The Green Brigade: The Psychological Effects of a Community-based Horticultural Program on the Self-development Characteristics of Juvenile Offenders

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SUMMARY. The Green Brigade horticultural program is a community-based treatment and diversion program for juvenile offenders. The objective of this study was to determine if participation in the Green Brigade program improved the self-esteem, locus of control, interpersonal relationships and attitude toward school of participating juvenile offenders. Participants in the Green Brigade program had significantly lower scores than the comparative group on measures of self-esteem, interpersonal relationships and attitude toward school prior to and after completion of the Green Brigade program. Although the Green Brigade

participants' scores were significantly lower than the comparative group's scores, the means were still considered 'normal' for their age group. However, adolescents participating in coed sessions, where the hands-on activities involved plant materials, displayed more positive interpersonal relationship scores than participants in an all male session where the hands-on activities focused on the installation of hardscape materials and a lack of plant materials. No significant differences were found in rates of repeated crimes of juvenile offenders participating in the Green Brigade program when compared to juvenile offenders participating in traditional probationary programming.

Juveniles commit about one-third of all property crimes and about one-fifth of all crimes against the person in the United States (Snyder, 1997). In the last 20 years, innovative community-based treatment and diversion programs have grown in response to the tension in juvenile justice between those who advocate rehabilitation of juvenile offenders over retribution (Mulvey et al., 1993). Community-based programs may employ any combination of a variety of activities such as restitution, counseling, community service, wilderness activities, general education, employment education and vocational programs (welding, horticulture, animal care, and mechanics, etc.). Regardless of the type of program, long-lasting effects of a lower rate of recidivism, better interpersonal relationships, better attitudes toward school and higher employability are all outcomes sought in juvenile probation programming (Mulvey et al., 1993).

Horticulture programs are commonly used in the vocational training and rehabilitation of adult prisoners (Flagler, 1995). Results from a 1990 survey reported that of 55 prison authorities in 41 states, 75% had facilities with "vocational or correctional horticulture industries; 19% had formal or informal horticultural therapy programs, and 6% currently had no horticulture programs" (Rice and Remy, 1994). Past evaluations of adult programming indicate that the incorporation of horticulture into juvenile offender probation programming may have some positive effects on participants' behaviors. For example, an evaluation of a Master Gardener program for the inmates of the Federal Women's Prison Camp in Bryan,

Texas found a significant improvement in the global life-satisfaction among inmates with self-reported alcohol or drug abuse (Migura et al., 1997).

The Bexar County San Antonio, Texas, Extension Service's Green Brigade is one program that combines horticultural activities and education with juvenile offender rehabilitation. The program began in 1990. Its objectives are to teach landscape horticulture principles to participants, beautify and improve the San Antonio community through landscaping and give participating juvenile offenders the opportunity to earn minimum wage for the purpose of paying restitution and court fees. In order to provide experience in these areas, the Green Brigade participants work on landscaping renovations and installations in the San Antonio area. To participate in the Green Brigade program, juvenile offenders must be attending school or actively pursuing their Graduate Education Diploma (GED), bring or wear no gang related items, and must actively participate in the learning and work activities.

The purpose of this study was to determine if participation in the Green Brigade horticultural program resulted in the improved self-esteem, attitude toward school, locus of control, and/or interpersonal relationships of juvenile offenders. Demographic comparisons were also made to evaluate whether certain groups were experiencing greater benefits than others from the probationary program.

Materials and methods

POPULATION AND TREATMENT. Juvenile offenders from the 1996 spring and fall sessions of the Green Brigade program were asked to volunteer to participate in the study. The program was divided into two sections: the Green Brigade East and the Green Brigade West. Participants attended the section of the program based on whether they resided in the eastern or western areas of San Antonio.

Both sections of the Green Brigade program met for 6 h each Saturday for 16 weeks or 96 h total per session; 2 h of the day were spent in classroom instruction in horticultural techniques, skills and information. Participants spent the remaining 4 h working outdoors on landscaping projects within the community.

Each Green Brigade section was headed by an individual Bexar County

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Extension Service employee. These employees were given a curriculum outlining the topics to be taught during the 2-h classroom sessions. The administration of the curriculum was entirely within the discretion of the section leader, and may have varied in the way it was presented. Landscaping projects varied in length, intensity and location between sections.

INSTRUMENTATION. The Behavior Assessment System for Children (BASC) measures the psychological attributes of self-esteem, interpersonal relationship skills, locus of control and attitude toward school (Reynolds and Kamphaus, 1992). It has been tested and demonstrated to have a reliability of 0.90. It is valid when used as a psychological assessment tool on children and is superior to similar tests in that it has been tested extensively for language difficulties, bias, reliability and validity. The BASC Self-Report of Personality for 12- to 18-year-old adolescents used for this study consists of 155 true/false statements, and took participants about 30 min to complete. A demographic information section was added to obtain information about the age, gender, grade in school, and ethnicity of the participants.

To understand the meaning of the BASC scores, standardized scores are compared with clinical cutoff scores (set by the authors of the instrument based on their clinical experience), the validity of the measurement tool, and general psychopathology literature (Reynolds and Kamphaus, 1992). For the variable of self-esteem, a score above 30 is con-

sidered normal for children and a score below 30 is considered clinical, revealing a possible "pervasive sense of dissatisfaction with the self" (Reynolds and Kamphaus, 1992, p. 62). A score of 40 or above on the interpersonal relations scale is considered within the normal range of scores, and a score below 40 indicates possible problems in the child's ability to relate to others and develop social skills (Reynolds and Kamphaus, 1992). For the variable of locus of control, scores above 60 indicate an external locus of control, while scores below 60 indicate a more internal locus of control (Reynolds and Kamphaus, 1992). Scores of 60 or below for the variable of attitude toward school, are considered within normal ranges for school aged children. However, scores of 60 to 69 indicate a "pervasive discomfort with school" (Reynolds and Kamphaus, 1992). Any score above 70 is considered clinically significant and suggests the child has an increased risk of dropping out of school (Reynolds and Kamphaus, 1992).

DATA COLLECTION. Pretests were administered in February and September 1996 for the spring and fall sessions, respectively; and posttests were administered in May and December 1996. A comparative group for the BASC data was obtained from the original BASC norming population (Reynolds and Kamphaus, 1992) of 7000 children and adolescents. The standard scores drawn from the BASC norming population records were matched to the Green Brigade population on the demographic variables of ethnicity and gender. These

standard scores were then used as a comparative group for the study.

The Bexar County juvenile court system provided an incidence report for each participant. This report was a cumulative listing through Jan. 1997 of all offenses reported to the juvenile court system by law enforcement agents. A random sample of juvenile probationer incidence reports were obtained to serve as a comparative group for the recidivism portion of the study.

DATA ANALYSIS. The BASC tests were scored using the BASC Enhanced Assist computer program (Stanton, 1994). The program scored the individual tests and produced a printout of scores, as well as an indication of the participants' compliance when filling out the test. If the output indicated extreme caution be exercised when interpreting the scores because of a problem with a participant's responses, the participant was removed from the study. All BASC scores and demographic information were entered into the Statistical Package for the Social Sciences (SPSS) for Windows 95 Release 7.5 computer program and evaluated (SPSS, 1997). Any missing scores were coded as missing values.

Paired samples *t* tests were used to test for mean differences between pretests and posttests. An independent samples *t* test was used to determine mean differences between the BASC comparative group standard scores and those participating in the Green Brigade program. Multivariate analysis of variance was used to determine if there were differences in BASC scores after

Table 1. The *t* test for independent samples analyses comparing the pretest Behavior Assessment System for Children (BASC) scores of Green Brigade program participants to the BASC scores of the comparative group not participating in the Green Brigade program.

Group and variable of interest	N ^a	Mean score	SD	df	<i>t</i>	<i>P</i>
Self-esteem						
Program participants	50	48.86	9.44	98	-1.801	0.075*
Comparative group	50	52.00	7.93			
Interpersonal relationships						
Program participants	50	43.54	12.38	82.880	-3.839	0.000*
Comparative group	50	51.50	7.85			
Locus of control						
Program participants	50	51.82	9.28	98	-0.270	0.787
Comparative group	50	52.34	9.94			
Attitude toward school						
Program participants	50	55.08	11.39	89.977	3.351	0.001*
Comparative group	50	48.38	8.37			

^aN = 50.

*Statistically significant at *P* ≤ 0.10.

participation in the Green Brigade program based on individual demographics. Pretest scores were used as covariates in the analysis to account for any preexisting differences among the groups. Posthoc pairwise comparisons indicated where differences were occurring.

Results and discussion

Fifty participants of the Green Brigade program completed both the pretest and posttest and were included in the study. Due to the nature of the self-selection process, the responses acquired were adequate for supplying ideas and trends for the given sample population, but are not necessarily intended for generalizations to other populations. Participants were primarily male (72%), and Hispanic (66%). The mean age of subjects was 15.

COMPARATIVE VS. EXPERIMENTAL GROUP. An independent samples *t* test was used to compare the Green Brigade participant BASC scores and the comparative group BASC standard scores to determine if the Green Brigade participants differed from the comparative population. Analyses were conducted to make observations between the comparative group's standard scores and the Green Brigade pretest and posttest mean scores. Differences were found in comparisons on the variables of interpersonal relationships, attitude toward school and self-esteem (Tables 1 and 2).

Participants in the Green Brigade program, scored significantly worse (7.96 and 6.70 points) than the comparative group on measures of interpersonal relationships and attitude toward

school, respectively, prior to participation in the program (Table 1). Green Brigade program participants still had significantly worse scores on both variables after participating in the Green Brigade program (Table 2). Although the Green Brigade participants scores were significantly worse than the comparative group's scores before and after participation in the program, the means were still considered normal for their age group (Reynolds and Kamphaus, 1992). Juvenile offenders have been shown to have poorer attitudes toward school and poorer interpersonal relationships in comparison to their non-offending peers (Coie et al., 1990; Elliott and Voss, 1974; Thornberry et al., 1985).

The self-esteem scores the Green Brigade participants were significantly worse prior to participation in the program than the self-esteem standard scores of the comparative group (Table 1). However, the participants' scores were no longer significantly worse than the comparative group's standard scores after participating in the Green Brigade (Table 2). Before and after participation in the Green Brigade program, self-esteem levels of participants were in the normal range for adolescents (Reynolds and Kamphaus, 1992). The juvenile offenders participating in the Green Brigade had significantly lower self-esteem than their non-offending peers, but this did not appear to be at an abnormal level as has been reported by other researchers (Minor and Elrod, 1994; Owens, 1994).

Statistical analyses revealed no differences between the comparative group

standard scores and either the Green Brigade program participants' pretest scores or posttest scores on the variable of locus of control (Table 1 and Table 2). The variable of locus of control involves the measurement of one's understanding of the source of rewards and punishments. A person with an external locus of control believes that rewards and punishments are controlled mainly by external events such as fate, luck, chance or people other than themselves (Reynolds and Kamphaus, 1992). People who believe they have a degree of control over their own destinies have an internal locus of control (Rotter, 1966). The Green Brigade findings differ somewhat from the findings of other researchers who stated that juvenile offenders tend to have a more external locus of control when compared to their non-offending peer group (Cole and Kumchy, 1981; Parrott and Strongman, 1984; Friedberg, 1982).

PRETEST VS. POSTTEST. When the pretest and posttest mean scores of participants of the Green Brigade program were directly compared on measures of self-esteem, interpersonal relationships, locus of control and attitude toward school using a *t* test for paired samples, no significant differences were found. Other evaluations addressing the effectiveness of community-based treatment programs for juvenile offenders have shown similar results. Wilderness programs have measured the influences of program participation on personal characteristics, such as self-esteem, but failed to show lasting effects (Kelly and Baer, 1971; Winterdyk and Roesch, 1981).

Table 2. The *t* test for independent samples analyses comparing the posttest Behavior Assessment System for Children (BASC) scores of Green Brigade program participants to the BASC scores of the comparative group not participating in the Green Brigade program.

Group and variable of interest	N ^a	Mean score	SD	df	<i>t</i>	<i>P</i>
Self-esteem						
Program participants	50	49.20	9.44	98	1.647	0.103
Comparative group	50	52.00	7.93			
Interpersonal relationships						
Program participants	50	43.22	12.38	77.610	3.684	0.000*
Comparative group	50	51.50	7.85			
Locus of control						
Program participants	50	53.86	9.28	98	0.727	0.469
Comparative group	50	52.34	9.94			
Attitude toward school						
Program participants	50	54.38	11.39	87.385	2.893	0.005*
Comparative group	50	48.38	8.37			

^aN = 50.

*Statistically significant at $P \leq 0.10$.

School-based delinquency prevention programs specifically designed to address behavior have demonstrated only short term behavioral improvements (Rotheram-Borus, 1988; Shure and Spivack, 1988). Alternative and vocational educational programs for juvenile delinquents have shown short-term improvements in participants' attitude toward school and home behavior, but long-term results have not been substantiated (Mulvey et al., 1993).

DEMOGRAPHIC COMPARISONS. Additional analyses were conducted because past studies indicated that, in some situations, certain demographic groups may have significant improvements over other groups (Dressner and Gill, 1994; Shields et al., 1985; Waliczek et al., 1996). There were no significant differences on posttest scores of Green Brigade program participants based on gender, ethnicity, age and grade for the variables of self-esteem, interpersonal relationships, locus of control and attitude toward school. Poor attitude toward school, academic failure, truancy and dropping out of school are common among juvenile offenders (Gottfredson and Hirschi, 1990). However, the U.S. Bureau of the Census (U.S. Bureau of Census, unpublished data) reported males and females were indistinguishable from one another in

terms of dropout percentages, suggesting they may have very similar attitudes toward school. With regard to the influence of age and grade, other studies have found that gardening and spending time in outdoor environments are similarly beneficial to both children and adolescents in socialization and interpersonal relationships (Dressner and Gill, 1994; Shields et al., 1985; Waliczek et al., 1996).

GREEN BRIGADE SESSION. Participants of four separate sessions (spring east and west sessions; fall east and west sessions) of the Green Brigade program were included in this study. No differences were found for the variables of self-esteem, locus of control and attitude toward school, but significant differences were found for participants' interpersonal relationships based on the session the participants attended (Table 3). Posthoc pairwise comparisons indicated that participants of the fall-west session had significantly lower interpersonal relationships in comparison to any of the other three sessions. Their lower score denotes these participants might have had problems in relating to others, as well as in developing social skills (Reynolds and Kamphaus, 1992).

One explanation may be found in the work activities for this particular session. The main project for the partici-

pants of the fall-west session was the construction of a greenhouse for the residents of a low-cost geriatric housing area. Little time was spent gardening or landscaping. In fact, the location for the construction of the greenhouse was an enclosed courtyard with little view of outside areas and no vegetation. Research overwhelmingly suggests that people prefer nature scenes to urban scenes (Honeyman, 1987; Heerwagen and Orians, 1986; Kaplan et al., 1982; Ulrich, 1979, 1984). Specifically, prison inmates with cell views of vegetation had fewer stress symptoms compared to inmates with only a view of building and walls (West, 1985). Other studies also have found that gardening and spending time in outdoor environments are beneficial to adolescents in the areas of socialization and interpersonal relationships (Dressner and Gill, 1994; Waliczek, 1997). For the participants of the fall, west session, the lack of vegetation and naturalistic environments may have contributed to the stress and tension created by working on a construction project. The other three sessions had the benefit of working with vegetation in settings less dominated by barren soil and concrete and appear to have received the benefits documented by previous studies. However, the influence of session and vegetation appeared to have

Table 3. Multivariate analysis of covariance determining the effects of the session attended on posttest Behavior Assessment System for Children (BASC) scores of participants in the Green Brigade program.

Group and variable of interest	N ^a	Mean score	SE	df	F	P
Self-esteem						
West session, Spring 1996	16	50.69	1.544	3	0.759	0.523
East session, Spring 1996	16	48.59	1.649			
West session, Fall 1996	8	46.77	2.277			
East session, Fall 1996	10	49.74	2.011			
Interpersonal relationships						
West session, Spring 1996	16	46.65	2.065	3	5.396	0.003*
East session, Spring 1996	16	43.77	2.205			
West session, Fall 1996	8	32.34	3.045			
East session, Fall 1996	10	45.55	2.690			
Locus of control						
West session, Spring 1996	16	51.99	2.594	3	0.722	0.545
East session, Spring 1996	16	54.79	2.771			
West session, Fall 1996	8	51.36	3.827			
East session, Fall 1996	10	57.36	3.380			
Attitude toward school						
West session, Spring 1996	16	55.36	2.203	3	0.966	0.418
East session, Spring 1996	16	51.62	2.353			
West session, Fall 1996	8	53.55	3.249			
East session, Fall 1996	10	57.89	2.870			

^aN = 50.

*Statistically significant at $P \leq 0.10$.

no influence on the other variables of horticultural knowledge or environmental attitude of the same subjects (Cammack et al., 2001).

Recidivism. There were no significant differences on rates of repeated crimes of juvenile offenders participating in the program when compared to the juvenile offenders participating in traditional probationary programming. Recidivism results of the Green Brigade program are similar to the results of other program evaluations. In a summary of over 90 studies including some 11,000 subjects, Gottschalk et al. (1987) found that community-based treatments of juvenile offenders did not have a large effect on any of the various outcomes measured in these studies, including recidivism.

The Green Brigade horticultural probationary program was successful in that it provided benefits to both the individual participants and the community at large. In terms of benefits to the San Antonio community, the program was just as effective as traditional probationary programming in the reduction of crimes, and the program provided a service to the city residents by cleaning and beautifying areas through landscaping. The Green Brigade program assisted juvenile offenders in paying restitution fees to their victims, and helped the participants gain valuable job skills. Since the Green Brigade program was a short-term probationary program, it may not have been long enough to influence complex psychological variables, especially when the program focused on only a few facets of the participants' lives, such as job training. Psychological variables tend to be interrelated and dependent on a multiplicity of factors including, but certainly not limited to, academic achievement, family environment, values and goals (Pope et al., 1988).

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