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# The Influence of the Forest Program on Depression Level*[1]

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# 山林 프로그램 參與 經驗이 憂鬱症 水準에 미치는 影響*[1]

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## 要 約

본 연구는 5일간의 산림내 프로그램 참여 경험이 참여자의 우울증 수준 변화에 어떠한 영향을 끼치는지를 조사하기 위하여 실시되었다. 우울증은 오늘날 주요 정신 장애중 가장 치료에 노출되지 않는 증상의 하나이다. 오늘날 사회 환경에서 우울증은 대단히 큰 비중을 차지하고 있다. 왜냐하면 우울증은 그 빈도가 높고 심리적 변화에서부터 생리적 변화에 이르기까지 다양하게 나타나는 정실 질환이며 가끔 자살, 사회·경제적 손실 등의 심각한 결말을 초래하기도 하기 때문이다.

본 연구는 500여명의 대학생 집단을 대상으로 Beck Depression Inventory(BDI)의 점수에 의하여 선발된 32명의 산림 프로그램 참여자들을 대상자로 선발하였다. 1995년 여름 이들에게 월악산에서 등반, 홀로의 시간, 그룹 토론, 감정 나누기, 상대 안내하기 등의 활동으로 구성된 산림 프로그램을 실시한 후 BDI와 정신과 의사의 상담 및 관찰에 의하여 우울증의 변화가 측정되었다.

자료의 분석 결과 프로그램 참여 이전 이후의 우울증 변화에 있어서 큰 차이를 나타내었고 특히 남자의 경우 큰 폭으로 우울증의 감소가 측정되었다.

## ABSTRACT

The purpose of this study was to examine the effects of participation in a forest program on the level of depression changes in the participants. Total of 501 university students residing in the middle province of Korea were administered Beck Depression Inventory(BDI). Among them, 32 students were selected as participants of the program based on the scores of the BDI.

A 5-day forest program included climbing, sharing experience with others and so on. Pre and post tests control group research design was employed for this study, with BDI measures taken from each of 32 participants on three time frames : 2 weeks before the program, immediately before participation, and immediately after participation.

BDI scores were expected to decrease as a result of forest program participation. The study results supported this hypothesis.

*Key Words : forest program participants, depression changes, BDI*

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## INTRODUCTION

Forest setting has been described as 'a great health machine'(President's Commission on Americans Outdoors, 1987) and forest activities were cited as providing both preventive and therapeutic health benefits(Green and Anderson, 1986). Under the general health related benefits, Ewert (1986) identified four categories specifically related to forest/wilderness recreation : psychological, sociological, educational, and physical benefits. Another taxonomy, developed by Driver, et al. (1990), classified benefits into personal development, social bonding, therapeutic/healing, and improved physical health. Conclusions reached by Ewert(1986) were essentially the same as those reached by Driver et al.(1990), even though they used different terms. Their conclusions were that tremendous opportunities for health benefits are likely to exist from forest/wilderness experiences.

The therapeutic benefits of forest experience can be considered as a health treatment in a forest setting. It is possible that forest may provide opportunities which foster the establishment of more efficient and active behavior, thereby enhancing mental health and psychological functioning(Hanson, 1977). Many empirical studies (Banaka and Young, 1985 ; Lee, 1983 ; Neffinger et al. 1984 ; Stich, 1983 ; Stich and Senior, 1984 ; Thomas, 1981) have examined the therapeutic values of forest/wilderness experience. Most of the studies appraised the values of the forest-related clinical programs in improving the effective performance of delinquents ; of in- and outpatients of psychiatric institutions, including emotionally disturbed children ; of drug abusers ; and of people with other clinical mental-health problems.

Depression is the most common psychological disorder and clinical syndromes(Craighead, et al. 1984). Wong(1996) argued that depression is quite prevalent in the college population. He reported that at any given moment 25% to 30% of college undergraduate students experience depression, and that 45% of those who seek counseling report depression. Oliver, et al.(1976) also have estimated the prevalence of depression in college students by administering the Beck Depression Inventory(Beck, 1970) to a random sample of freshmen and sophomores at four private, medium-sized, coeducational, urban universities. When the criterion for depression was set at a number or intensity of symptoms associated with a diagnosis of depression in a psychiatric population, 23% of the respondents qualified as at least mildly depressed. They argued that the rate of depression may be as much as 50% higher in college students than in American adults between the ages of 18 and 74, in whom the prevalence of depression was cited as 15% in a special report on depression issued by the National Institute of Mental Health(1973).

Depressed person has been described as a loss of interest in pleasurable events. It can be experienced transiently at any given moment and chronically over an extended period of time. Another symptoms associated with major depression include a loss of appetite, insomnia, psychomotor retardation, loss of energy, feelings of worthlessness and guilt, diminished ability to think, poor concentration, restlessness or irritability, and suicidal thought or action(American Psychiatric Association, 1994).

Beck(1976) argued that depression can exert major effects on people's views of themselves. Depression affects self-evaluation and self-esteem (Brown and Mankowski, 1993), self-focused attention(Salovey, 1992), self-efficacy(Kavanagh and Bower, 1985), memory about the self and the ability to process personally relevant information (Ingram, 1984), illusion of control and learned helplessness(Seligman, 1990), and attribution patterns following undesirable events(Peterson, et al, 1983).

Underlying experiential interventions used in the treatment of depression is the assumption that changing persons' view of themselves can impact on levels of depression. One of these experiential interventions is the use of initiative activities associated with forest experiences. Forest experience may include situations in which the participants are exposed to elements of risk, hostile

weather, physical endurance, and mutual cooperation with others. The ability to make decisions and apply learned skills to be successful at activities such as climbing, and backpacking can be a powerful influencing factor on self-concept (Ewert, 1983), self-confidence(Harmon and Templin, 1987), and self-actualization(Shin, 1993).

The major problem addressed by this research was the lack of information on the degree, if any, of level of depression change which occurs in participants as a result of forest experience. Therefore, the overall purpose of this study was to determine to what extent participation in short forest program improved the level of depression of participants. This research made explicit the variety of possible relationships between forest use and depression change ; the possible relationships between the two have not been investigated this way before, particularly in the exploration of possible explanations as to why and how a wilderness experience may be psychologically and mentally rewarding. More generally, research on forest use benefits such as this study can also help forest managers in several aspects. The most important are : enhancing rationality of resource allocation decisions ; helping to promote optional management ; identifying substitutes ; facilitating additional research ; and advancing professionals.

## METHODS AND RESEARCH HYPOTHESES

### Research questions

The principal questions researched in this study deal with the degree of personal changes occurring in participants taking part in a forest program. Specifically this study investigated the following research questions :

1. Does the level of depression, as measured by the Beck Depression Inventory, increase as a result of participation in a forest program?
2. Is there a relationship between any change in depression level and "personal variables"?

### Research hypotheses

Based on the research questions and the review of the literature, the following research hypotheses have been formulated for this study. They are presented in the non-null form as follows :

*Hypothesis #1*

The posttest scores of the Beck Depression Inventory for subjects participating in the forest program(the experimental group) will be significantly higher than the posttest scores for subjects not participating in the forest program(the control group).

*Hypothesis #2*

There will be no change in the depression level for subjects not participating in the forest program(the control group) as measured by pretest to posttest scores of the Beck Depression Inventory.

*Hypothesis #3*

The degree of depression change in participants as a result of the forest program will be moderated by the participants' personal variable of sex.

### Subjects

Subjects, undergraduates attending at the Chungbuk National University, completed the self-reported Beck Depression Inventory. Among 501 students, thirty two subjects were selected as treatment group participants. The first selection criterion was the level of depression ranging mild to medium level based on the score of the Beck Depression Inventory ranging from 18 to 30. This score criterion was advised by psychiatrist(Oh, 1996) as a cutoff for major depression. Then final selection was made based on the individual counselling with psychiatrist, and the following classification groups were emerged : (ⅰ)major depressive disorder, (ⅱ)persons with capacities to be adapted to the forest program, (ⅲ)persons who expressed their intention to be participated in the forest program, and (ⅳ)non-psychiatric medical/surgical patients.

### Inventory

The independent variables in this study were measured by the BDI and the personal data sheet. The BDI(Beck, 1978) appeared to be most frequently used(Wetzel, 1984) and best validated self-report measure of depression(Rehm, 1976).

The BDI is a 21-item measure of the cognitive, motivational, behavioral, and somatic symptoms of depression. It has been proved to be valid for assessing depression in college student samples (Bumberry, et al. 1978). Also several studies have demonstrated its concurrent and discriminant validity(Beck, et al. 1988).

Korean version of BDI was developed by Hahn et al. in 1986. Psychometric properties of the Korean Version of BDI were reported as a sound tool for depression measure. Han et al.(1986) reported that reliability coefficients of the Korean BDI were 0.88 for split-half reliability coefficient and 0.94 Spearman-Brown reliability coefficient. Concerning to the validity, the inventory showed enough ability to discriminate normal and depressed groups. Hahn et al.(1986) compared to the scores from clinically nominated depressed and non-depressed groups. The difference between the means was highly significant. Comparing to the scores in different cultures(e.g., Cavanaugh, et al. 1983), Korean adult population showed higher scores than those of American population.

**Research design**

For the purpose of this study, the pretest-posttest control group design(Campbell and Stanley, 1966) was selected(see Fig. 1). In this study, the "Treatment" is considered to be a forest program. The dependent variable of this study is the level of depression change of participants as a result of the "Treatment". It is extremely difficult to choose an equivalent control group population to compare to a self-selecting population such as subjects in this study. It was therefore decided that the control group should be selected from among the participants who were already booked.

A cover letter, a copy of the pretest instrument and a self-addressed, stamped return envelope were sent to each participant two weeks prior to the scheduled departure date of his or her program. On the first day of their program, students were introduced briefly to this study. They were then asked during pre-program briefing to fill out some personal variables and asked to answer the instrument as a posttest for the control group students or a pretest for treatment group students. At the last day of his or her program, each of the treatment-group students was asked to complete the instrument as a posttest.

There are many natural and social settings in which the research person can introduce something like experimental design into his scheduling of data collection procedures. This study was typically categorized in this field. Collectively, such situations can be regarded as quasi-experimental designs. Campbell and Stanley(1966) encouraged to use the pretest-posttest control group design in such conditions, because it fairly fulfilled scientific requirements such as need replication, cross-validation at other times, and generalization of the results. However, the research design also has some factors jeopardizing internal and external validities, if not controlled in the design, might produce effects confounded with the effect of experiment. They are : (1)the specific events occurring between the first and second measurement in addition to the experimental variables ; (2)function of the passage of time such as growing older, growing more tired, and the like ; (3)the effects of taking a test upon the scores of a second testing ; (4)the interaction effects of selection biases and the experimental variable, etc.

**Program**

Each participant was involved in a 5-day forest program. The forest program was comprised of several sessions. Each session consists of two major phases :

Phase I is a presentation to the entire group of participants while Phase II presents experien-

| Time | 2 Weeks Prior To Forest Program | On Forest Program | |
|---|---|---|---|
| | | Before | After |
| Treatment Program | | Pretest $O_1$ × | Posttest $O_2$ |
| Control Program | Pretest $O_1$ | Posttest $O_2$ | |

**Fig. 1.** The Pretest-Posttest Control Group Design For This Study(After Campbell and Stanley, 1966)

tial exercises designed to apply the principles given in Phase I. The exercises were directed by the two leaders and supervised by the researchers.

The following is a brief description of the program :

### Becoming better acquainted

(a) Group Presentation

Participant responsibility and the concept of "active listening" was explained in preparation for the first exercise. This facilitated the development of bonds of affection and respect between participants.

(b) Team Exercise

Active listening ; Introduction of partners to the team members

### Setting personal goals

(a) Group Presentation

Participants were shown how they had gained through their participation in the forest program. To be benefitted during the program and in their future, endeavors depends on their expectations and goals. The concept of the "self-fulfilling or self-actualization[1]" and its contribution to life was explained.

(b) Team Exercise

Group discussion of participant's expectations ; Establishing personal goals.

### Forest activities

A large part of the program involved hiking and climbing in the mountain and forests. Through these activities, small group cooperation was focused. Solo experience which involved being alone with little equipment was provided to foster personal growth.

### Discussion about their experience

Every night, time to share their forest experience was held around campfire. Through this opportunity participants were expected to understand more each others.

1) Self-fulfillment or self-actualization refers to the desire for a person to become actualized in what he or she perceives to be his or her own potential.

### Program settings

The forest program was held in Worak-san National Park. The park was established in 1984 to protect a significant landscape of the area and to provide for recreational opportunities and nature appreciation. Worak-san is located approximately 83km North-East of Seoul. The area of parkland encompasses some 286km$^2$ of rugged mountains and valleys. Most of Worak-san forests are designated as experimental forest of Chungbuk National University. Therefore, there are many facilities for program running. Worak-san also has a wide range of physical(such as different forest types, topography, etc) and social attributes. These varieties might explain the substantial variation in the response to forest to the participants - one of reasons for selecting this park for the study.

## RESULTS

All participants in this study were students in a 5-day forest program during the summer of 1995. The ages of the participants ranged from 18 to 32 years(mean=23.13 years). Males(78%) outnumbered females(22%).

Prior to testing the hypotheses listed in the previous section, some preliminary examinations were carried out. To examine whether or not there was any difference in depression scores between male and female subjects, a series of t-tests was performed(See Table 1). There were not significant differences between males and females in either treatment or control group. There

**Table 1.** T-tests On Pretest-Posttest Mean Scores of the Deck Depression Inventory for Control and Treatment Groups by Sex.

| Group | Sex | N | Mean(S.D.) | t | Prob. |
|---|---|---|---|---|---|
| Control (Pretest) | F | 25 | 23.76 (3.8) | 1.44 | 0.160 |
| | M | 7 | 21.57 (2.3) | | |
| Control (Posttest) | F | 25 | 23.92 (3.7) | 1.52 | 0.140 |
| | M | 7 | 21.71 (2.0) | | |
| Control (Posttest) | F | 25 | 23.92 (3.7) | 1.52 | 0.140 |
| | M | 7 | 21.71 (2.0) | | |
| Treatment (Posttest) | F | 25 | 19.44 (3.6) | -0.19 | 0.847 |
| | M | 7 | 19.71 (1.7) | | |

were also no differences in pretest scores and posttest scores of control group.

**Tests of hypotheses**

*Hypothesis # 1 (null form)*

*The mean posttest score on the Beck Depression Inventory for subjects participating in a forest program(treatment group) will not be significantly lower than that for subjects not participating in the forest program(control group).*

The pretest and posttest means and standard deviations of the Beck Depression Inventory scores for the each group are presented in Table 2. The scores indicate that the treatment group means decreased from 23.43 to 19.50 while the control group means increased slightly from 23.28 to 23.43.

Table 3 reports the t-test on the posttest scores for control group and treatment groups. The values of t=12.29 found to be significant(p=0.001). Hypothesis #1 in the null form was rejected ; the results indicate that the treatment group was significantly less depressed than the control group at the conclusion of the forest program.

For the purpose of statistical testing, research hypotheses in this section are stated in the null form.

*Hypothesis # 2 (null form)*

*There will be a significant change in the depression level of subjects not participating in the forest program(control group) as measured by pretest to posttest mean gain on the total scores of the Beck Depression Inventory.*

The t-test of the data(Table 4) for the pretest and posttest scores of the control group indicates a mean change score of -0.14 and t-value of -0.93 which was not significant(p=0.361). Hypothesis #2 in the null form was not rejected, as the results indicated that the control group did not experience a significant decrease in depression level.

*Hypothesis # 3 (null form)*

*The degree of depression change in participants as a result of a forest program will not be moderated by the participants' personal variable of sex.*

A t-test was performed to determine the significance of a sex effect on change in depression level. The results of the t-test on the gain scores between sex are summarized in Table 5. The t-value of -3.85(p=0.001) revealed that there was a significant difference between sex on the gain scores of Beck Depression Inventory for the students who took part in the forest program.

Sex has been considered as an important personal variable on depression. Wong(1996) indicated women have twice the risk for depression. Because of the previous findings, sex was selected as a dependent research variable.

An Analysis of Variance(ANOVA) was performed to test whether a significant difference existed in gain scores due to the participant personal variables. This examination was rationalized that depression changes might differ considerably

**Table 2.** Descriptive statistics of Pretest and Posttest Mean Scores of the Beck Depression Inventory for the Treatment and Control Groups.

| Group | Test | N | Mean | S.D. |
|---|---|---|---|---|
| Control | Pretest | 32 | 23.28 | 3.61 |
| | Posttest | 32 | 23.43 | 3.47 |
| Treatment | Pretest | 32 | 23.43 | 3.47 |
| | Posttest | 32 | 19.50 | 3.25 |

**Table 3.** T-test between posttest scores of the Beck Depression Inventory for the control and treatment groups.

| Group | Test | N | Mean | S.D. | t | Prob. |
|---|---|---|---|---|---|---|
| Control | Posttest | 32 | 23.43 | 3.47 | 12.29 | 0.001 |
| Treatment | Posttest | 32 | 19.50 | 3.25 | | |

**Table 4.** T-test on pretest-posttest mean scores of the Beck Depression Inventory for the control group.

| Group | Test | N | Mean | S.D. | t | Prob. |
|---|---|---|---|---|---|---|
| Control | Pretest | 32 | 23.28 | 3.61 | -0.93 | 0.361 |
| | Posttest | 32 | 23.44 | 3.47 | | |

**Table 5.** T-test on the gain scores of the Beck Depression Inventory for the control group.

| Test | N | Mean | S.D. | t | Prob. |
|---|---|---|---|---|---|
| Females | 7 | -2.00 | 1.41 | -3.85 | 0.001 |
| Males | 25 | -4.48 | 1.53 | | |

from one person to another because of his or her personal background. Personal variables used here were based on previous studies including Lucas (1980), Stankey(1973), Watson et al.(1991), and Young(1983). These variables were considered to be important in forest use frequencies and use patterns.

F-values from the ANOVA are shown in Table 6. The results of the ANOVA indicated that there were no significant age, previous forest experience, place of residence, or major they were studying effects on the change of BDI scores resulting from the treatment. Based on the results above, it is argued that if decreasing level of depression is an achievable goal for all participants, it can be attained regardless of gender, age, place of residence, previous forest experience, and major.

Sample's age and education levels were homogeneous because they were university students. This might lead no diffferences in their depression changes. The results confirm earlier findings in the literature(Young, 1983). In the case of frequencies of forest visitations and place of residence, the examinations were performed based on the notion that one man's nature or forest is perceived by his living environment and attitudes(Stankey, 1973).

**Table 6.** ANOVA to determine effects of personal variables on the gain scores of the BDI for the treatment group.

| Source of Effect | N | d.f. | F | Prob. |
|---|---|---|---|---|
| Age[a] | 32 | 11 | 1.085 | 0.419 |
| Frequencies of Visitations to Forest Areas[b] | 32 | 3 | 0.605 | 0.618 |
| Place of Residence[c] | 32 | 2 | 0.522 | 0.599 |
| Major[d] | 32 | 5 | 0.394 | 0.848 |

[a] Ages ranged from 18 to 32 years(mean=23.13 years).

[b] Frequencies of recreational visitations to forest a year : None=10(31%) ; 1-2=15(46%) ; 3-5=4 (14%) ; Over 5=3(9%).

[c] Place of Residence before College : Large City =13(40%) ; City=17(53%) ; Town or Rural=2(6%).

[d] Major : Humanities and Literature=6(18%) ; Engineering=10(31%) ; Natural Sciences=3(9%) ; Agriculture=3(9%) ; Business and Commerce= 5(15%) ; Law=5(15%).

However, the results of the ANOVA in this study did not support Stankey's argument. Major was indicated as an important factor in differentiating attitude toward nature(Choi and Kim, 1995).

The data indicated that program participants' personal profile variables did not in any significant way influence their depression changes. This results refuted the intuitive expectation that personal background would at least to some extent influence depression changes. This might be attributable to the limited range of variables and characteristics of the sample itself, i.e., its rather homogeneous nature. A more diverse sample(general citizen for example) may indicate different results.

## CONCLUSIONS AND DISCUSSION

The statistical analyses indicated that there were significant decreases in the level of depression for the students under the study during the forest program. Results supported that participation in a forest program could decrease depression levels of participants. These results conformed previous study results dealing with depression(Chakravorty, et al., 1995), self-concept (Wright, 1983), and self-actualization(Shin, 1993).

How might the forest experience become beneficial in shaping and developing mental health? There must be some relationship of man and forest(Sharp, 1940). As Peterson (1972) and Scherl (1988) stated, there have been very few attempts to explain "why" and "how" forest experience promotes mental well-being. It is time to provide some of the answers. The possible explanation of these questions might be "forest stimuli." Forest stimuli include a low density of human population, low level of noise and movement, and a slow rate of change. Therefore, it offers a high degree of predictability and little conflicts or ambiguity. These stimuli constitute a "behavior setting" which evokes certain kinds of responses. During the time spent in the forest, results of these stimuli can be felt. The deeper meaning and significance of nature seems to penetrate the person's mind. Explanation of these powerful psychological phenomena were difficult at best

(Scott, 1977).

The result of testing hypothesis #3, males tended to be more sensible to depression change than women as a result of the forest program participation. These differences might be due to a variety of factors, including these : (a)women may be more willing to express depressive symptoms ; (b)biological hypotheses suggest that women are genetically prone not to change ; (c)learned helplessness suggests that if women learn to be helpless, they will be more helpless ; and (d)women are more state-oriented than men and more inclined to worry. However, the basic problem in sex difference in this study is that the small number of female subjects might not be enough to draw such assumptions.

Results from the ANOVA, dealing relationship between depression changes and participants' personal background, bring an intriguing interpretation. If decreasing depression level is not related to personal background, it could be argued that this benefit from forest program participants is not exclusively the domain of a rather small and privileged segment of the population. Decreasing depression potential, it is hoped, is an achievable goal for all program participants, regardless social class, place of residence, or other background.

Further suggestions for future research programs would look at not only those depressed population, but also at prevention programs with specific populations in mind. The same prevention focus could be applied to at-risk populations for depression of various ages and gender. While a forest program held in one area to be more effective in causing depression change in the younger portion of the sample, another program may have a greater impact on the older participants. Similarly, individuals participated in programs of the same length may be affected differently by curriculum of the program.

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