SEMBRANDO JUNTAS: A MIXED METHODS EXPLORATION OF GARDENING'S THERAPEUTIC POTENTIAL FOR ADOLESCENT LATINX FEMALES WITH MOOD DISORDERS

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ABSTRACT

In the midst of the youth mental health crisis in the United States, Latinx adolescent females are at particular risk of having a mood disorder while being simultaneously disproportionately less likely to access mental health care due to a multitude of structural barriers. Nature-based social prescribing, increasingly popular in primary care settings, refers to recommending participation in community programs to provide a multitude of beneficial effects, including improved mental health. Gardening is an example of one of these programs that has been well studied in adults with evidence of positive impacts on mental health. However, it is unclear whether gardening has similar positive impacts on high-risk groups such as adolescent Latinx females with mood disorders. Using mixed-methods, this pilot study explored the experiences of adolescent Latinx females with mood disorders as they participated in an 8-week-long gardening club intervention. Quantitative findings demonstrated statistically significant reductions in participant Strengths and Difficulties Questionnaire (SDQ) impact scores and conduct scores after participation in the intervention. Qualitative feedback from participants supported these results and identified additional positive impacts of participation including relational connection, knowledge acquisition, and appreciation of having a safe space to engage with others.

I dedicate this thesis to my patients:

You are the reason I enrolled in this program,

were integral to my project, and continue to be the

reason that I do what I do. It is an honor to learn about

your lives, offer support, and have your trust.

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CHAPTER 1

INTRODUCTION

At first glance, the 12-year-old girl waiting in the exam room for her annual well child exam with her mother and younger brother looked like any other female middle schooler. Mirabel's hair was parted in the middle, her sneakers were crease-free, and her cell phone was never far from her hand[1]. What stood out to her primary care provider, however, was the absence of her typically ever-present smile. Mirabel, who had once been recommended by her elementary school teachers to attend a rigorous middle school due to her academic excellence, was now struggling to get Bs and Cs in class. Her mother was concerned about Mirabel's overeating and apparent need to constantly chew on things like her fingernails and paper. Over the course of the visit, Mirabel shared that she had started vaping at school, had significant suicidal ideation with development of a suicide plan, and had only recently disclosed to her older sister that she had been molested by her older male cousin about 3 years ago. According to the depression screen she completed as part of her visit, Mirabel was endorsing symptoms of severe depression.

Stories like Mirabel's have become a familiar refrain in primary care provider offices across the nation. In June 2023, the American Medical Association (AMA) became the latest leading medical organization to declare a national emergency over the state of child and adolescent mental health in the United States. Mental health disorders in children and youth, already on the rise before the COVID-19 pandemic, have skyrocketed over the last several years. Emergency room visits for suspected suicide attempts increased by an

[1] Name changed to protect identity

alarming 50.6% in female adolescents between March 2019 and March 2021 (Yard et al., 2021). According to the most recent Youth Risk Behavior Survey, 42% of high schoolers in the United States reported persistent feelings of sadness or hopelessness, 22% considered a suicide attempt, 18% planned a suicide attempt, and 10% attempted suicide in 2021 (Centers for Disease Control [CDC], 2021). For each of these measures, females were more likely than males to report worse mental health with 30% of high school females reporting that they seriously considered a suicide attempt compared to 14% of high school males (CDC, 2021).

Mirabel lives in Philadelphia, the sixth largest city in the United States and where adolescent mental health data mirrors that of the nation (U.S. Census Bureau, 2024). When data is broken down along ethnic and gender lines, however, it is clear who is most at risk. According to a city-wide survey done in Philadelphia in 2019, 40.3% of teenagers reported depressive symptoms. (Assibey-Mensah et al., 2020). While 29.8% of males reported depressive symptoms, 50.5% of females reported these symptoms. Amongst females, those who identified as Latinx were more likely to report depressive symptoms (51.9%) compared to their White (43.3%) and Black (41.9%) peers. Latinx females were also more likely to have suicidal ideation (22%) and attempt suicide (16.2%) compared to their peers who identified as male or as belonging to another race or ethnicity.

In addition to stressors that are universally faced by adolescents such as poor self-esteem, unhealthy relationships, excessive social media use, and bullying, as well as those common to many minority youth like poverty, community violence, and lack of education, Latinx adolescents face a unique combination of additional stressors that may contribute to their higher rates of poor mental health (Abrams, 2023; Lukoševičiūtė-

Barauskienė et al., 2023; Pumariega et al., 2022). For example, Latinx adolescents have reported instances of discrimination in which they are not only treated as if they are inferior or criminal, but also with the assumption that they are undocumented or unintelligent (Pasco et al., 2022). Immigration is a known risk factor for trauma and poor mental health, but transgenerational immigration trauma can affect even those Latinx adolescents that are not first-generation immigrants (Pumariega et al., 2022). Second-generation Latinx adolescents are subject to acculturative stress in which they more quickly adapt to United States culture and may adopt certain values and customs that their parents do not agree with (Zayas & Pilat, 2008). This can lead to familial friction, resulting in strained relationships and additional stress.

Despite the many calls to action to improve access to youth mental health care, there are several barriers to engagement in treatment. Most importantly, there is a general lack of access to mental health professionals. Although child and adolescent psychiatrists are increasing in number, they are less likely to live in underprivileged areas and 70% of U.S. counties still lack a psychiatrist qualified to treat youth (McBain et al., 2019). Pediatric primary care providers often take on the role of initial assessment, diagnosis, and treatment of mental health conditions, but report lack of time, inadequate medical training, and a dearth of mental health referral sources as obstacles to their provision of adequate care (O'Brien et al., 2016). As a result, between 2013 and 2019, only 10.1% of children nationwide had received treatment from a mental health professional despite as many as 25% of children having a diagnosable psychiatric disorder (Bitsko et al., 2022). Even in Philadelphia, a city with 2 large children's hospitals and several additional large hospital systems, 78% of adolescents with a mental health disorder do not receive mental health treatment (Children's Hospital of Philadelphia PolicyLab, 2022).

When mental health services are available, there are notable racial and ethnic disparities when it comes to accessing these services. Latinx youth are significantly less likely to receive mental health care compared to their White peers. In 2021, only 10.1% of Latinx youth ages 5-17 years received any kind of mental health treatment (including medication and/or counseling/therapy) compared to their Black (12.5%) and White (18.3%) peers (Zablotsky & Ng, 2023). It should not be assumed that minority youth need less mental health care as parents of minority youth are more likely than White parents to report that their child needed mental health care in the last year, but were unable to access care (Casseus, 2023). Latinx parents most often report cost as a barrier to accessing care for their child, but also report difficulties in getting an appointment, lack of time, transportation and childcare for appointments, fear or embarrassment in seeking care, concern about possible deportation while seeking care, general mistrust of the historically White medical system, and language differences as significant obstacles to engaging their child in mental health treatment (Casseus, 2023; Castro-Ramirez et al., 2021; Panchal et al., 2024; Ramirez et al., 2017). Finally, cultural perceptions of mental health may make a parent less inclined to engage their child or adolescent in mental health treatment (Castro-Ramirez et al., 2021).

"Mental health care" in primary care or specialty mental healthcare settings typically refers to treatment involving psychotherapy, pharmacotherapy, or both (Pettit et al., 2022). Primary care providers may also recommend non-pharmacologic treatments, including improvements in their patient's sleep, diet, and exercise habits (Lester et al., 2023). An alternative, more personalized treatment involves the use of "social prescribing." First described and pioneered in the United Kingdom, social prescribing refers to "an approach that connects people to activities, groups, and services in their community to meet the practical, social and emotional needs that affect their health and wellbeing" (National Health Service England, n.d.). For example, a provider may recommend that an adolescent with depression consider participation in a sport at school or attending an event in their community that might interest them.

One promising subset of social prescriptions involves activities that are nature-based, such as going on a walk, visiting a park, and community gardening (Leavell et al., 2019). Leavell et al. posit that intrapersonal, interpersonal, and environmental factors may contribute to a sense of social connectedness which can ultimately contribute to mental wellbeing (2019). In addition to the social connection opportunities provided by nature-based activities, there are several prominent theories as to why being in nature is beneficial for mental health. Attention Restoration Theory holds that nature is inherently restorative in that it can decrease mental strain and promote greater attention and focus (Kaplan & Kaplan, 1989). Similarly, Stress Reduction Theory suggests that individuals are able to relax and experience a decrease in stress when exposed to non-threatening, natural stimuli (Ulrich et al., 1991). As depicted in Figure 1, social connection, attention restoration, and stress reduction can all individually impact a person's mental wellbeing, but also can interact with each other to potentiate the positive impact (Leavell et al., 2019).

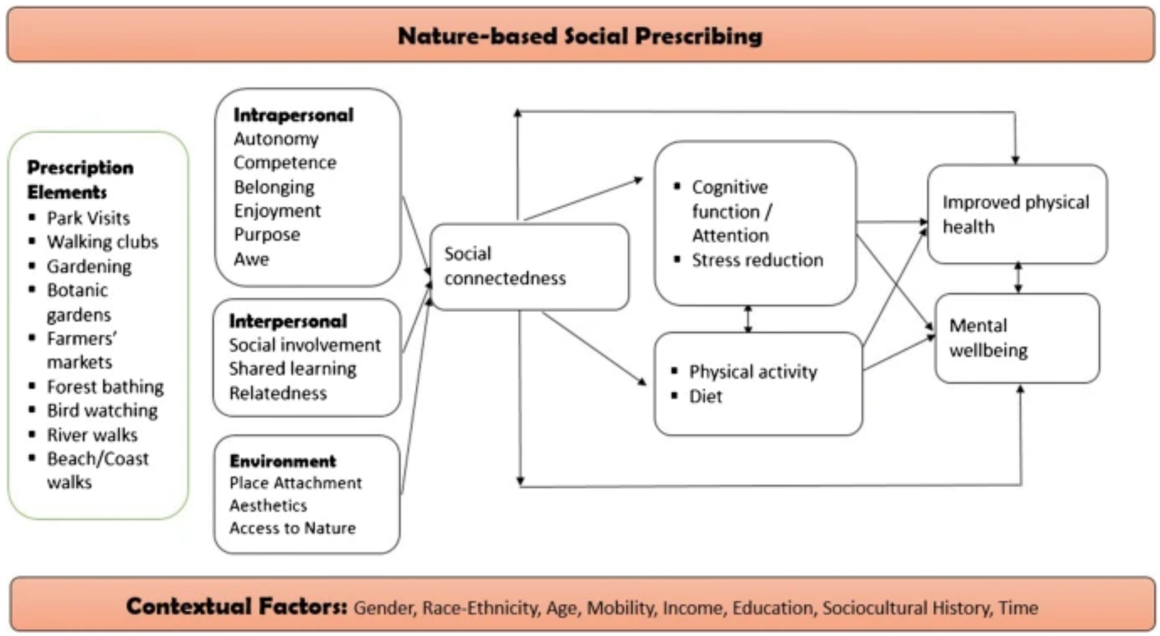

Figure 1. Conceptualizing Nature-Based Social Prescriptions as an Intervention to Address Social Connectedness. (Leavell et al., 2019)

Gardening in particular has been shown to have a positive effect on mental health as well as improving symptoms in people with mental health conditions such as anxiety and depression, but research studies have largely focused on adult populations (Ambrose et al., 2020; Clatworthy et al., 2013; Gonzalez et al., 2011; Howarth et al., 2020; Soga et al., 2017). Although gardening interventions have been done with children and adolescent populations, they have primarily focused on changes in eating habits and academic performance (Berezowitz et al., 2015; Blair, 2009; McCormick, 2017; Meinen et al., 2012; Morgan et al., 2010; Ohly et al., 2016; Ozer, 2007). Therefore, there is a significant gap in the literature in regards to whether gardening provides positive mental health benefits in adolescents with mood disorders.

It is clear that adolescent Latinx females are at great risk of harm because of mental health disorders. Given the lack of mental health professionals nationwide and the many barriers to engagement in traditional mental health treatment, the question exists as to whether there may be alternative ways to alleviate mental health distress in Latinx youth. Nature-based interventions such as gardening show promise in improving mood symptoms in adult populations but are understudied in adolescent populations. The purpose of this thesis is to direct attention towards the adolescent Latinx female population in order to explore whether gardening may fill the treatment void by serving as a beneficial mental health intervention.

CHAPTER 2

METHODS

This paper reports on a pilot study, Sembrando Juntas, an after-school, 8-week program in which Latinx adolescent females with diagnoses of mood disorder participated in a weekly gardening club in order to determine how their mental health was impacted over the course of the club as well as establish the feasibility of implementing a gardening club in the primary care setting. The principal investigator is a pediatric nurse practitioner with 7 years of practice at the North Philadelphia clinic where this pilot study was conducted. She designed and led the program. She speaks fluent Spanish as many of her patients and their families are Latinx and identify Spanish as their preferred language. This study was approved by Temple University's Institutional Review Board.

Location

This study was conducted at an urban federally qualified health center (FQHC) in North Philadelphia. This FQHC has three clinical sites that provide comprehensive care including medical, dental, and behavioral health care, to approximately 15,000 patients each year. Approximately 85% of these patients identify as Latinx. Participants were recruited from all sites, but the intervention took place at a single clinical site with a small garden at the rear of the building. The neighborhood in which this study took place has the highest rate of gun violence in the city and a poverty rate over three times the national average (Office of the City Controller, 2024; U.S. Census Bureau, 2022). The Child Opportunity Index, a measure that reflects whether neighborhoods have the necessary supports and resources for a child to develop in a healthy way, has deemed the area a "very low-opportunity neighborhood" (diversitydatakids.org, 2024).

Recruitment

Recruitment for this study began in October 2023 and concluded in November 2023. An email was sent to medical and behavioral health providers informing them of the study and inviting them to refer eligible participants. Patients were identified as eligible for the study if they met the following criteria: self-identified as Latinx, female (gender assigned at birth), ages 11 to 17, and with a diagnosis of mood disorder (specific mood disorder diagnosis available upon request). Participants were also identified by running a report with eligibility criteria using the clinic's electronic medical record (EMR). When a participant was identified by a clinician or by EMR report, the primary investigator called potential participants' caregivers and explained the study. Participation entailed attending club sessions in addition to completing standardized questionnaires and a semi-structured interview both before club sessions began and after the final club session. If the participant and caregiver expressed interest in participating, study details and consent materials were sent via e-mail. The primary investigator followed up with the participant and the caregiver two days later and arranged an interview if the family expressed interest in study participation. The principal investigator met with the participant and their caregiver either virtually or in-person depending on the family's preference to obtain informed consent and assent.

Study Design

The study was a pre- and post- test mixed methods design. Participants and their caregivers were asked to complete a standardized survey before and after participation in the 8-week program. Participants were additionally invited to participate in a semi-structured interview to elaborate on their experiences before and after the program. The interviews and surveys were administered by the principal investigator. The pre-intervention interview duration was approximately one hour long and was conducted in either English, Spanish, or both languages depending on the preference of the participant and their caregiver. The interviews took place virtually or in-person at the family's convenience. Details about the measures are listed below.

The intervention for this study involved 8 sessions over a 10-week period between November 2023 and January 2024. The sessions were formally called "Sembrando Juntas" or "Growing Together" and informally referred to as "gardening club." Sessions were conducted in English as each participant spoke English proficiently. Sessions included a variety of activities related to gardening, including soil preparation, planting seeds and bulbs, making crafts using items from nature, creating a terrarium, learning about composting, and propagating various plants. Each session closed with sharing a snack.

Following the final gardening club session, participants who had attended at least one session were invited to complete another survey and interview. Similar to the initial interview, the participant and their caregiver each completed a standardized follow-up survey. A semi-structured interview between the participant and primary investigator followed completion of the surveys and lasted for approximately 45 minutes. Participants were compensated with a $25 gift card after completing each interview.

Strengths and Difficulties Questionnaire (SDQ)

The Strengths and Difficulties Questionnaire (SDQ) with impact supplement was administered to both the participant and their caregiver before and after their participation in the program. The SDQ is a behavioral screening questionnaire that assesses five psychological domains in children 2-17 years old: emotional problems, conduct problems, hyperactivity, peer problems, and prosocial behaviors (Goodman, 1997). These are each referred to as subscales and scoring is discussed below. The SDQ has an optional “impact supplement” questionnaire which was used in this study to determine whether the caregiver or participant felt the participant’s behavioral difficulties impacted their lives in various ways (Goodman, 1999). There are different SDQ versions for both caregivers and youth, allowing both to complete individual questionnaires

Each questionnaire has multiple scores: scores for each subscale, the “total difficulties score,” “externalizing score,” “internalizing score,” “impact score,” and “prosocial score.” Each subscale score ranges from 0 to 10. Excluding the score for the prosocial behavior subscale, the total difficulties score ranges from 0 to 40 and sums up the score for the remaining four subscales: emotional problems, conduct problems, hyperactivity, and peer problems. The impact score ranges from 0 to 10 and indicates the degree of interference a participant experiences because of their behavioral symptoms. With the exception of the prosocial scale, the higher the score, the greater the degree of difficulty (more problematic behavioral symptoms). In contrast, a high prosocial score indicates a high degree of prosocial (“positive”) behaviors. The SDQ also offers a means-tested interpretation of the emotional problems, conduct problems, hyperactivity, and peer problems subscale scores as well as the total difficulties and the impact scores. Scores are classified as “close to average,” “slightly raised,” “high,” or “very high” compared to means derived from a similar age group. In regards to the prosocial subscale score, a score is classified as “close to average,” “slightly lowered,” “low,” or “very low” compared to means derived from a similar age group.

In 2010, Goodman et al. proposed reporting an externalizing score (the sum of the scores from the conduct and hyperactivity subscales reflecting those behavior symptoms that are more outwardly expressed) and an internalizing score (the sum of the scores from the emotional problems and peer problems subscales reflecting those behavior symptoms that are more inwardly expressed). These broad categories have been used to detect difficulties in low-risk samples, but these subscales were included to make comparisons across studies more accessible. Externalizing and internalizing subscale scores range from 0 to 20 with a higher score indicating a greater degree of difficulty.

The SDQ includes an isolated follow-up question (not related to its subscales) that allows the caregiver and participant to give a general estimation as to how the intervention impacted them. This question was included in follow-up analysis to promote internal validation and to capture more subtle feelings that SDQ scores may not relay. This question is phrased as "Since coming to the clinic, are your (or your child's) problems…?" with possible answers being "much worse," "a bit worse," "about the same," "a bit better," or "much better." Responses for both caregiver and participant were assigned a numerical value for measurement and reporting purposes (-2 = "much worse," -1 = "a bit worse," 0 = "about the same," 1 = "a bit better," and 2 = "much better").

Semi-structured Interview

In addition to SDQ questionnaires, participants completed semi-structured interviews with the principal investigator. The pre-intervention and post-intervention interview guides were developed by the principal investigator and finalized after discussion with the research advisors (see pre-intervention interview guide in Appendix B and post-intervention interview guide in Appendix C). Pre-intervention interviews were designed to elicit participants' perceptions of the outdoors, their associations and experience with gardening, and their current emotional state. Post-intervention interviews were designed to understand participants' experience of gardening club, whether they observed changes to their habits or mood since participating, and collect ideas for future clubs or programs. Interviews were recorded with an audio recorder and transcribed using Otter AI after identifiable information was removed from the recordings by the primary investigator. The principal investigator and the research team reviewed and corrected the transcripts.

Analysis plan

This study employed the use of a within subjects pre- and post-test design. For caregivers and participants, pre- and post-intervention scores for each of the SDQ scales were compared using a one-tailed paired T-test.

Semi-structured interviews were coded according to the two-level coding method described by Sankar and Jones (2007). Interviews were first coded according to the answers given in response to interview questions. Those responses, as well as iterative readings, were then used to identify larger themes. A modified form of consensus coding was performed in which the principal investigator reviewed and coded all transcripts to develop the initial codebook. To ensure intercoder reliability, members of the research team each individually coded a subset of transcripts to finalize the codebook. Interviews were then analyzed using NVIVO 12 until code saturation was achieved (see Appendix D for codebook).

CHAPTER 3

RESULTS

Ten female Latinx participants between the ages of 12 and 17 were recruited with an average age of 14.5 years (Table 1).

Table 1. Demographic Data for Sembrando Juntas Participants

Participant #	Age	LatinX Origin	Diagnosis	# of sessions attended	% of sessions attended
1	16	Dominican Republic	MDD[a]	7	87.5%
2	13	Honduras	UBED[b]	8	100.0%
3	17	Venezuela	UBED	5	62.5%
4	15	Dominican Republic	UBED	7	87.5%
5	13	Puerto Rico	MDD	2	25.0%
6	17	Puerto Rico	UBED	6	75.0%
7	14	Dominican Republic	UBED	7	87.5%
8	12	Puerto Rico	UBED	5	62.5%
9	16	Dominican Republic	UBED	4	50.0%
10	12	Dominican Republic	UBED	0	0.0%[c]
Mean:	14.5			5.7	70.8%

[a]MDD=Major Depressive Disorder
[b]UBED=Unspecified Behavioral and Emotional Disorder
[c]Participant 10 did not attend any sessions and was excluded from calculating the mean number of sessions attended.

Five participants identified their specific Latinx origin as Dominican, three as Puerto Rican, one as Honduran, and one as Venezuelan. Participants had either a diagnosis of "Unspecified behavioral and emotional disorders with onset in childhood and adolescence" (80% of participants) or major depressive disorder (20% of participants). At the time of recruitment, two participants (20%) reported taking medications for mental health and one participant (10%) reported receiving mental health therapy or counseling. Participant 10 did not attend any gardening club sessions and thus was not eligible to participate in a post-intervention interview. Therefore, quantitative analysis was done only on the none participants that completed both pre-intervention and post-intervention measures. On average, participants attended 5.67 out of 8 gardening club sessions (70.8%).

Quantitative analysis of SDQ scores

Results are detailed in Table 2. There was a statistically significant reduction in participant impact score, which represents a participant's perception of how disruptive their mood and behavior symptoms are in everyday life ($p = 0.048$). The participant impact pre- score of 2.89 was categorized as "high," indicating the participants' difficulties were causing a high degree of disruption to their lives when compared to means derived from a similar age group. After the intervention, the participant impact post- score reduced to 1.44, considered a "slightly raised" degree of disruption compared to means derived from a similar age group. No statistically significant reductions were observed in the participant pre-post total difficulties score, internalizing and externalizing scores, or any of the subscale scores. There were no observed statistically significant changes in caregiver pre-post SDQ total difficulties, impact, externalizing, internalizing, or subscale scores. There was a statistically significant increase in participant pre-post internalizing scores ($p = 0.092$), however this relationship disappeared when controlling for 60%+ attendance.

Table 2. Pre/Post-Intervention Difference in Mean SDQ Scores

SDQ scores	Participant Self-Report					Parent Report				
	Pre-Intervention		Post-Intervention		p-value	Pre-Intervention		Post-Intervention		p-value
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Total difficulties score	14.00	2.00	14.78	4.41	.354	12.75	2.93	13.11	4.28	.413
Impact score	2.89	2.03	1.44	1.81	.048**	1.56	2.65	1.56	1.42	.500
Internalizing score	7.00	2.00	7.67	2.74	.092*	7.44	2.07	7.44	2.24	.500
Emotional problems	4.00	1.00	5.00	2.00	.123	5.00	1.58	5.11	2.20	.417
Peer problems	2.22	1.00	2.67	1.00	.173	2.44	1.01	2.33	.71	.364
Externalizing score	7.56	1.81	7.11	2.09	.351	5.31	2.11	5.67	2.69	.380
Hyperactivity	5.22	2.00	5.44	2.00	.332	3.53	2.35	3.78	1.92	.400
Conduct problems	2.33	2.00	1.67	1.00	.250	1.78	0.67	1.89	1.45	.380
Proscocial Score	8.44	2.19	7.89	1.27	.200	8.78	1.09	8.67	1.5	.407
Note: *p < .01, **p < .05										

To test for a dose-dependent response and because 78% (7 out of 9) of participants attended over 60% of club sessions, a second one-tailed paired t-test was done to control for 60%+ attendance (Table 3). This eliminated the unexpected increase in internalizing scores and showed a statistically significant improvement in participant pre-post conduct problems (*p = 0.091*). No other statistically significant changes were observed when we controlled for greater than 60% club session attendance.

Table 3. Pre/Post-Intervention Difference in Mean SDQ Scores for Those who Attended >60% of Club Sessions

SDQ scores	Participant Self-Report					Parent Report				
	Pre-Intervention		Post-Intervention		p-value	Pre-Intervention		Post-Intervention		p-value
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Total difficulties score	14.00	3.00	14.00	4.76	.469	13.11	2.58	13.29	4.92	.465
Impact score	3.43	1.90	1.57	1.99	.047**	1.71	2.98	1.29	1.50	.308
Internalizing score	6.00	2.00	7.14	2.91	.220	7.43	2.37	7.29	2.56	.419
Emotional problems	4.00	1.00	4.57	1.99	.224	4.86	1.77	4.86	2.48	.500
Peer problems	2.29	.76	2.57	1.51	.302	2.57	1.13	2.43	.79	.368
Externalizing score	7.71	2.06	6.86	2.27	.282	5.68	1.49	6.00	3.00	.413
Hyperactivity	4.86	1.68	5.43	2.23	.160	3.68	2.06	3.71	2.14	.488
Conduct problems	2.86	2.48	1.42	.79	.091*	2.00	.58	2.29	1.38	.261
Proscocial Score	8.00	2.31	7.71	1.38	.363	8.43	.98	8.29	1.50	.409
Note: *p < .01, **p < .05										

Analysis of the SDQ follow-up question generally showed program participation was perceived to have a positive impact. Eight out of 9 (88.9%) participants and 5 out of

9 (55.6%) caregivers reported improvement following program participation. On average, participants reported feeling between “a bit better” and “much better” (Table 4). Eight out of 9 participants reported feeling their problems were “a bit better” or “much better” while one participant reported feeling her problems were “about the same.” Caregivers reported, on average, that their child’s problems were between “about the same” and “a bit better.” Specifically, 5 out of 9 caregivers reported their child’s problems were “a bit better” or “much better,” 2 caregivers reported their child’s problems were “about the same,” and 2 caregivers reported their child’s problems were “a bit worse.”

Table 4. Parent and Participant Response to the Follow-Up SDQ Question, “Since coming to the clinic, are your (your child's) problems..?"

Participant #	% of sessions attended	Participant self-report	Parent report
1	87.5%	2	-1
2	100.0%	1	-1
3	62.5%	1	0
4	87.5%	1	0
5	25.0%	1	2
6	75.0%	1	1
7	87.5%	2	2
8	62.5%	0	1
9	50.0%	1	1
Mean:	70.83%	1.11	.56
Note: -2 = Much worse, -1 = A bit worse, 0 = About the same, 1 = A bit better, 2 = Much better			

Qualitative analysis

Nine of the 10 participants recruited for this study completed both a pre-intervention interview and a post-intervention interview. Data from the pre-intervention interview with Participant 10 was coded and included in the qualitative analysis, but her data was excluded when comparing pre- and post- self-reported emotional states.

Pre-intervention

The pre-intervention interview asked participants about how they perceived and interacted with the outdoors, their associations and experience with gardening, and their current emotional state. Nine out of 10 participants provided independent definitions of what "being outside" meant to them. Answers varied amongst participants and included: being in the sun, breathing fresh air, seeing greenery or wildlife, meditating, walking, hanging out with friends, going to the park, being outdoors for at least 20 to 30 minutes, "freedom," and either a place to clear the mind or feel more stressed depending on who you're with. Some participants defined "being outside" by negation, noting that it was not: being inside, commuting, going outdoors to relax, or playing outside. One participant was not able to provide a definition of what "being outside" meant to her.

Participants were asked to identify outdoor activities they enjoy doing. All participants were able to identify at least one enjoyable activity and most participants gave multiple responses. Both leisure (sitting or relaxing activities) and active (sports or play) activities were identified as the most common responses with 4 participants noting each of these as enjoyable activities:

> *I kind of just like sitting outside and just like... being outside. Like just sitting there, you know what I mean? Or like, sometimes, like if I want to go into a park and like read a book, or just like being out... Yeah or like walking.* (Participant 3)

Five other distinct responses to the question were given as well: Going to the park (3 participants), spending time with others (2 participants), listening to music (2 participants), and eating (1 participant).

Participants then shared about their current outdoor activities. Three participants noted they had no current outdoor activities. Of those who had no current outdoor activities, 1 participant shared about outdoor activities she had previously engaged in, and another noted she had ambitions to bike with her mom in the future. Of the remaining 7 participants, 5 reported walking as a current activity, 2 mentioned creative activities (journaling, painting, meditating, and listening to music), 2 said sports or play, 1 stated going to the park, and 1 participant said commuting. Of note, none of the participants mentioned gardening as an enjoyable or current outdoor activity.

Participants' feelings about being outside were mixed (Table 5). Eight out of 10 participants mentioned mental and emotional feelings with 7 participants articulating positive feelings and 4 noting negative feelings.

Table 5: Participant Feelings About Being Outside

Response	n	Descriptors used
Mental and emotional feelings	8	
Positive	7	At peace, open, happy, motivating, nice, fresh air, fun, a place to clear the mind, a "me-moment," clam, free
Negative	4	Stress, worried about physical appearance, tired, scared, cautious
Physical feelings	5	
Positive	0	n/a
Negative	5	Hot, painful, tiring, sweaty, cold
Neutral	1	Normal

Many participants observed their feelings varied depending on who they were with outside:

> *Yeah. I feel happy, but at the same time scared. Like, if I'm walking home let's say? Or I'm walking somewhere, I'm always really scared. And that's, that's like part of what they [participant's caregivers] put in me kinda? Like, when I'm with other people, I feel like, okay, like, I'm really cautious? But I'm having fun or something.* (Participant 7)

> *Depends on the situation, I mean, if I'm in the park just watching my little sister play in the playground, then I'm feeling okay. I'm maybe a little bothered cause I- maybe I want to go home. Maybe… in a situation where I'm feeling tired and I just want to sit and watch [a] movie? Because you know, I'm kind of lazy, but… But sometimes it's like nice because you're- if you've been stuck for a long time? It's just "Oh, finally" [breathes] Even though the air is not that good! We're still breathing it... Like I feel like, yeah, like- a week ago, like after like- this long weekend that I had from school. I just went outside and [deep breath] I just breathed it in. I was like "Ah, yeah. I'm finally going to school." It was- it was a sad moment, but I was happy for a little bit.* (Participant 4)

Five participants mentioned physical feelings about being outside. All descriptions of physical feelings were unpleasant and included feeling cold, hot or sweaty, tired, and in pain. Only one participant reported having completely neutral feelings about being outside.

As a transition to discussing gardening experience, participants were asked what they associated with gardening. The majority of these associations were neutral or positive with the exception of one participant who specifically mentioned thinking about bugs when considering gardening. Seven participants listed items related to the products of gardening (vegetables, flowers, fruits) and items necessary for gardening (plants, water, soil). Gardening activities were discussed by four participants and included potting, planting, watering, cutting off dead leaves, and helping the planet. In contrast to her peers, participant 9 shared that she specifically associated her family with gardening:

> *Yeah, my grandma loves umm.. she loves plants. And like- I grew up seeing my aunt, like who was here right now? I grew up, like, looking at her doing the garden like, she had a whole like, flower thing. And my other aunt? She used to live on top? And nobody could touch the flowers or anything cause she.. used to love them so much. She would sit here every morning. So like, it's a big thing in my family.* (Participant 9)

Eight out of 10 participants reported prior basic gardening experience. Of these, 3 participants had engaged in gardening at home, 2 at school, and 3 in both the home and school settings. Those who had gardened previously explained that although they had some hands-on experience, they had a basic knowledge of gardening in general:

> *My family [in the Dominican Republic] gardens, that's like their thing. And my mom gardens. We have- we have a backyard, my mom gardens. She has a lime plant. And she does tomatoes and all of that… So I just help a little bit, water it. Put some seeds in. That's it. I don't do too much.* (Participant 1)

> *In middle school, we used to do like, some like something in the front yard where we would all go outside and like, do stuff. But I didn't really get to do much because it was like- it was like the whole school. So it was like, everyone were already getting done. And by the time I would go do something it was like already done.* (Participant 3)

The two participants who had no prior gardening experience also had a basic knowledge of gardening. For example, Participant 2 shared:

> *I think I know – well you obviously use tools. Umm, and I know that plants can't grow well without sun, water, and when it's cold outside. It takes time. And some plants can be harder to manage more than others.*

The pre-intervention interview closed by asking participants to describe their current emotional state in their own terms. Seven participants reported feeling an overall negative emotional state:

> *Right now it's like, I'm stressing about school cause I just came back from.. summer? And.. I'm still not realizing that I'm in school and I have to, you know, to get in [to the] school schedule. Um, so I been stressing out cause like, when I come from school, I know, I have to start doing homework, the same thing that I always do. Like, do homework? And.. then study a little bit. And then I can do whatever I want. But my problem is that.. I'm not- I'm not feeling it. I- I come to- I come from home literally, [soft hand clap] straight to bed. And that's, like that's stressing me out because I been like keeping things – a lot of homework a lot of things, so it's very- it's very-. it's been very stressful. And now we're talking about colleges. And some colleges are not giving me what I want and things aren't happening the way that they're planning to? Um.. I had to take a lot of tests and like.. School's been like, literally so stressful? Um, and like, I get to close my mind sometimes? So I actually don't like- look, like open it? And I'm aware of that, you know? But I think the main thing that stress me out right now is that I overthink. And when I overthink, I overthink, I*

> *stop myself and I cannot do some stuff because I just keep overthinking the stuff. So I think that- what's keeping me like, being stressed.* (Participant 9)

Three participants reported feeling as though their current emotional state involved both positive and negative emotions:

> *Mmm.. [pause] I feel like it really depends. Because like since I work and go to school, and I have other stuff, if it's a week where I'm really, really busy? My stress levels and like... I would just be very moody and very stressed just cause like I don't have any time for me. But if it's like- like this week coming up? I don't have work until Thursday. And I don't have a club until Wednesday. So I have like, a good three to two days to like... you know what I mean? Do nothing and kind of focus on me so I'm not stressed. So it really depends on the week, and like how much things I have to do.* (Participant 3)

Post-intervention

The post-intervention interview focused on asking participants about their experience of gardening club, changes to their habits or mood since participating, preference to work individually or in groups, and ideas for future clubs or programs.

Participants were first asked to share in their own words how they would describe gardening club to a friend. Eight of the 9 respondents volunteered that they found gardening club fun or enjoyable. Participants also commented on specific gardening activities, learning new things, and working with others as is summed up by Participant 4:

> *Well, in the gardening club, you get to have these fun activities where you get to learn about different types of gardening, composting, and you get to interact with people around you, have these fun activities before you start doing the actual, like main part of the whole club. And then just get to hang around, have a good laugh and just good vibes, you know?*

When participants were asked to list their favorite part or parts of gardening club, each participant gave multiple responses. Responses included specific enjoyable club activities, meeting and interacting with other participants, and learning new things.

Participant 1 described an activity in which participants were asked to smell various herbs concealed in paper bags and identify them:

> *I loved the herbs! That was one of my favorite things too. I loved the herbs… Everything about it. The- to guessing it. Um.. Helping each other with it. And like... taking different scents and putting it together, learning fun facts about herbs, like, all of that. And how- like, seeing how everyone reacted to the herbs as well, like, "Oh, I know this one; I don't know this one." And like, some of us use it for the same things. So it was similarities in there… Which connected the group.*

When asked about their least favorite part or parts of gardening club, 4 participants were in agreement that they disliked being in the cold. Otherwise, responses varied with single participants mentioning a dislike of pulling weeds, breaking up the soil, compost smell, arriving late (and feeling lost), origami, being unable to attend other activities, and the commute to the clinic. Two participants reported they did not have a least favorite part of gardening club.

Questions transitioned to asking about participants' current emotional states as well as participant reflections on the impacts of gardening club in their lives. As in the pre-intervention interview, participants were asked to self-report their current emotional state (Table 6).

Table 6. Participant Report of Emotional State Pre- and Post-Intervention

Participant #	Pre-intervention	Post-intervention
1	Negative	Mixed
2	Negative	Mixed
3	Mixed	Positive
4	Mixed	Positive
5	Mixed	Positive
6	Negative	Negative
7	Negative	Mixed
8	Negative	Neutral
9	Negative	Mixed

Three participants noted being in an overall positive emotional state:

> *Yeah, I definitely feel like before when we did the interview, I was in a much worse state. Not- maybe not that bad, but like maybe like, not as good as now... I think I'm feeling pretty solid... I feel like I've been very, like productive lately. I've been doing my work. I'd like- the grades just um happened. And I have all A's except for Spanish.* (Participant 3)

Four participants identified as having both positive and negative (mixed) emotions:

> *Well, so right now, it's like in the middle? Because one thing that my sister-in-law told me about ROTC is that it will stress you out a lot. And I did not believe her till yesterday. I was trying to put the ribbons on my jacket. And I was just getting stressed out because no one was helping me and I didn't know how to do it. And then one of my friends accidentally, like, bumped into me and I got really mad and started like screaming… My mood, like, it's been okay. And especially with lots of people around? Like I've been happy.* (Participant 7)

One participant indicated being in a neutral emotional state and only Participant 6 reported feeling an overall negative emotional state:

> *Stress lately has been awful. Only because like- of like the college deadlines and stuff. And I haven't gotten anything done (laughs), so it's like been terrible (stated emphatically)...I like working on the essay, but it's like- like not fully finished. It still needs... some work on it. And I haven't had a teacher's recommendation letter or anything at all. So like ah! So yeah, stress has been up (stated emphatically).*

All 9 participants reported feeling different in a positive way while at gardening club compared to other social contexts. Participants mentioned feeling "positive," "more welcomed," "pretty relaxed," and "more happy." Two participants specifically mentioned enjoying listening to others talk even though they perceived they themselves did not talk much. Some representative comments from participants 7 and 9 illustrate additional positive feelings:

> *In other places, I don't really like to, like, I don't like to socialize. Well, I like to socialize. But like, let's say I'm in a place where I know no one. I*

don't like it. And especially if [participant's best friend] is not with me. Like, that's just.... I- I can't do that. But in gardening club, even when [participant's best friend] was not here. Like it was really fun hanging out with all the girls. So I feel like in gardening club, I was more open than if I go out. (Participant 7)

But when I was like on the gardening thing, I feel like very relaxed. I'm a very hype person. But every time I went there, I was feeling very relaxed, very calm. So I feel like I was feeling good at that time. Like I didn't have any stress at all. (Participant 9)

When asked if these positive emotional changes persisted after attending gardening club each week, 6 participants affirmed that they did in some way. The duration of this change varied, but participants broadly noted an increase in energy, optimism, or sense of calm. Participant 7 explained: "Like, I would talk to new people [at school]. I even made a couple new friends that I didn't expect to be friends with them." Participant 9 shared:

You know, something that I did like about the gardening thing is that I was feeling so calm and I just came home and like study. Because I was like, I feel like I was more focused on things… I always used to study after the gardening club 'cause I was feeling focused. [But the next day], again, I was like very hype.

Three participants denied that they noted persistent positive emotional change after leaving gardening club sessions. For two of those participants, positive emotions returned each week while at gardening club. The third participant noted whether her positive emotions returned each week depended on events preceding club sessions and whether she was entering club sessions in a negative emotional state.

Participants were asked to describe in their own words whether they noticed any changes in their day-to-day stress levels or mood since attending gardening club. Three participants reported that they noted no change in their mood or stress levels. Of the 6 participants who did report a change in mood or stress level, 3 reported decreased stress, 1 said she was speaking up more in school, 1 was sad that the gardening club was over, and 1 reported an improved relationship with her mother:

> *I'm definitely a little less stressed. That's for sure. 'Cause, first of all, I don't grab my hair as much. And I noticed that it's a habit that I have when I'm stressed like I yank it for some reason. And I don't do that as much as I used to anymore. Like something my mom also mentioned- I don't cry in the bathroom as much anymore. I haven't done it in a while. So I'm proud of myself for that. I haven't cried since like, a month ago? Or two? So that's pretty good. For me. So yeah, definitely less stress a hundred percent.* (Participant 4)

Five participants noted improved sleep, appetite, activity levels, or a combination of these since participating in gardening club while four participants reported no change. Of the 5 who noted changes, 2 reported improved sleep, 2 had improved appetite, and 4 reported increased activity levels. No participants reported worsening sleep, appetite, or activity levels.

The next two questions were designed to understand how group dynamics affected participants' experience of gardening club. Participants were asked their preference for working in groups or individually both at gardening club and in other social settings (Table 7).

Table 7. Preference to Complete Work in a Group or Individually by Setting

Preference	Gardening club	Other social setting
Group	5	1
Individual	3	2
Depends on the situation	0	6
No preference	1	0

While at gardening club, five participants preferred working in groups, 3 preferred individual activities, and 1 had no preference:

> *I liked when it was like... everybody together. [Even when there were individual activities] we always made it a group thing. Randomly we just*

make it a group thing. Somebody would just start talking and everybody would start talkin'. (Participant 1)

I liked the individual, but that's- that's [how] I always have been, I always like individual stuff better. But, you know, group- group stuff is good because you know, you get to talk to people, but individual stuff is always my cup of tea if I know what I'm doing. If I don't know, definitely group stuff. I know the instructions? Give me the individual. (Participant 4)

In other social settings, participants were more likely to report that it depended on the situation or activity with six participants responding in this way. Two participants preferred individual activities and 1 preferred group activities.

All 9 participants reported feeling supported by other group members and several participants expanded on their answers:

Oh, yeah. 100%. The girls are really nice. Like, even though I didn't become friends friends with them? Like it was still nice to see them like every single day and communicate with them. Yeah, it was nice. And when they sang me happy birthday [pounding chest] it hit me right here. (Participant 4)

Participants had several ideas for other clubs they felt could be helpful for themselves or peers hoping to improve their stress levels or mood. Suggestions included having clubs about animals, books, cooking, creative arts, do it yourself (DIY) projects, science, and volleyball. Three participants noted that new programs should be developed in collaboration with potential participants as individuals have different ways of coping with stress.

Thematic Coding

In addition to the findings from first level coding to the questions asked in the semi-structured interviews, thematic analysis reinforced level 1 results, provided insight into the quantitative data, and extended awareness into how the gardening club intervention impacted participants. Three themes emerged from the data as significant aspects of Sembrando Juntas that positively impacted participants: relational connection, knowledge acquisition, and having a safe space.

Relational connection. Throughout post-intervention interviews, participants frequently highlighted their enjoyment of connecting with other participants during gardening club sessions. These positive group dynamics and relational connections developed in different ways over the course of the program. Several participants attributed this to the similarities they had with other participants, mentioning both shared experiences and a shared cultural identity:

> *Everyone there- like I think we all had like the same experiences? Like.. not trauma, but like... like feeling or stress.. levels? Like the age? Umm.. also like, living in the same neighborhood and having the same experiences.* (Participant 2)

> *And it was nice- like- hanging out with other girls and being like, in a place where you know that they go through the same thing that you go through. So you could talk about it with them if you wanted to.* (Participant 7)

> *Also that everyone is like.. Latin? Like, umm, we just all kind of like connected over us being in a gardening group- club together. So it was nice to like, socialize. And we kind of like, had to socialize together.* (Participant 1)

Two participants noted they enjoyed group dynamics because of how they were different than other group members. While they perceived the rest of the group to be talkative, they enjoyed listening quietly to the conversation around them. Participant 5 explained, “So I’m okay to talk, granted I didn’t really talk that much. So it was still fun to hear everybody talk though.” This sentiment was also shared by Participant 4:

> *Because even though it was pretty obvious that I wasn't communicating a lot with the people around me, I was still just listening and just doing my own little handcraft things you know… I feel like that was the majority*

part of how I was able to de-stress just hearing other people talk around me? That helps me de-stress.

As group members completed activities in different ways, relationships developed as participants assisted and learned from each other:

> *If I couldn't make something at first? Like I would definitely give up but [participant 6]? Like, I would just copy her. Especially [participant 6] like I would sit next to her [laughs]… I would definitely ask her for help. And she would get annoyed with me like, she still be gettin' annoyed with me (stated humorously). I know she loves me.* (Participant 2)
>
> *Like I was lost in directions when y'all told me to… do things I was like, "Umm?" And then we joke about it and then we do it. And I would saw them, and I just do the same thing they were doing and it was fun.* (Participant 6)

Finally, participants made their own efforts to contribute to building connections within the group. For Participant 1, this effort felt natural: "I also wanted to make people-other people feel comfortable with too and not so like... close-minded.. and like, kinda like.. awkward. Everybody was kinda like.. guarded… I tried to bring it- bring like loudness out." Participant 9 contributed similarly despite feeling out of her comfort zone:

> *I feel like I was trying to push myself to talk to, like, to make the things less uncomfortable. You know, less awkward. And I get to talk to some of the girls – they were very sweet. And also I pushed myself to talk a little bit more.*

Through both purposeful effort and repeated interactions, relational connections developed over the course of the 8 weeks, resulting in a positive and encouraging group dynamic.

Knowledge Acquisition. Despite whether they had previously engaged in gardening, all participants began this pilot study with a very basic knowledge of gardening. This pilot study was designed to teach basic gardening skills and methods to participants, but participants were not formally asked what they learned over the course of the club. Nevertheless, the theme of knowledge acquisition as a positive impact became apparent through data analysis. Some participants enjoyed how this newly acquired knowledge appeared in their everyday lives:

> *"And it was like kind of learning about nutritious- 'cause like, you made the snacks and like- like things that I thought weren't good like, like bell peppers with hummus? Like, I actually liked! Like, it was a good opportunity to learn new stuff that you didn't know. And about the plants, it was fun. Like the flowers? Like the herbs?And then, sometimes when I be on Pinterest I be seein' herbs and I be like "Wait. I seen that herb before!" And I never thought that so, I thought that was cool.* (Participant 2)

Participants also expressed excitement over not only learning information for their own benefit, but also so they could share information they had learned with others:

> *But here, you know, I had like, origami, I had stuff to do. I was excited to come [to gardening club] because I was like, "Oh, I'm gonna do something new today. I'm gonna bring something back home, impress my mom." And learn something new, so... I did learn some skills.* (Participant 4)

> *I liked the composting. I did like that. I didn't think I was gonna like it. 'Cause I just thought it was like crap at first. But it was.. I liked it… especially when we watched the video [about the benefits of composting]. I didn't know like, you know the whole methane thing? I didn't know that… 'Cause I am interested in like, pollution and stuff like that. It's good to know. So I can encourage [others]... I like to be educated.* (Participant 1)

Lastly, some participants expressed a desire to apply the knowledge they had learned from gardening club in their own lives. Participant 4 shared: "I might do my own composting thing, but later on in the future... when I get a mini one [compost bin]." After one club session that involved identifying and learning about herbs, Participant 5 took some home and commented: "I haven't used them for anything yet. But like, I want to. I want to bake something but our oven doesn't really work. We have an air fryer though that we use." Although expressed in different ways, the learning of new information and skills was clearly important to participants.

The Importance of "Space." The theme of "space" was nuanced for each participant, but participants were united in expressing how they enjoyed having a safe and predictable environment in which they could gather for club sessions. Several participants spoke to the overall ambience of club sessions. Participant 8 described gardening club simply as "comforting" while Participant 3 highlighted an aspect of club that she found unique:

> *I feel like we weren't on our phones. And we kind of got to like interact with each other. 'Cause I feel like teenagers sometimes when they're not feeling safe- not safe, but, you know… They kind of go and hide on their phones. And I feel like if we weren't doing that as much, I feel like it kind of spoke a lot about the environment that we had going on and what we were doing.*

The ability to express their personality without feeling criticized by others in club sessions was noted by Participants 1 and 9 who both appreciated the chance to be themselves:

> *Ever since like, my mom changed me from schools? Like you know I haven't fully adapted yet. So I don't talk. And I'm a talkative person, I love to talk, I love to socialize, and that's how I was at my old school.. 'cause I went there my whole life. I still haven't adapted to my new school, that I just went to. So I don't talk, I don't socialize, I'm very enclosed, which is not like me at all. Which is very different than what I'm used to. So, being able to come somewhere and actually talk and be loud was nice.* (Participant 1)

> *I felt like, my shyness sometimes was like- I was like, not the only one. Because I used to see this girl. I don't know her name really. She always used to be quiet. I used to be like, "She's just shy like me." You know, "I'm not the weird one," you know "sitting by himself" you know. So, yeah. And I like that- when I was like, quiet- nobody was like, "Oh! You can talk!"* (Participant 9)

Gardening club was also seen as a safe place to process through feelings as Participant 6 explained:

> *'Cause sometimes like I would get in an argument or something with like friends and stuff and I would go over there and I'm not gonna lie I would take my anger out on the plants… When we were like pulling out the weeds and stuff like and I had the shovel? I don't know if you remember that day- it was like- I had to take out the tree? I was just going at it… That day I had an argument with one of my friends and I was like, "Uhhh!" And I was like- when I got the tree I was like [big sigh] "Finally! I'm done with this!" It was helpful. It took out most of my anger.*

Finally, the predictability of club session time, location, and structure was appreciated by participants as expressed by Participants 2 and 6:

> *Every Wednesday, it was like, I'd have something to look forward to... Like, if I had a bad day, I'd be like, "I don't have to skip. I don't have to stay for a detention." Like I could just go home, change, and go to the gardening club… I would be excited 'cause, yeah, there was some days I didn't wanna go to gardening club but, it was just cause I had to walk and then get changed. But like, I did go every time. I'm happy I did go every time.* (Participant 2)

> *I felt like there was more tasks in garden club than any other clubs. Because like most of the other clubs, that you could sit there and like, talk to your- like your friends and stuff and like kind of like, you're just like, "Oh, well! We're just staying behind a little bit of school!" In the other clubs they're more like, "You can do whatever you want… Just do whatever you want."* (Participant 6)

Although some aspects of having a safe space were designed by the club leaders, participants were also critical in contributing to that sense of safety by demonstrating respect and kindness towards each other.

Feasibility

Apart from understanding the impacts of a weekly gardening club on study participants, another important aim of this pilot study was establishing the feasibility of hosting such a club in the primary care setting. As the leader of the intervention, the primary investigator had time set aside from clinic duties to plan and execute this program. Importantly, clinic executive leadership was supportive of this pilot study and assisted with reserving classroom space at the clinic as well as providing basic supplies for club sessions (chairs, tables, paper etc.). The principal investigator planned each week's activities with input from one of her colleagues (a physician assistant at the clinic) who volunteered to assist with the first six weeks of club sessions. Additional support was provided by three medical students who attended three of the sessions as part of their community engagement class. Approximately 8-10 hours were spent planning and executing each week's gardening club session which included activity planning, purchasing supplies, snack preparation, setup, and clean up. As club sessions were held toward the end of the clinic workday, there was ample space to hold club sessions and security staff were onsite throughout the entirety of the club session.

CHAPTER 4

DISCUSSION

This pilot study provides compelling evidence that implementing a program like Sembrando Juntas is not only feasible but also powerful as demonstrated by the positive impacts it had on study participants. The quantitative data provide insight into a population that is often understudied and provides some baseline data that can be built upon in future iterations of this program. The qualitative data reveal how adolescent Latinx females living in a large urban city interact with the outdoor environment, describe their emotional state, and explain the positive effects of participation in Sembrando Juntas.

Although there were few statistically significant changes in SDQ scores, it should be noted that for many of the scores (emotional problems, conduct problems, prosocial and total difficulties), pre- scores were in the “close to average” range. The pre- and post- hyperactivity and peer problem scores were considered to be in the “slightly raised” range. It is possible then that the magnitude of the effect of the intervention may be greater in a sample whose pre- scores are “high.” Controlling for at least 60% attendance, there was a significant reduction in participant reports of conduct problems. However, it should be noted that participants were in the “close to average” range before the intervention. It may be possible to imagine that those who attended more than 60% of club sessions had a greater interest in gardening and therefore saw improvement in behavioral symptoms, but the qualitative data suggest that interest in gardening is not predictive of improvement in SDQ scores. It is interesting to note that although there were statistically significant positive changes in participant conduct and impact scores, differences in caregiver pre-post scores were not statistically significant. This certainly may have to do with the small sample size of this study, but also suggests that caregivers may not always perceive improvements in their adolescents' behavioral symptoms.

The qualitative data suggest the benefits of participation in Sembrando Juntas can go far beyond what simple questionnaires can capture. Participants described eager anticipation of club sessions, satisfaction and pride about knowledge gained, and rewarding social interactions with other participants. Although the majority of participants had positive mental or emotional feelings towards spending time outside, most reported the majority of their time outside was spent walking and not spent doing fun or leisurely activities. Similarly, although most participants had been exposed to gardening, no participant had more than a basic knowledge about gardening, making this intervention a novel experience for all participants.

After participating, participants shared a general sense of emotional improvement as demonstrated both by qualitative data and quantitative data. Of note, some participants reported this improvement was not limited only to emotional symptoms, but also included improvement in their eating, sleep, and activity levels. Feedback from participants indicated club sessions felt welcoming and approachable regardless of whether they were more introverted or extroverted. Having a combination of group and individual activities during club sessions also allowed participants to take part however they felt most comfortable. It is notable that participants were more likely to prefer working in a group while at club sessions compared to other social settings which speaks to the concepts of relational connection and safe space that were identified as themes.

Implications

As discussed previously, participants in this study live in an under-resourced neighborhood where gun violence and poverty are prevalent. All of these factors are known to contribute to childhood stress and adversity which can then lead to both physical and mental health conditions (Shim et al., 2022). While social determinants of health are daunting to address, evidence shows that one of the most protective factors for children are the presence of "safe, stable, and nurturing relationships" (SSNRs) (Garner & Yogman, 2021**)**. These SSNRs can act as "buffers" to limit or eliminate the negative effects of adverse childhood experiences as well as increase a child's resilience when encountering future challenges (Garner & Yogman, 2021**)**. The American Academy of Pediatrics has called for pediatric providers to focus on SSNRs and encourage their development between individuals, families, and communities (Garner & Yogman, 2021**)**. This pilot study provides an example of how primary care providers can promote SSNRs outside of the exam room in order to improve the mental health of their patients.

In order for programs like Sembrando Juntas to succeed, it is vital that policymakers, medical insurance companies, and clinical leadership realize the role they can play in improving adolescent mental health. Policymakers should continue to advocate for adequate provision of mental health services, promote equal access to these services, and direct resources towards developing evidence-based treatments for mental health conditions. Insurers must realign payments in order to promote preventative mental health care in the primary care setting and allow for the implementation of programs such as the one described in this pilot study. Finally, clinical leadership should encourage their providers to engage in the community outside of the clinical setting, provide opportunities to do so, and compensate providers for these activities. The longevity of programs like Sembrando Juntas depend on support from all of these stakeholders.

When gathering support from stakeholders to address adolescent mental health, it is beneficial to consider the ethical arguments in favor of programs such as Sembrando Juntas. First, this program increases the agency of participants in being able to seek mental health care. In the state of Pennsylvania, minors who are 14 years old or older may request mental health treatment without the consent of their parents (Pennsylvania Department of Human Services, 2023). In reality, minors' ability to seek care is highly restricted as it is typically their parents who pick up their prescriptions and transport them to appointments. In addition, parents and adolescents are often wary of traditional mental health treatments. For these families, engaging in a gardening club may seem more approachable than taking a medication or going to therapy. Second, this intervention is one small step towards social justice. As already noted, participants face structural inequalities that threaten their physical and mental health. This study argues that even a simple intervention such as a gardening club can be implemented as one way to dismantle those barriers.

Study limitations and future research

There are several limitations of this pilot study that should be noted. First, the sample size was quite small. Although the group size was based off similar interventions and recommendations in the realm of horticultural therapy (Catlin et al., 2017; Siu et al., 2020), this study could be replicated with a larger sample size by having multiple small groups of participants. Future studies could involve participants from other minority groups, those who identify as a gender other than female, those living in rural or suburban areas, and those who are of varying socioeconomic status.

Second, this study lacked a control group. Although it is impossible to completely account for all variables contributing to a participants' mood, a controlled study could further provide evidence that interventions like Sembrando Juntas contribute to improved mood and sense of wellbeing in adolescents.

Third, this pilot study was conducted in the late Fall and early Winter. This affected the amount of time that participants could spend outdoors during club sessions. Although many gardening activities were successfully done inside, it remains to be seen whether more "traditional" gardening in which participants can participate in planting, tending, and harvesting plants may demonstrate even more positive effects on mood and wellbeing. Therefore, this study could be replicated in other seasons. It is encouraging, however, that participants reported positive feedback despite the cold weather, demonstrating support for the ability to continue gardening club throughout the winter season.

Finally, the principal investigator for this study was the primary care provider (PCP) for the majority of the participants in this study. Although participants were assured that their care at the clinic would not be impacted by their decision to participate or not participate in the club, it is possible that participants were predisposed to report a positive experience at club. Alternatively, it may be that having the PCP as leader of this intervention contributed to participants' sense of safety while at club sessions and increased the positive psychological effects of the intervention. Future research might consider exploring this relationship further as well as gathering caregiver feedback to understand how hosting this intervention in the primary care setting influenced the family’s decision to participate.

CHAPTER 5

CONCLUSION

It is clear that innovative interventions like Sembrando Juntas have the potential to make a significant positive impact on adolescents with mood disorders in a moment when time is of the essence. Although increasing the mental health workforce and improving access to mental health care are critical as well, these actions will take time and significant resources. This pilot study demonstrates the feasibility of implementing a program like Sembrando Juntas in the primary care setting to allow for prompt intervention. The voices of the participants presented here illustrate how they appreciated the opportunity to interact with others and learn about gardening in a secure and safe environment. While additional research is needed to expand and support the findings presented in this pilot study, it is important to center and respect the participants as we continue to advocate for programs like Sembrando Juntas. As Participant 7 shared at the close of her last interview:

> *Cuz really, the club helped out a lot. Like, that's really it. Like, it helped out a lot (emphasizing words). And like, even my friends could tell that I was in a better mood, I was happier. So, you know? It helped out a lot.*

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APPENDIX A

PRE-INTERVENTION SEMI-STRUCTURED INTERVIEW GUIDE

Thank you so much for agreeing to participate in a short interview with me. I'm going to be asking you some questions about your experiences of being outside and any experiences you might have had previously with gardening. If there are ever any questions that you prefer not to answer, you absolutely can let me know to just skip the question.

1. When you think about being "outside," what does that mean to you?
    a. If needed, can prompt by asking: "Is _______ (playing, commuting, sports, relaxing, etc.) "being outside?" Why/why not?
2. Are there specific activities you enjoy doing outside?
    a. If they list many activities, move to question 3
    b. If they say "no" or that they don't enjoy doing activities outside, ask why and move to question 3
3. What activities do you currently do outside?
    a. If needed, can prompt by asking about the participant walking to school, going to the park, attending sports practices, going to the river, etc.
4. How do you feel when you're outside?
    a. If participant mentions physical feelings (hot, sweaty, cold, etc.), ask about mental feelings (scared, happy, unsure, disinterested, etc.)
    b. If participant mentions mental feelings (scared, happy, unsure, disinterested, etc.), ask about physical feelings (hot, sweaty, cold, etc.)
5. When you think about "gardening," what are some of the things you associate with this activity?
6. Have you ever gardened before?
    a. **If yes:** What did that look like?
    b. **If no:** What do you know about gardening?
7. How would you describe your current stress levels or mood?

Thank you so much for your time! I'm really looking forward to growing things with you throughout gardening club.

APPENDIX B

POST-INTERVENTION SEMI-STRUCTURED INTERVIEW GUIDE

Thank you so much for agreeing to participate in an interview with me. I'm going to be asking you about your experience of gardening club, whether you feel like your mood or regular day-to-day life has changed since participating in gardening club, and some questions about how you interact with others. If there are ever any questions that you prefer not to answer, you absolutely can let me know to just skip the question.

1. If your friend asked you about gardening club and what we did, how would you describe it
2. What was your favorite part of gardening club? Why?
3. What was your least favorite part of gardening club? Why?

The next few questions ask about your mood and some questions ask you to think back before starting gardening club to compare how you feel now to then.

4. How would you describe your current stress levels or mood?
5. Did you feel different at gardening club than you do in other places (i.e. at home, at school, etc.)?
    a. **If yes:** Tell me a bit more about feeling __________
    b. **If no:** Clarify by asking "So you felt about the same in gardening club as you do at home, at school, and at work?
        i. **If yes:** move to question 6
        ii. **If no:** Tell me a bit more about feeling _____
6. Did these emotions continue throughout the week when you weren't at gardening club?
    a. **If yes:** Are there any examples you can share with me about how you noticed your emotions (whether positive or negative) carrying over from gardening club?
    b. **If no:** Each week when you came back to gardening club, did those emotions/feelings return?
7. Since gardening club, have you noticed any changes in your day-to-day stress levels or mood?
    a. **If yes:** Could you tell me a bit more about that?
    b. **If no:** Did you have any expectations about mood/stress level changes when participating in gardening club?
8. Since gardening club, have you noticed any changes in your sleep, eating habits, or activity level?
    a. **If yes:** Could you tell me a bit more about that?
    b. **If no:** Are you surprised that you haven't experienced any changes?
        i. **If yes:** Tell me more about that.
        ii. **If no:** Go on to next question.

Now I'm going to ask you a little about how you like to interact with others as well as about other hobbies/activities you do.

9. During gardening club, there were both group and individual activities. Did you prefer one over the other?
    a. **If yes:** Why? What benefits do you see about each of these ways of gardening?
    b. **If no:** What benefits do you see about each of these ways of gardening?
10. In other social spaces (school, church, sports, etc.), do you prefer working in groups or individually? Can you tell me more about that?
11. Did you feel connected and supported by other group members and leaders at gardening club?
    a. **If yes/no:** Tell me more about that.
12. What other activities or hobbies do you enjoy? Do you have other ideas for clubs or programs that could be helpful for you or your peers hoping to improve their stress levels and/or mood?
13. Is there anything we haven't talked about that you would like to share or you think would be helpful for me to know?

Thank you so much for your time and for answering these questions.

APPENDIX C

CODEBOOK

Code	Description	Files	References
(Post) current emotional state		9	10
(Post) Both positive and negative	Both positive and negative aspects of emotional state mentioned	4	5
(Post) Negative	Clearly more negative than positive	1	1
(Post) Neutral	Not necessarily positive or negative	1	1
(Post) Positive	Clearly more positive than negative	3	3
(Pre) Current emotional state		10	13
(Pre) Both positive and negative	Both positive and negative aspects of emotional state mentioned	3	3
(Pre) Negative	Clearly more negative than positive	7	10
(Pre) Other	Not necessarily positive or negative	0	0
(Pre) Positive	Clearly more positive than negative	0	0
Activities and hobbies enjoyed by participant		9	48
Arts and crafts	Includes drawing, painting, crocheting	6	6
Community health equity class		1	1
Cooking		1	1
Doing makeup		1	1
Gaming		1	1
Learning a new language		2	2
Reading		4	4
ROTC		1	1
Self-care		1	1
Shopping		1	1
Singing		1	1

Code	Description	Files	References
Social media		1	3
Spending time with friends		1	2
Sports or exercise		5	5
Trying new things (activities and food)		2	2
Watching movies		1	1
Writing		2	2
(Post) Additional thoughts or comments		3	6
Benefits of group vs individual gardening		9	38
Benefits of group gardening		9	21
Finishing tasks more quickly		2	2
Getting inspiration or help from others		2	2
Helping others		2	2
Socializing with others		5	5
Benefits of individual gardening		7	17
Greater agency and learning potential		1	1
Greater concentration, alone with thoughts		3	4
Having a fun hobby		1	1
No benefit		1	1
Sparking creativity		1	1
Therapeutic		1	1
Changes in day-to-day stress levels or mood		9	9
No, but had expectations of change		1	1
No, but no expectations of change		1	1

Code	Description	Files	References
No, no comment on expectations		1	1
Yes, example given		6	6
Changes in sleep, eating habits, or activity level		9	13
No, not surprised no changes noted		3	3
No, surprised no changes noted		1	1
Surprised about change		1	1
Yes		5	5
Connected and supported by group members and leaders?		9	9
Yes, by members and leaders		7	7
Yes, by members, not by all leaders		2	2
Current outside activities		10	16
Ideas for future activities		1	1
Listed by participant		7	9
Commuting to school		1	1
Creative activities	Journaling, art, reading	2	2
Going to the park		1	1
Sports or play		2	3
Walking		5	6
No current outside activities		3	3
Past outside activities	No longer doing these activities	3	3
Defining being outside		10	27
No answer or Don't know		1	2
Outside is (agrees with interviewer)	Responding to specific prompts from interviewer, no elaboration on answer	7	9
Commuting to school		3	3
Going to the park		1	1

Code	Description	Files	References
Playing		2	3
Playing sports		5	5
Walking		2	2
Outside is (defined by participant)		9	11
Being in the sun		1	2
Being outdoors for at least 20-30 minutes		1	1
Breathing fresh air		2	2
Freedom		1	1
Going to the park		1	1
Hanging out with friends		1	2
It depends		1	1
Meditating		1	1
Seeing greenery or wildlife		2	2
Walking		1	1
Outside isn't	(defined by participant or disagreement with interviewer's prompts)	4	5
Being inside or within walls		1	1
Commuting to school		2	2
Going outdoors to relax		1	1
Playing outside		1	1
Enjoyable outside activities		10	34
Eating		1	1
Going to the park		3	3
Listening to music		2	2
Sitting or relaxing activities	Reading, drawing, picking flowers	4	6
Spending time with others		2	2
Sports or play		4	4

Code	Description	Files	References
Walking		3	3
Favorite part(s) of gardening club		9	13
Activities		7	12
Interacting with others		5	6
Learning new things		1	3
Feeling different continued after gardening club		9	9
No, but emotions returned each week		2	2
No, emotions didn't always return or changed		1	1
Yes, example given		6	6
Feelings about being outside		10	47
Mental or emotional feelings	Feelings related to mood or emotions like happy, sad, etc	8	32
Negative		4	7
Cautious or scared		1	2
Concern about physical appearance		1	1
Stressed or annoyed in certain situations		3	4
Positive		7	13
At peace or relaxed		3	4
Feels nice		2	2
Fun or funny		2	2
Happy		5	5
Neutral		3	3
Physical feelings	Feelings related to a physical state, like hot, sweaty, tired, cool, etc.	5	12
Negative			

Code	Description	Files	References
Cold		1	1
Hot or sweaty		2	2
Risk of injury		1	1
Tired		2	2
Positive		0	0
Felt different at gardening club		9	13
Yes, positively		9	13
Ideas for future clubs or programs		9	25
Ideas		8	24
Animal club		1	1
Book club		1	1
Cooking club		2	2
Creative arts club	Music, drawing, crocheting, etc.	2	2
Depends on others' interests		3	4
DIY club		1	1
Science club		1	2
Volleyball		1	1
No ideas		1	1
Least favorite part(s) of gardening club		9	10
Arriving late and feeling lost		1	1
Breaking up soil		1	1
Cold		4	4
Compost smell		1	1
Journey to the clinic		1	1
Missing out on other activities		1	1
No least favorite part		2	2
Origami		1	1
Pulling weeds		1	1
Participant description of gardening club		9	35

Code	Description	Files	References
Doing garden-related activities		6	7
Fun or enjoyable		8	9
Learning new things		3	3
Working with others		6	7
Participant Themes	Stories and sentiments not captured under other codes	12	46
Applicable knowledge from club	Used when participant shares how knowledge from club showed up in her life	2	2
Being female	Used when participant explicitly mentions their gender	1	2
Cultural identity	Used when participant specifically mentions her culture or ethnic identity	1	1
Expectations of gardening club vs reality	Used when participant describes how their expectations of gardening club differed from reality	2	3
Gem	Stories, sentences, etc. from the participant that are great, but aren't captured under other codes	8	9
Hopes for gardening club	Used when participant alludes to hopes or ideas she has for gardening club	1	1
Identity	Used when participant discusses their ethnicity or culture	0	0
Important or enjoyable club aspects	Used when participant mentions specific features of club she enjoyed	6	11
Parental limitations	Used when participants mention parental limitations affecting what they do	2	4
Participant 1	Used when participants mention Participant 1	3	7
Shared experiences	Used when a participant mentions having shares experiences with other	3	4

Code	Description	Files	References
	participants		
Suggestions for improvement	Used when participants had suggestions for future club sessions	1	2
Preference for group or individual work in other settings		9	9
Depends on the situation		6	6
No preference		1	1
Preference for group work		1	1
Preference for individual work		2	2
Preference for group or individual work in gardening club		9	9
Depends on the situation		0	0
No preference		1	1
Preference for group work		5	5
Preference for individual work		3	3
Previous gardening experience		10	14
No		2	2
Knowledge of gardening	Participant shares what they know about gardening	2	2
Yes		8	12
Educational	Gardening experience in the educational setting	5	5
Home	Gardening experience in the home setting	7	7
Interviewer themes	Used to identify when interviewer conveys sentiments during interviews	18	58
Affirming	Used when interviewer attempts to affirm or comfort a participant	11	18
Empathy	Used when interviewer expresses understanding how participant feels or having similar feelings	8	11
Empowering	Used when interviewer attempts to highlight participant's strengths or accomplishments	10	17

Code	Description	Files	References
Positive reframing	Used when interviewer attempts to positively reframe a situation that participant has presented	9	12
Things associated with gardening		10	14
Nouns		8	9
People-related	Family, friends, etc.	1	1
Plant-related	Vegetables, fruits, tools, dirt, etc.	7	8
Senses	Smell, sight, etc.	1	1
Verbs	Planting, potting, watering, etc.	4	4

APPENDIX D

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