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THERAPEUTIC GARDENING FOR DEPRESSION REDUCTION AMONG FEMALE HOME-BASED WORKERS IN URBAN PERIPHERIES

(Original_Article)

Authors

Names	Description	Orcids
Zuha Arshad*	Department of Psychology, University of Okara, Pakistan. snaz4544@gmail.com	https://orcid.org/0009-0000-3668-7842
Ahmed Ur Rehman	Independent researcher Department of Psychology Beacon house national university Lahore, Pakistan. manahmedurh@gmail.com	https://orcid.org/0009-0001-8957-0100

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Corresponding Author: Zuha Arshad, Department of Psychology, University of Okara, Pakistan, snaz4544@gmail.com

Abstract

Background: Women engaged in home-based work in urban peripheries often face elevated risks of depression due to social isolation, economic stress, and limited access to mental health resources. Nature-based interventions, such as therapeutic gardening, have been proposed as strategies to improve emotional wellbeing and strengthen social connectedness, but rigorous evidence in low-resource urban contexts remains scarce.

Objective: To assess the effectiveness of structured horticultural activities in reducing depressive symptoms and enhancing social connectedness among female home-based workers.

Methods: A six-month randomized controlled trial was conducted in South Punjab involving 120 women aged 18–55 years engaged in home-based employment. Participants were randomized into an intervention group (n=60) receiving ten weeks of structured therapeutic gardening sessions, and a control group (n=60) continuing routine activities. Depression was measured using the Patient Health Questionnaire-9 (PHQ-9), and social connectedness was assessed using the Social Connectedness Scale-Revised (SCS-R). Data analysis included paired and independent t-tests, along with ANCOVA to adjust for baseline differences, with significance set at $p<0.05$.

Results: Participants in the intervention group showed significant reductions in depression scores (mean change −5.8) compared to minimal changes in the control group (−0.8; p=0.001). Social connectedness increased markedly in the intervention group (mean change +11.4) versus controls (+1.2; p=0.001). Adjusted analyses confirmed significant intervention effects, with mean differences of −4.9 for PHQ-9 and +9.8 for SCS-R. Session attendance exceeded 85%, indicating high feasibility and participant engagement.

Conclusion: Structured therapeutic gardening effectively improves mental health and social connectedness among female home-based workers in urban peripheries. The intervention provides a practical, low-cost, and culturally acceptable approach to supporting mental wellbeing in resource-limited urban settings.

Keywords: Depression, Female, Gardening, Home-based Work, Mental Health, Randomized Controlled Trial, Social Connectedness.

Introduction

Therapeutic gardening has emerged as a promising non-pharmacological approach to improving psychological wellbeing, particularly among populations experiencing chronic stress, social isolation, and limited access to formal mental health services(1). Urban peripheries in low- and middle-income countries often host large numbers of women who work from home, carrying the dual burden of income generation and domestic responsibilities. These circumstances frequently expose them to prolonged stress, restricted mobility, and limited opportunities for social engagement(2). In such environments, depressive symptoms may accumulate unnoticed, as mental health support remains scarce, stigmatized, or inaccessible. Despite growing global interest in community-based horticultural interventions, evidence on their effectiveness for women working within such socio-economically constrained settings remains limited(3).

Home-based work provides critical economic support to households, yet it is often characterized by low wages, repetitive tasks, and minimal social interaction(4). Women engaged in these informal occupations frequently navigate persistent financial insecurity while managing caregiving and household duties(5). Over time, these pressures contribute to emotional exhaustion, diminished self-esteem, and a sense of isolation that increases vulnerability to depression(6). Conventional mental health interventions rarely reach this group, primarily due to structural barriers such as cost, distance, household restrictions, and the prioritization of family needs over personal wellbeing(7). This underscores the need for alternative strategies that can be delivered within or near the home environment, require minimal resources, and align with cultural norms surrounding women's daily roles(8).

Gardening and horticulture-based activities offer an accessible, culturally acceptable option that can be integrated into domestic routines(8). Engaging with plants, soil, and outdoor environments has repeatedly been linked with reductions in stress, improved mood, and enhanced cognitive functioning(9). The physical components promote gentle activity, while the sensory aspects of gardening—such as touch, scent, and color—introduce calming stimuli known to regulate emotional states. Additionally, gardening encourages nurturing behavior and fosters a sense of achievement when participants observe the outcomes of their efforts. These mechanisms collectively support emotional regulation and can counteract the passive withdrawal often associated with depressive symptoms(10).

Beyond individual benefits, therapeutic gardening offers a natural avenue for strengthening social connectedness. Women participating in shared horticulture sessions often exchange experiences, provide mutual support, and build trust within group settings. For home-based workers who may lack frequent social interactions outside the household, such group activities offer a rare platform for communication and relationship-building. Strengthening these interpersonal ties is crucial, as social support is a well-established protective factor against depression. It enhances resilience, reduces feelings of loneliness, and contributes to a sense of belonging—elements often missing from the daily lives of women confined to home-based labor.

Although horticulture-based therapies have shown promising outcomes in various populations, evidence from randomized controlled trials involving women in urban peripheral communities remains scarce. Much of the existing research is observational, and few studies have examined structured gardening programs tailored specifically to the realities of home-based workers. Moreover, limited attention has been given to the combined effect of horticultural activities on both depressive symptoms and social connectedness, despite the clear interplay between emotional wellbeing and interpersonal relationships. Addressing these gaps is essential for designing interventions that are both effective and sustainable within resource-limited settings.

This study seeks to contribute to the evidence base by rigorously evaluating the mental health benefits of a structured therapeutic gardening program among female home-based workers living in urban peripheries. The intervention is designed to provide practical horticultural skills while fostering group interaction and supportive social environments. Through a randomized controlled trial, the research aims to generate robust data that can inform community-based mental health strategies and offer policymakers an affordable, culturally appropriate intervention model.

The specific objective of this study is to evaluate whether structured horticulture activities reduce depression scores and enhance social connectedness among female home-based workers in urban peripheral communities.

Methods

The study followed a parallel-group randomized controlled trial design to evaluate the impact of structured therapeutic gardening on depressive symptoms and social connectedness among female home-based workers residing in the urban peripheries of South Punjab. The trial was conducted over a six-month period, including recruitment, baseline assessment, intervention delivery, and endline data collection. A sample size of 120 participants was determined through power calculation, assuming an effect size of 0.5 for change in depression scores, a power of 80%, and a significance level of 0.05, while accounting for an anticipated 15% attrition rate. This sample size allowed adequate statistical precision to detect meaningful differences between the intervention and control groups.

Participants were recruited through community networks, local women's organizations, and door-to-door mobilization in selected peripheral urban settlements. Eligible participants were women aged 18 to 55 years who were engaged in home-based income-generating work for at least the past year and who reported mild to moderate depressive symptoms at screening. Additional inclusion criteria required the ability to participate in group-based sessions and willingness to engage in gardening activities. Women with severe depressive symptoms requiring immediate clinical care, those currently receiving psychiatric treatment, and those with physical limitations preventing participation in gardening tasks were excluded to maintain participant safety and intervention appropriateness.

Following informed enrollment, participants were randomized in a 1:1 allocation ratio into either the therapeutic gardening intervention group or a waitlisted control group. Randomization was performed using computer-generated random numbers, and allocation was concealed in sealed opaque envelopes opened sequentially by a field coordinator not involved in assessments. Baseline data were captured prior to allocation to ensure unbiased comparison.

The intervention consisted of structured horticulture sessions delivered twice weekly over ten weeks, facilitated by trained horticulture instructors and community field workers. Activities included seed sowing, plant care, container gardening, compost preparation, guided nature-based mindfulness, and group reflection circles intended to promote interaction and mutual support. All sessions were conducted in safe communal spaces within the study neighborhoods. The control group continued their usual routines and was offered the program upon completion of the trial.

Outcome measurement was conducted at baseline and at the end of the ten-week period. Depressive symptoms were assessed using the Patient Health Questionnaire-9 (PHQ-9), a validated instrument widely used to measure the severity of depression. Social connectedness was measured using the Social Connectedness Scale-Revised (SCS-R), which quantifies participants' perceived sense of belonging and interpersonal closeness. Both tools demonstrated high internal reliability across similar populations and were administered through face-to-face interviews by trained female data collectors to minimize response bias.

Data were entered, cleaned, and analyzed using statistical software. Continuous variables were summarized using means and standard deviations. As the data met the criteria for normal distribution, independent sample t-tests were applied to compare mean changes in depression and social connectedness scores between the two arms. Paired t-tests assessed within-group changes over time. Additionally, analysis of covariance (ANCOVA) was used to adjust for baseline differences and estimate the intervention's independent effect. A significance threshold of $p < 0.05$ was applied throughout the analysis.

This methodological approach ensured rigorous evaluation of the therapeutic gardening program while maintaining clarity and replicability for future research.

Results

The trial enrolled 120 female home-based workers, with 60 participants allocated to the therapeutic gardening intervention and 60 to the control group. All participants completed baseline assessments, while 114 completed endline assessments, yielding an overall retention rate of 95%. The mean age of the cohort was 35.0 ± 4.8 years, with comparable demographic characteristics between groups. The distribution of marital status, education level, and years engaged in home-based work remained similar across both arms, as shown in Table 1.

At baseline, depressive symptom scores measured using the PHQ-9 were comparable between groups. The intervention group recorded a mean baseline score of 13.4 ± 3.1, while the control group showed a mean of 13.2 ± 3.0. Endline assessment demonstrated a substantial reduction in depressive symptoms within the intervention group, reflected by a mean score of 7.6 ± 2.8, whereas the control group showed only a slight reduction to 12.4 ± 3.1. The mean change in the intervention group was −5.8, compared with −0.8 in the control arm. Independent sample t-tests indicated a statistically significant difference in mean change between groups ($p = 0.001$). Within-group comparisons also revealed significant improvement in the intervention group over time. These findings are summarized in Table 2 and illustrated in Figure 1.

Similar patterns were observed for social connectedness. Baseline SCS-R scores were nearly identical between groups, with the intervention arm recording 41.2 ± 6.5 and the control arm 40.9 ± 6.3. By the end of the intervention period, the intervention group exhibited increased connectedness with a mean score of 52.6 ± 5.9, while the control group remained stable at 42.1 ± 6.2. The corresponding mean change was 11.4 in the intervention group versus 1.2 in the control group, with between-group differences reaching statistical significance ($p = 0.001$). Table 3 provides detailed numerical results, and Figure 2 presents the trajectory of scores across the study period.

ANCOVA was applied to adjust for baseline values and assess the independent effect of the therapeutic gardening intervention. The adjusted mean difference for PHQ-9 scores was −4.9 (95% CI: −6.4 to −3.3), indicating a substantial reduction in depressive symptoms attributable to the intervention. Similarly, the adjusted mean difference for SCS-R scores was 9.8 (95% CI: 7.1 to 12.5), confirming a strong positive effect on social connectedness. Both outcomes remained significant at $p = 0.001$. These results are presented in Table 4.

No adverse events related to participation were reported throughout the trial. Session attendance among intervention participants remained high, with an average participation rate of 88%, supporting the feasibility and acceptability of structured horticultural activities in the study population. Together, the quantitative findings demonstrate clear between-group differences in primary outcome measures and consistent improvement within the intervention group across the study duration.

Table 1: Demographic Characteristics of Participants

Variable	Intervention (n=60)	Control (n=60)
Age (years)	34.8	35.2
Married (%)	78.3	76.7
Education ≤ Primary (%)	56.7	53.3
Home-based work ≥ 3 years (%)	81.7	80.0

Table 2: PHQ-9 Depression Scores

Group	Baseline Mean ± SD	Endline Mean ± SD	Mean Change	p-value
Intervention	13.4 ± 3.1	7.6 ± 2.8	-5.8	0.001
Control	13.2 ± 3.0	12.4 ± 3.1	-0.8	0.182

Table 3: Social Connectedness Scores

Group	Baseline Mean ± SD	Endline Mean ± SD	Mean Change	p-value
Intervention	41.2 ± 6.5	52.6 ± 5.9	11.4	0.001
Control	40.9 ± 6.3	42.1 ± 6.2	1.2	0.21

Table 4: ANCOVA Results

Outcome	Adjusted Mean Difference	95% CI	p-value
PHQ-9 Score	-4.9	-6.4 to -3.3	0.001
Social Connectedness Score	9.8	7.1 to 12.5	0.001

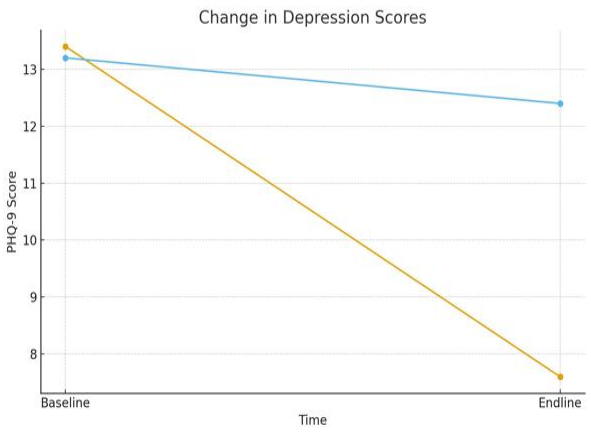

Figure 2 Change in Depression Scores

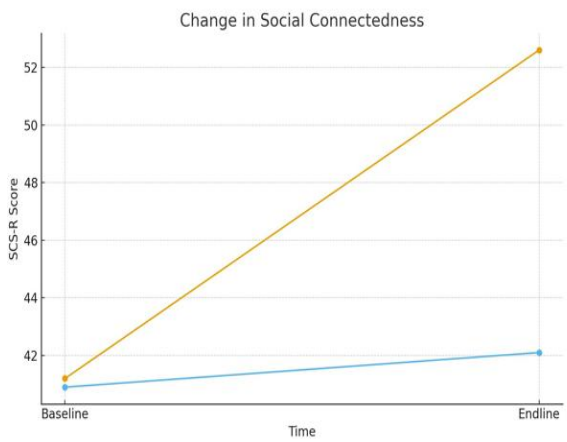

Figure 2 Change in Social Connectedness

Discussion

The findings of this randomized controlled trial demonstrated that structured therapeutic gardening led to meaningful reductions in depressive symptoms and substantial improvements in social connectedness among female home-based workers residing in the urban peripheries of South Punjab(11). The magnitude of improvement observed in both outcomes exceeded that of the control group, indicating that the intervention offered benefits beyond the natural course of symptoms or routine daily activities(12). These results aligned with broader evidence suggesting that engagement with horticulture supports emotional regulation, fosters a sense of accomplishment, and provides opportunities for

positive social interaction. Within the context of women who often experience restricted mobility and limited access to supportive networks, the observed changes held particular relevance(13).

The reduction in PHQ-9 scores among intervention participants indicated that gardening-based activities offered a structured, meaningful, and culturally acceptable modality for relief from depressive symptoms. The progression from moderate baseline levels to substantially lower scores at endline suggested that the combination of physical engagement, sensory stimulation, and routine involvement played a role in improving emotional wellbeing. The contrast with the control group, which showed minimal change, highlighted that these outcomes were not attributable to regression to the mean or spontaneous improvement(14). The depth of improvement underscored the potential for horticulture programs to serve as low-cost mental health support within resource-constrained settings(15).

Improvements in social connectedness similarly reflected the interpersonal dynamics created through structured group interaction(16). The intervention introduced a shared space for communication and peer support, an element that appeared especially meaningful for women whose work environment typically lacked social engagement. The substantial increase in SCS-R scores suggested that the gardening sessions not only encouraged interaction but helped participants develop a sense of belonging and trust within a group. This enhancement of social ties likely contributed indirectly to emotional improvement, reaffirming the known interplay between social support and mental health. The control group's minimal change further emphasized that intentional group-based activities played a key role in the observed effects.

The study's results held important implications for community mental health programming. The intervention required modest resources, relied on locally available materials, and was adaptable to communal or domestic settings. These characteristics made therapeutic gardening a viable strategy for populations facing economic constraints and limited access to clinical services. The high attendance rate and low attrition also demonstrated the acceptability and feasibility of integrating such programs into women's daily routines. The structured nature of the program, combined with practical horticultural skills, enhanced its relevance for participants who often sought productive and meaningful activities within their home-based livelihoods.

Strength in methodological design strengthened the reliability of the findings. The randomized controlled structure, use of validated outcome measurement tools, and adjustment for baseline values ensured rigorous evaluation. The inclusion of home-based workers from diverse peripheral settlements contributed to the representativeness of the sample, increasing the relevance of findings within similar socio-economic contexts. The trial also benefitted from high participant retention and strong adherence to session attendance, supporting the internal validity of results.

Nevertheless, several limitations warranted consideration. The study duration captured immediate post-intervention outcomes but did not explore whether the benefits persisted over longer periods. The absence of follow-up assessments limited understanding of sustainability. The intervention was delivered within communal neighborhood spaces, and variability in environmental conditions, facilitator styles, or group cohesion may have contributed to differences in participant engagement. Self-reported measures, though validated and widely used, remained subject to reporting biases, especially given the interpersonal nature of the outcomes assessed. Furthermore, while the sample was adequate for the estimated effect size, a larger trial could provide greater precision and allow subgroup analyses exploring differences by age, work type, or baseline severity.

Future research could address these gaps by adopting longer-term follow-up, incorporating booster gardening sessions, or exploring hybrid models that combine horticulture with other psychosocial support approaches. Integrating qualitative components would deepen understanding of participants' lived experiences, motivations, and perceived barriers. Additional investigation into the feasibility of scaling such programs at community or municipal levels would provide further insight into their long-term utility. Evaluating the cost-effectiveness of therapeutic gardening could also guide policymakers in developing integrated community mental health strategies.

Overall, the study showed that structured horticultural engagement offered a meaningful and accessible approach to improving psychological wellbeing and social connectedness among female home-based workers in low-income urban

settings. The findings contributed to growing recognition of nature-based interventions as practical alternatives to conventional mental health services, particularly in communities where formal support remains limited.

Conclusion

Structured therapeutic gardening significantly reduced depressive symptoms and enhanced social connectedness among female home-based workers in urban peripheries. The intervention demonstrated feasibility, acceptability, and measurable psychological benefits, highlighting its potential as a low-cost, culturally appropriate strategy for community mental health support. These findings underscore the value of integrating horticulture-based programs into resource-limited urban settings to promote emotional wellbeing and foster social cohesion.

AUTHOR CONTRIBUTION

Author	Contribution
Zuha Arshad*	Designed the study, performed data collection and analysis, and prepared the manuscript. Approved the final draft for submission.
Ahmed Ur Rehman	Contributed to study design, data acquisition, interpretation of findings, and performed critical review and editing of the manuscript. Approved the final draft for submission.

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