The Effects of a Horticulture Activity Program on the Psychological Well-being of Older People in a Long-term Care Facility

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SUMMARY. This study investigated the effects of indoor horticulture activities on the current psychological well-being of older people in two long-term care facilities over a 7-week period. Thirty-one participants at one facility served as the control group. Thirty-one participants at another facility served as the horticulture group. Participants in both facilities continued with their normal daily routine and activities over the 7-week period; however, the horticulture group participated in a 1-hour horticulture activity session once a week over the 7-week period and the control group did not. The control group and horticulture group did not differ significantly in psychological well-being prior to the start of the study. After the 7-week program, the horticulture group had a significant increase in psychological well-being, whereas the control group had a slight decrease in psychological well-being. The results of this study indicate that horticulture activities may have a beneficial effect on the current psychological well-being of older people in a long-term care facility.

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The fastest growing segment of the U.S. population is people 65 years and older. By the year 2000 there were 35.3 million Americans in that age group. By 2030, 70 million people will be 65 years or older (American Association of Retired Persons, 1999). According to Rivlin and Wiener (1988), the number of older people living in long-term care facilities will double or triple by the year 2030. The projected increase in the number of older people in long-term care facilities requires critical examination of the quality of life for individuals who reside in these facilities (Mooney, 1994).

"Horticulture has been identified as the number one leisure pursuit of older Americans and as a therapeutic activity which enhances physical and mental health." (Simson and Haller, 1997). Willcox and Mattson (1979) found that older people living in a long-term care facility who did not participate in an activity therapy program experienced a significant decline in life satisfaction levels over an 8-week period. Mattson and Hilbert (1976) reported that geriatric nursing home tests indicated that active therapies, such as gardening activities, maintain life satisfaction indexes of seniors, whereas seniors who were inactive had a significant decline in self-esteem. According to Relf (1998), passive contact with plants and active participation in gardening experiences on a continual basis can have a pronounced effect on physical and psychological functioning. A survey conducted by Rothert and Daubert (1981) at a nursing home in Libertyville, Illinois, "…revealed that over 90 percent of the residents had enjoyed some form of gardening in the past. They also expressed regret in not having the opportunity to continue the pastime once they entered the facility." Many senior care facilities have an activities therapy department that asks incoming residents to fill out an assessment form indicating past activity interests. Residents consistently reported that they had engaged in some form of gardening in the past, which indicates that residents might be receptive to a horticulture program (McGuire, 1997).

Horticultural therapy is defined by Davis (1994) as: "…a process through which plants, gardening activities, and the innate closeness we all feel toward nature are used as vehicles in professionally conducted programs of therapy and rehabilitation." Compared to many other forms of therapy, the use of horticulture as a therapeutic tool is relatively new (Davis, 1998). Research is essential for the validation and growth of horticultural therapy (Nebbe, 1995). In 1990 the People-Plant Council was formed to promote research on people-plant interactions. Diane Relf (1992), founder of the People-Plant Council, defines people-plant interactions as: "the wide array of human responses (mental, physical, and social) that occur as a result of both active and passive participation with plants." Existing and future research of people-plant interactions will substantiate a vast amount of anecdotal evidence that points to the therapeutic benefits of plants, which will help horticultural therapy gain acceptance by the medical and health care communities (Davis, 1998).

The purpose of this study was to test the widespread belief that people-plant interactions enhance psychological well-being. The main question of interest was: What effect does a 7-week horticulture program have on the psychological well-being of older people in a long-term care facility?

Methods and procedures

This study was conducted in Summer 2000. The research design involved 62 older people from two long-term care facilities in St. Louis County, Mo., who volunteered to be in a 7-week horticulture activity program. Participants at each facility were classified as being in skilled or residential care. Thirty-one participants at Laclede Groves Senior Living Center (Webster Groves, Mo.) served as the horticulture group. Thirty-one participants at Cardinal Carberry Senior Living Center (St. Louis, Mo.) served as the control group.

Participants at both facilities continued with their normal daily routine and activities over the 7-week period; however, the horticulture group participated in a 1-h horticulture activity session once a week over the 7-week period and the control group did not. The control group was told that the

horticulture activity program was to begin 7 weeks later, which allowed for this group to serve as a control during the 7-week study. Upon completion of the study, the control group received a 7-week horticulture activity program.

HORTICULTURE ACTIVITIES. Horticulture activities (Table 1) took place indoors at a table where residents could sit. The primary author conducted the one-hour horticulture activity sessions. Three-tiered plant-stands were constructed out of PVC pipe to hold the plant material after each horticulture activity session. Grow lights were located on each tier. The plant-stands were placed in an accessible area where residents could have passive and active contact with the plants throughout the week.

MEASUREMENT OF WELL-BEING. The Affect Balance Scale (ABS), developed by Bradburn (1969), was used to measure participants' current (over the past few weeks) psychological well-being. The 10 questions on the ABS are made up of five positive subscale questions and five negative subscale questions. These two subscales contribute to well-being independently of one another. The degree of positive affect over negative affect or negative affect over positive affect is the best overall predictor of psychological well-being (Bradburn, 1969).

On the ABS, participants answer yes or no for each question. However, to increase the variance, a five-point scale (strongly disagree, disagree, neutral, agree, strongly agree) was used for this study. The score for the ABS is derived by subtracting the negative affect score from the positive affect score. This results in a score between (–5) and (+5). However, because a five-point scale was being used for this study, ABS scores can range from –20 (lowest level of psychological well-being) to +20 (highest level of psychological well-being). A score of 0 results from a balance between positive affect score and negative affect score and therefore indicates neutral psychological well-being.

Bradburn (1969) established the ABS as having a high degree of reliability over a 3- to 5-d test/retest period with a test/retest correlation of (r = 0.76). However, because the scale has been altered from a yes/no dichotomous scale to a five-point scale for this study, a reliability test for the ABS was conducted over a slightly longer period, 5 to 7 d, to determine the reliability of this measure.

The correlation of participants' scores on the five-point scale ABS test/retest were significant (pearson r = 0.72, P = 0.000) at the $P < 0.05$ alpha level. This indicates that the five-point scale ABS (strongly disagree, disagree, neutral, agree, strongly agree) is reliable, in this population sample, over a 5- to 7-d test/retest period. These reliability results correspond with Bradburn's (1969) test/retest reliability findings. The adjustment of the ABS from a yes/no dichotomous scale to a five-point scale did not affect the reliability of this measure.

The ABS was selected for several reasons. The ABS measures current well-being and therefore was seen as an appropriate means of assessing changes in current well-being as a result of a new activity (e.g., gardening). George and Bearson (1980) and Moriwaki (1974) found the ABS to be an appropriate measure of older adult well-being. The ABS is an established, reliable and valid measure (Himmelfarb and Murrell, 1983). Mroczek and Kolarz (1998) report the ABS to be a well-known and valid instrument.

Bradburn (1969) found that the stability of the ABS over short time periods (3 to 5 d) make it a useful tool for measuring meaningful changes in well-being over longer time periods (several months). For these reasons the ABS was seen as an appropriate measure for measuring meaningful changes in psychological well-being of participants for this 7-week study.

All 62 participants filled out the ABS over a 2-d period before the start of the 7-week horticulture activity program. Upon completion of the last horticulture activity session, all 62 participants filled out the ABS again over a 2-d period. The ABS was administered verbally to any of the participants who could not fill out the assessment on their own.

ANALYSIS. SAS (SAS Institute, Inc., Cary, N.C.) and SPSS (SPSS Inc., Chicago, Ill.) statistical software pro-

Table 1. Brief description of horticulture activities completed by the horticulture group over the 7-week study. The horticulture group participated in a 1-h horticulture activity session once a week.

Week 1
Start various flowers and vegetables from seed that germinate easily and are easy to grow: marigold (*Tagetes patula*), zinnia (*Zinnia elegans*), cosmos (*Cosmos sulphureus*), sunflower (*Helianthus annuus*), four o' clocks (*Mirabilis jalapa*), radish (*Raphanus sativus*), cucumber (*Cucumis sativus*), bell pepper (*Capsicum annuum*), and cherry tomato (*Lycopersicon esculentum*).
Week 2
Take cuttings of common houseplants: wandering jew (*Zebrina pendula*), impatiens (*Impatiens walleriana*), ivy (*Hedera helix*), and root them in soil.
Week 3
Smell various herbs: pineapple mint (*Mentha variegata*), chocolate mint (*Mentha piperita* 'Chocolate'), spearmint (*Mentha spicata*), peppermint (*Mentha piperita*), and lemon balm (*Melissa officinalis*). Take cuttings of these herbs and root them in soil.
Week 4
Take cuttings of the following plants: impatiens and wandering jew. Have residents take their cuttings back to their rooms so they can watch the roots develop in the water.
Week 5
Divide and transplant flowers and vegetables into individual pots.
Week 6
Take rooted cuttings of the houseplants and herbs and transplant them into larger containers.
Week 7
View a 15-min edited gardening video. After watching edited movie, have residents transplant the cuttings that they rooted in water into soil.

grams were used for all statistical analyses. Chi-square tests were used to test for significant differences between the control group and horticulture group on: gardening experience, avowed happiness, 30-d subjective health and year subjective health. A t-test was used to test for significant differences in age and years residing in the facility between the control group and horticulture group.

A two-way ANOVA with time as a repeated measure was used to determine if there were significant differences between the control group's pretest/posttest changes in mean ABS score compared to the horticulture group's pretest/posttest changes in mean ABS score. A one-way ANOVA was used to compare the control and horticulture group separately to test for significant changes in pretest/posttest mean ABS score. A significance level of $P = 0.05$ was used for all statistical analyses.

Results and discussion

Comparison of groups on living environment and demographic data. The two facilities in this study were selected based upon their similarities in resident population, facility design, and operation. Demographic data and living environment were examined prior to the start of this 7-week study in order to establish that the control group and horticulture group at these two facilities were in fact representative of the same specific subset of the population.

Both facilities were similar in location, age of facility, management, number of residents, type of care provided, cost of rent, building structure, and views of and access to nearby natural settings.

Laclede Groves is both a skilled nursing facility and a residential care facility. The skilled nursing was last updated in 1972, had 231 residents at the beginning of this study, and daily room rates from $133 to $174. The residential care facility was constructed in 1994, had 121 residents at the beginning of this study, and monthly room rates from $2,321 to $4,996. The facility is managed and operated by a Christian not-for-profit organization and is licensed by the Missouri Department of Social Services: Division of Aging (Jefferson City, Mo.) requiring quality care and services for residents. Laclede Grove's setting is in a residential neighborhood, yet offers views of and access to surrounding semi-wooded areas. The one to three-story interconnected buildings are set off the main road.

Cardinal Carberry is located within 1/4 mile (0.4 km) of Laclede Grove and offers similar care and services. The skilled nursing facility at Cardinal Carberry was updated in 1980, had 196 residents at the beginning of the study, and daily room rates of $125 to $164. Residential Care was constructed in 1996, had 80 residents, and monthly room rates from $2,305 to $4,770. Cardinal Carberry is also managed and operated by a Christian non-for-profit organization and is licensed by the Missouri Department of Social Services: Division of Aging (Jefferson City, Mo.). The one to three-story interconnected buildings are set off from the main street, located in a residential neighborhood, and offer views of and access to semi-wooded areas for the residents.

No significant differences ($P < 0.05$) were found between the control group and horticulture group on any of the demographic data (gender, race, marital status, religion, age, years residing in the facility, gardening experience, type of care provided, avowed happiness, and subjective health, before the start of this 7-week study (Table 2.)

The similarity between the two facilities in living environment and the non-significant difference between groups on the demographic data indicated that the participants in the control group and horticulture group were similar, and therefore representative of the same specific subset of the older adult population.

Comparison of groups on ABS mean score. No significant differences were found between the control group and horticulture group in current psychological well-being, based

Table 2. Comparison of the horticulture group and control group on demographic data. The horticulture group participated in a 1-h horticulture activity session once a week over the 7-week period and the control group did not.

Parameter	Control group	Horticulture[NS] group
Gender		
Male	3	3
Female	28	28
Race		
Caucasian	30	31
African American	1	0
Marital status		
Married	3	4
Widowed	28	26
Other	0	1
Religion		
Christian	31	30
Other	0	1
Mean years of age	87.61	85.97
Mean years residing in the facility	2.84	2.79
Gardening experience		
Very little to some experience	14	10
Very much experience	17	21
Type of care provided		
Skilled nursing	16	10
Residential	15	21
Avowed happiness		
Not so happy	7	5
Pretty happy or very happy	24	26
30-d subjective health		
Very poor, poor, or average	13	15
Year subjective health		
Very poor, poor, or average	19	16
Better than average or excellent	12	15

[NS]Horticulture group was not significantly different from the control group on mean age and mean years residing in the facility, based on *t* tests, or on any of the other demographic data, based on chi-square tests.

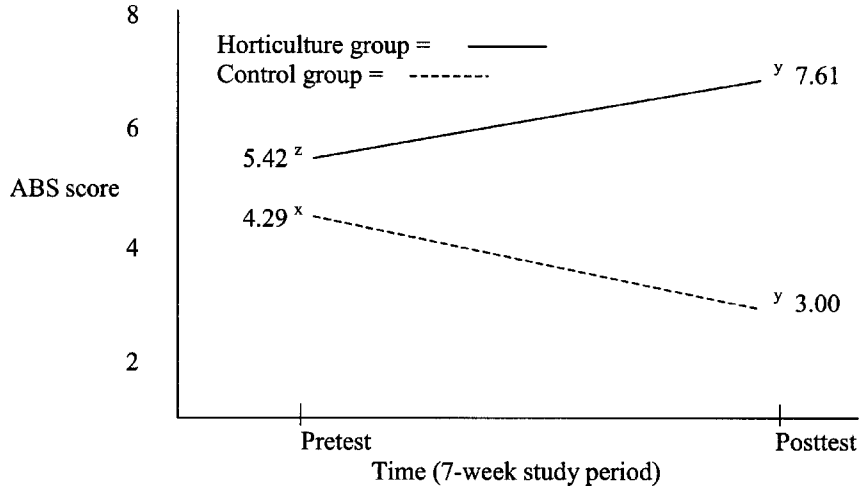

Fig. 1. Comparison of the horticulture group and control group on pretest/posttest mean Affect Balance Scale (ABS) score. The ABS scale measures current psychological well-being over the past few weeks. ABS scores can range from –20 (lowest level of psychological well-being) to +20 (highest level of psychological well-being). The horticulture group participated in a 1-h horticulture activity session once a week over the 7-week period and the control group did not.

[z]Control group pretest score not significantly different from the horticulture group pretest score, based on a one-way ANOVA.
[y]Within group pretest score not significantly different from posttest score, based on a one-way ANOVA.
[x]Interaction of group by time significant at $P = 0.01$, based on a two-way ANOVA.

on a one-way ANOVA comparing mean ABS score between groups on the pretest ($F = 0.70$, $P = 0.41$). On the posttest, the control group had a decline in current psychological well-being, based on mean ABS score. However, a one-way ANOVA revealed that this decline in mean ABS score by the control group over the pretest/posttest time period was not significant ($F = 0.70$, $P = 0.40$). The horticulture group had a near significant increase in current psychological well-being, based on a one-way ANOVA on mean ABS score over the pretest/posttest time period ($F = 3.17$, $P = 0.08$).

A two-way ANOVA showed that the pretest/posttest changes in current psychological well-being, based on mean ABS score, for the horticulture group were significantly higher than the pretest/posttest changes in psychological well-being, based on mean ABS score, for the control group ($F = 6.78$, $P = 0.01$), as shown in Fig. 1.

Overall, participants in the control group maintained psychological well-being over the 7-week study period, whereas the horticulture group had a near significant increase in psychological well-being, over the 7-week study period. A comparison of mean ABS score between groups over the pretest/posttest time period found that the horticulture group had a significant increase in current psychological well-being as compared to the control group.

The results of this study agree with Mooney's (1994) findings that participation in a horticulture activity program improved the psychological well-being of older people in a long-term care facility. An interesting pattern in Mooney's study was that not only did the horticulture group improve on a number of psychological measures, the control group improved on some of the psychological measures as well. Mooney acknowledged that by having a random sample at the same facility in his study, the control group had passive and active exposure to the garden areas, which may have been responsible for an increase in the control group's scores on some of the psychological measures.

To avoid this problem, participants in this study were not randomly assigned to be in a control group or horticulture group. Without random assignment of groups, it was difficult to control for all-important factors that ensured that these two groups were statistically similar. Therefore, as discussed earlier, careful consideration was taken in choosing two facilities that had similar living environments and older adult populations.

Also, by not randomly assigning participants to group, the ethical problem of denying someone the opportunity to participate in horticulture activities was avoided. All participants in this study who volunteered to be in a 7-week horticulture program were allowed to participate, but were told that the program would begin on different dates.

Conclusion

The results of this study suggest that a horticulture program may be beneficial to the psychological well-being of older people over a short time period. Future research could assess if the beneficial effects of a horticulture program last over a longer time period within this population.

This study only compared the effectiveness of a horticulture program between a control and horticulture group. Having a comparison of a horticulture program against a control group and another therapy (e.g., art therapy, music therapy, pet therapy) would help researchers further understand the effectiveness of using horticulture as a therapeutic tool, compared to these more established therapies.

Studies on people-plant interactions suggest that passive and active participation with plants and the natural environment can have a profound beneficial impact on human well-being. Existing research by Kaplan (1973), Ulrich (1984), Ulrich and Simons (1986), Talbot and Kaplan (1991), Mooney (1994), and Marcus and Barnes (1995), support the findings in this study that people-plant interactions have a positive impact on human well-being.

While horticulture is beginning to gain recognition as a therapeutic tool, more research is needed for it to be accepted as a viable therapy by the medical and health care communities. Future research that documents the positive effects of using horticulture as a therapeutic tool will help institutions (long-term care facilities, hospitals, mental health and rehabilitation centers, jails, etc.) obtain public and private funding for this underutilized, yet beneficial therapy.

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