of the following be helpful to increase your likelihood to recommend participation in the “How-To Gardening Instructions”?

- Instructions that supported organic gardening
- Presentation of information through video format
- Presentation of information through text
- Forum for participants to share gardening questions and answers

15. If the online resource offered virtual group meetings to support connection and wellbeing through gardening, how likely would you be to recommend participation?

0 100

16. What might be helpful to increase your likelihood to recommend participation in the virtual group meetings?

17. Would any of the following be helpful to increase your likelihood to recommend participation in the virtual group meetings?

- Regular scheduled meetings
- Presence of a licensed psychologist
- Group members stay the same week to week

## Hobbyist Needs Assessment

1. If there was an online gardening resource that supported connectedness and wellbeing, what elements would you hope to find?

- |   |   |
|---|---|
| <input type="checkbox"/> Supportive community forums            | <input type="checkbox"/> Opportunity to share images of personal gardens                  |
| <input type="checkbox"/> Organic gardening instructional videos | <input type="checkbox"/> Connections to gardening materials (i.e., seeds, soil, planters) |
| <input type="checkbox"/> Gardening mindfulness prompts          | <input type="checkbox"/> Weekly Telehealth group check-ins                                |

2. How likely would you be to participate in an online gardening resource that supports connectedness and wellbeing?

0 100

3. If there were “Greenhouse Groups” - shared virtual spaces to convene with other individuals interested in gardening - how likely would you be to participate?

0 100

4. What might be helpful to increase your participation in a greenhouse group?

5. Would any of the following be helpful to increase your participation in a greenhouse group?

- |  |  |
|--|--|
| <input type="checkbox"/> Profiles that shared participant's basic information, such as gardening background, age, state of residence | <input type="checkbox"/> Informational community forums                                  |
| <input type="checkbox"/> Opportunity to share images of personal gardens   | <input type="checkbox"/> Weekly virtual meetings to discuss well-being through gardening |
| <input type="checkbox"/> Supportive community forums   | <input type="checkbox"/> Participation of licensed psychologist in group activity        |

6. If the online resource offered a platform called “Life Cycling” - a place for participants to post photos of the garden/plants over the course of the garden/plants’ life cycle - how likely would you be to participate?

0 100



7. What might be helpful to increase your participation in “Life Cycling”?

8. Would any of the following be helpful to increase your participation in the “Life Cycling”?

- Ability to update photos daily
- Ability to view other participant's photos
- Ability to write comments on personal photos
- Ability to write comments on other participant's photos

9. If the online resource offered a “Seed Share” - a collective forum where participants request seeds or share seeds of their own - how likely would you be to participate?

0 100



10. What might be helpful to increase your participation in the “Seed Share”?

11. Would any of the following be helpful to increase your participation in the “Seed Share”?

- Informational forum to learn how to save seeds
- Ability to request free seeds from other participants
- Opportunity to list free seeds to share with other participants

12. If the online resource offered “How-To Gardening Instructions”, how likely would you be to participate?

0 100



13. What might be helpful to increase your participation in the “How-To Gardening Instructions”?

14. Would any of the following be helpful to increase your participation in the “How-To Gardening Instructions”?

- Instructions that supported organic gardening
- Presentation of information through video format
- Presentation of information through text
- Forum for participants to share gardening questions and answers

15. If the online resource offered virtual group meetings to support connection and wellbeing through gardening, how likely would you be to participate?

0 100



16. What might be helpful to increase your participation in the virtual group meetings?

17. Would any of the following be helpful to increase your participation in the virtual group meetings?

- Regular scheduled meetings
- Presence of a licensed psychologist
- Group members stay the same week to week

## APPENDIX B: RECRUITMENT LETTERS

### American Horticultural Therapy Association (AHTA) Recruitment Letter

Dear AHTA member,

My name is Dana Ludmer and I am a doctoral student at Antioch University New England. I obtained your contact information from the American Horticulture Therapy Association. Over the course of the pandemic, many people have experienced high levels of stress and isolation. Research suggests that engagement in gardening might offer therapeutic benefits. This is an invitation to participate in a survey about the creation of an online gardening resource. Your participation at AHTA, and familiarity with therapeutic horticulture, makes your feedback especially helpful.

The survey is intended to gauge the level of interest in the website. Your participation is completely voluntary. The survey will not ask you any personally identifying information and your responses will only be used to inform the website's content.

If you are interested in participating in this survey, please follow the link below. The survey will take no longer than five minutes via SurveyMonkey. I will then use the information from the survey to create a website that supports mental health through a gardening community. If you have any questions, please feel free to reach out to me at.

[LINK](#)

Thank you very much.

Sincerely,

Dana Ludmer, PsyD Student  
Antioch University New England  
Keene, New Hampshire

## Hobbyist Recruitment Letter

Dear Fellow Gardener,

My name is Dana Ludmer and I am a doctoral student at Antioch University New England. Over the course of the pandemic, many people have experienced high levels of stress and isolation. Research suggests that engagement in gardening might offer therapeutic benefit. This is an invitation to participate in a survey about the creation of an online gardening resource. The survey is intended to gauge the level of interest in the website.

Your participation is completely voluntary. The survey will not ask you any personally identifying information and your responses will only be used to inform the website's content.

If you are interested in participating in this survey, please follow the link below. The survey will take no longer than five minutes via SurveyMonkey. I will then use the information from the survey to create a website that supports mental health through a gardening community. If you have any questions, please feel free to reach out to me at.

[LINK](#)

Thank you very much.

Sincerely,

Dana Ludmer, PsyD Student  
Antioch University New England  
Keene, New Hampshire



## APPENDIX C: TABLES

**Table C.1**

*Website Component's Integral Theory Quadrants*

	Integral Theory Quadrant			
	Interior Collective	Exterior Collective	Interior Individual	Exterior Individual
<b>Website Component</b>				
Greenhouse Group	✓		✓	
Life Cycling	✓	✓	✓	
Seed Share		✓		✓
How-To Gardening Instructions		✓		✓
Virtual Group Meetings	✓	✓	✓	✓

**Table C.2**

*Continuous Scale Items: Likelihood of Recommending or Participating in a Web-Based Therapeutic Horticulture Intervention Website Component*

	Mean	Median	N
Online Gardening Resource	74.63	81.00	42
Greenhouse Group	72.47	77.00	42
Life Cycling	67.02	75.00	41
Seed Share	76.46	90.00	41
How-To Gardening Instructions	81.38	92.50	40
Virtual Group Meetings	67.92	80.00	39

**Table C.3***Checkbox Items: Endorsed Aspects of Each Website Component*

<b>Website Component</b>	<b>Aspects</b>	<b>N</b>	<b>% out of total respondents</b>
<b>Greenhouse Group</b>	Profiles that shared...	15	33.33
	Opportunities to share...	20	47.62
	Supportive community...	21	50.00
	Informational forums	26	61.90
	Weekly virtual meetings...	16	38.10
	Participation of a licensed...	20	47.62
<b>Life Cycling</b>	Ability to update photos...	21	50.00
	Ability to view other...	38	90.48
	Ability to write comments...	28	66.67
	Ability to write comments on other...	24	57.14
<b>Seed Share</b>	Informational forum...	33	78.57
	Ability to request seeds...	34	80.95
	Opportunity to list free seeds...	33	78.57
<b>How-To Gardening Instructions</b>	Instructions that supported...	29	69.05
	Presentation of information...	33	78.57
	Presentation of information through...	18	42.86
	Forum for participants to share gardening...	30	71.43
<b>Virtual Group Meetings</b>	Regular scheduled meetings...	26	61.90
	Presence of a licensed psychologist	22	52.38
	Group members stay the same	23	54.76

**Table C.4***Categories, Themes, and Raw Data Across Open-Ended Needs Assessment Survey Items*

Categories	Themes	Raw Data
Greenhouse Group	Respondents had preferences about the platform's informational content.	Easy to follow directions (ie. equipment, how to plant, what to plant, how to use those plants) inclusive of environment
		Educational sessions
Greenhouse Group	Respondents had preferences about platform's participant incentives.	Localized info
		Task analysis for provider and informative worksheet for clients
Greenhouse Group	Respondents supported usage given adequate facilitation.	Easy to use and useful information
		University science based
Greenhouse Group	Respondents had preferences about participation.	Horticulture therapy how to video
		Free food
Greenhouse Group	Respondents had preferences about participation.	Monthly share opportunities
		Starter packs
Greenhouse Group	Respondents supported usage given adequate facilitation.	Good administrators and guidelines
		High quality programming lead by an experienced HTR professional
Greenhouse Group	Respondents supported usage given adequate facilitation.	Only if the group was facilitated by an HTR, Expressive Arts Therapist or LPC.
		Knowing clear vision from creators and how it's beneficial so I know what I am recommending/participating in
Greenhouse Group	Respondents supported usage given adequate facilitation.	Protocols or a moderator? My first thought was that it's easy for less dominant people to fade away in the virtual format.
		I'm not a huge fan of groups. Know it all's and bragging seem to always take over. Would need good and attentive administration.
Greenhouse Group	Respondents had preferences about participation.	This is really a matter of personal interest. I like interacting with others, but a lot of my gardening is personal quiet time. An occasional check in with such a group is supportive, but TOO much time spent there would take me away from the joy of BEING in the garden. Other may feel the same, so I'd suggest these groups on an as-interest basis.
		Being able to participate first to see if it is suitable from my client base
Greenhouse Group	Respondents had preferences about participation.	Knowledge of the client's personal history
		Small groups, ability to observe before actively engaging
Greenhouse Group	Respondents had preferences about participation.	I would like to see what it's like in order to recommend it
		Location
Greenhouse Group	Respondents had preferences about participation.	A welcoming attitude for non-experts and possibilities to go deeper for those who wish to

	<p>Knowing more about the quality of the group in terms of its structure, organization and knowledge base</p> <p>If the group serves populations similar to those I work with</p> <p>Safety features for security and/or some commonality for groups</p> <p>Supportive community</p> <p>Ease of access, convenient time of day, content</p> <p>Having live video lessons and meet ups online and in person</p> <p>I think it is important to have some kind of structure so that you get good participation.</p> <p>Low cost</p>
	<p>Plants and/or activities that have proven to be calming, restorative</p> <p>Mental health benefits</p> <p>Verifiable benefits</p> <p>Would depend on quality and if I believe it would be helpful to a particular individual.</p> <p>A link to website; a 1 page summary of benefits/background</p>
Life Cycling	<p>Interaction with other life cyclers</p> <p>More time in my "life cycle"</p> <p>Sometimes sharing pictures and seeing those of others is supportive to our learning and growth. Sometimes it causes negative feelings towards oneself due to making comparisons. Ideally, we're all honest and can share in the joy of journeys and successes one another experience through gardening. A balance of seeing/learning from the work of others AND getting out to do it ourselves is really important.</p> <p>Non-competitive sharing</p> <p>To try it out to see what it is like</p> <p>I like the concept. Discussion with small groups for Q&amp;A</p> <p>No participation requirement, thereby eliminating additional stress</p> <p>I'm a 30 year psychotherapist in private practice, and well versed in taking care of my own needs/working my network and tools.</p>
	<p>Same as abv (Good administrators and guidelines)</p> <p>Facilitation by psychologist or therapist</p> <p>Guidelines, so content isn't diluted with dogs, neighbors, etc</p> <p>Same answer as before (Would need good and attentive administration.)</p>
	<p>Photos</p> <p>Some connection to our personal life cycle</p> <p>Seeing a series of sample photos to demonstrate that someone need not be an expert photographer to participate</p> <p>Hands on tasks</p>
	<p>Respondents wanted the platform to be beneficial.</p>
	<p>Respondents had preferences about participation.</p>
	<p>Respondents supported usage given adequate facilitation.</p>
	<p>Respondents supported usage given specific content.</p>

		More information about the benefits in participating in such a group
		Short blurb about connection between plant and human seasons and cycles
		Add a nature journaling component
		This is gardening and not all horticultural therapy
		Easy photo uploading
		ease of use, multiple ways to access based on equity
		"Life Cycling" should be easy operation
	Respondents endorsed usage given website component's accessibility.	Time
		Ease for clients to post photos
		It would probably depend on how user friendly it is for participants
		working with autism spectrum
Seed Share		Where is it located?
	Respondents had questions about the platform.	will it be in-person?
		How would it work? Mail?
		Others may be interested
	Respondents demonstrate support for platform.	excellent idea
		Sounds so coooool. Omg
		concern of cost (shipping)
		Too complicated. Huge hours need to instruct people on seed saving, correct mailing and transport, etc. etc.
	Respondents demonstrate lack of support for platform.	Not much. seed sharing appeals to small portion of gardeners
		Correct plant id and gathering instructions. usually someone offers seeds online and gets hundreds of people asking for some. Making the thoughtful deeds giant pain.
		Sharing of flower seeds that provide unique and interesting plant material
	Respondents had suggestions about seeds shared.	Knowing the seeds are what folks say they are and not invasive; native seeds
		Quality and accuracy of seed types
		Having everything labeled for each variety
		the ability for individuals to share info/photos with those seeds
		Seeing photos of people growing seeds from the share, what worked, what didn't
	Respondents had suggestions for information provided about the seeds.	maybe education, tips, photos linked to life cycling group?
		Resources on how to save seeds and share them. Explain the benefits, Have way for people in local communities to connect
		General guidelines for how to prepare seeds, qty, etc.
		exchange with colleagues from other countries
	Respondents had suggestions of exchanging seeds with others	need to clear any state/federal regulations
		Local/regional connections
		Ease for clients

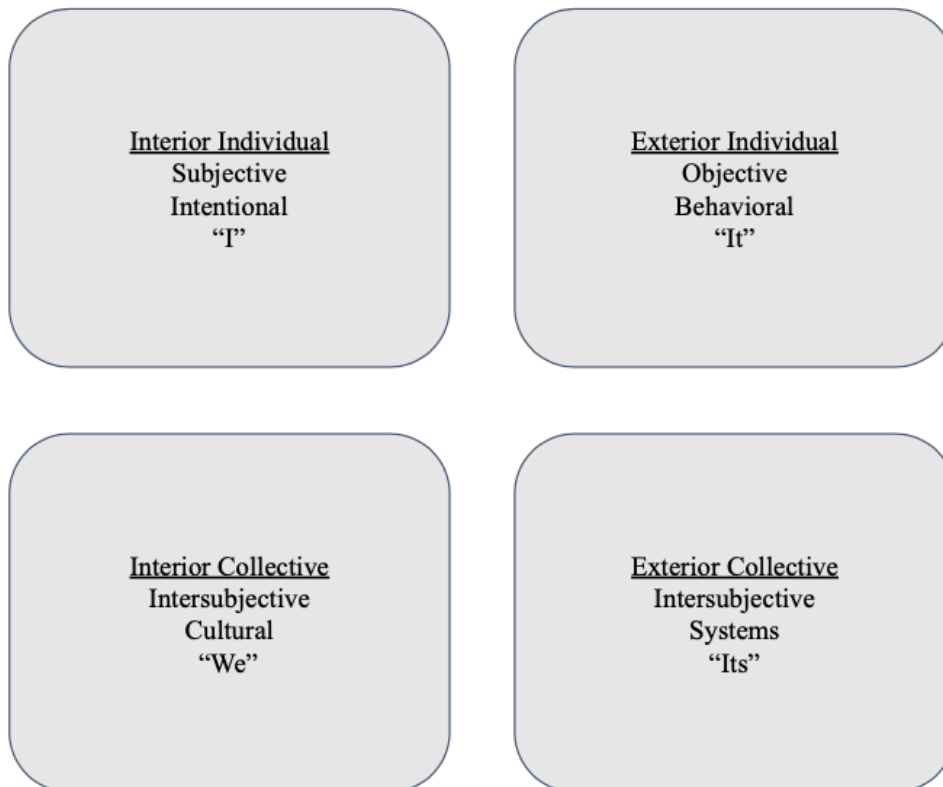
		local to where i live, in same country
		easy sending
		access
How-To Gardening Instruction		Knowing who to recommend
	Respondents had preferences about participation.	Skill level, access
		Variety of engagement levels, variety of skill sets for instructions- not all beginner, organized simply
		A judgment free space
		new things each time
		Wellness information
		Step by step photos of each activity
		Well-produced videos featuring competent gardeners on a very specific topics
		Is it reliable university science based?
		Well done videos
	Respondents supported usage given specific content.	Integration of therapeutic techniques
		Research-based information, no home remedies, info specific to zones/regional variances
		Organic only
		Video and gardening quality
		Up to date resources, new videos depending on the season. Or an archive of old ones based off of seasons. Some live classes for people to ask questions. Resource lists for each video.
		Quality information
		Good, basic info on a variety of gardening approaches and designing
		Format should be high quality
		Quality
		Learning from a person, real time or virtual, is my favorite to learn. Love this!
	Respondents supported usage given adequate facilitation.	Youtube is full of gardening videos. I am interested in viewing things or referring others with mental health challenges to videos made by someone with a 4 year or more horticulture therapy degree, not a lay person. Too much liability.
		Some experts, like plant disease and pest experts, are in the group
		Not sure, a level/proof of expertise?
		Participant inquiries answered.
	Respondents shared their criticism about the platform.	This type of resource is available at many sites and organizations
		So many out there
Virtual Group Meetings		I am burnt out on virtual group meetings. No longer like them.
	Respondents acknowledged participation on the platform.	Some people are hesitant to join a discussion group of people they do not know.
		Small groups can be helpful sometime and help people feel more connected and valued. checklists/ weekly seasonally appropriate activities could keep people on the same page, give them direction, and supply conversation topics.

Respondents supported usage given specific content.	Sharing of HT activities & experiences
	Research based methods
	Format quality
	easy connection
Respondents encouraged convenient meeting times.	Privacy. Access. Dependability
	Same time each week
	Monthly group meetings
	Depends on time and availability, but a weekly check in is a lovely idea to build community!
	more time in the day
	convenient time
	Multiple times
	Less frequency like once a month
	convenient times
	Respondents supported usage given adequate facilitation.
Every meeting should have a leader to host	
Again, competently managed and accessible platform	
Understanding clear purpose of the groups, helpful people who moderate and run groups	
Quality implementation	
High quality, dependable scheduling led by experienced HTR	
Facilitator	
Understanding the criteria for participation and monitoring of comments	
Screening of members to keep out wackos	



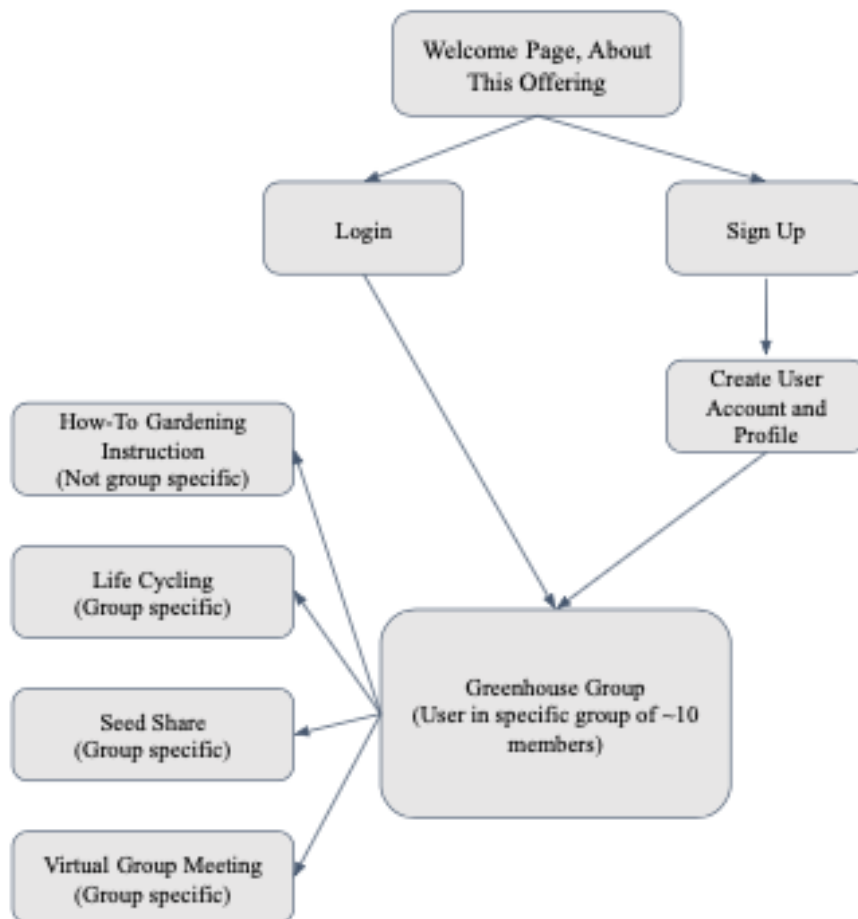
## APPENDIX D: FIGURES

Figure D.1

*The Four Quadrants of Integral Theory*

**Figure D.2**

*User Flow: Architecture of a Therapeutic Horticulture Web-Based Intervention*



**Figure D.3**

*User Flow: Architecture of the Initial Prototype of the Therapeutic Horticulture Web-Based Intervention*

