

The effect of forest therapy on the mood states of young adults in Ulaanbaatar

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Abstract— This study aimed to examine the effects of forest therapy, specifically Shinrin-yoku (forest bathing), on the mood states of young adults living in Ulaanbaatar, the capital city of Mongolia, where environmental pollution poses ongoing concerns. The study was conducted in nearby pristine forest environments, where participants engaged in two short forest therapy sessions held at different natural sites on separate days, allowing exposure to varied forest settings. A total of 27 young adults (11 males and 16 females) participated in the study. Mood states were assessed immediately before and after each forest therapy session using the Profile of Mood States (POMS) questionnaire, a validated psychological instrument measuring six mood dimensions: tension–anxiety, depression–dejection, confusion–bewilderment, vigor–activity, fatigue–inertia, and anger–hostility. The results showed significant and consistent improvements in participants’ mood states following forest therapy. Significant reductions were observed in four negative mood dimensions, including tension–anxiety, depression–dejection, confusion–bewilderment, and anger–hostility. In contrast, no significant changes were found in the fatigue–inertia subscale, despite assessments being conducted after extended forest walks. Participants also showed a significant increase in vigor–activity, the only positive POMS subscale, reflecting enhanced energy and enthusiasm after forest exposure. Consequently, Total Mood Disturbance scores decreased significantly following participation in both forest therapy sessions. No statistically significant differences were observed between the experimental sites, suggesting that variations in environmental conditions did not substantially influence participants’ mood states. These findings indicate the potential of forest therapy as a low-cost, non-invasive, and effective nature-based intervention for improving mental health and overall well-being among young adults living in polluted urban environments such as Ulaanbaatar.

Keywords— Forest therapy, Mood states, Psychological well-being, Nature-based interventions

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1. INTRODUCTION

According to a survey conducted in 2013, the prevalence of chronic fatigue syndrome, anxiety disorder, somatic symptom disorder, and depressive disorder among Mongolians aged 16-64 was measured at 16.2%, 18.4%, 11.9% and 6.2%, respectively. However, a subsequent survey in November 2021 revealed a substantial and concerning increase in these psychological conditions, with chronic fatigue syndrome rising to 60.1%, anxiety disorder to 53.9%, somatic symptom disorder to 47.2%, and depressive disorder to 39.3%. These findings indicate a noteworthy escalation in the incidence of these psychological disorders among the surveyed population over the eight-year period [1] [2].

Ulaanbaatar, Mongolia's capital, faces severe air pollution challenges that can significantly impact mental health. In 2022, the average fine particulate matter (PM_{2.5}) air quality in Ulaanbaatar measured 52.9 micrograms per cubic meter, indicating that PM_{2.5} concentrations in Ulaanbaatar exceeded the World Health Organization's (WHO) annual limit of 5.0 micrograms by nearly 11-fold³. Therefore, air pollution has been linked to adverse effects on human mental health. Extended contact with pollutants such as fine particulate matter (PM_{2.5}) and nitrogen dioxide (NO₂) has been linked to heightened probability of encountering mental health problems, including stress, depression, anxiety, and cognitive decline [3] [4].

Forest Therapy offers a promising natural solution to alleviate these adverse effects. In a study, Ochiai et al. concluded that among females, engaging in forest therapy resulted in heightened sensations of comfort, a greater sense of naturalness, an increased feeling of relaxation, and an improvement in the mood state [5]. Furthermore, there was a notable decline in anxiety and an increase in feelings of vigor [5] [6]. Studies have shown the impact of forest therapy on diminishing stress-related hormones within the body [7] [8], beneficial for exhaustion disorder [9], positive effect on mood states [10] [11], and decline in anxiety [12].

To the best of our knowledge, this study represents the first of its kind conducted in Ulaanbaatar, introducing the novel application of forest therapy to improve mood states and shedding light on an unexplored avenue of research in this unique urban environment. In Ulaanbaatar, a city with high air pollution and a notable increase in psychological disorders, this study was conducted based on the hypothesis that forest therapy is effective in improving individual psychological states. The present study aimed to explain the psychological effects of forest therapy on young adults residing in Ulaanbaatar.

2. THEORETICAL OVERVIEW

Forest therapy, commonly known as Shinrin-yoku, is a nature-based practice that centered on immersing oneself in a forest or natural setting and connecting with nature through five senses to promote physical, mental, and emotional well-being [13]. Based on the belief that the forest environment reduces human stress, has a comforting effect and is

³ <https://smartairfilters.com/en/blog/ulaanbaatar-mongolia-live-aqi/>

beneficial for overall well-being, Shinrin-yoku was first used in Japan in 1982 with the objective of reducing stress among workers. Forest therapy involves leisurely walks, meditation, and other contemplative activities in a forest setting, encouraging participants to engage all their senses. The belief guiding this practice is that the soothing and restorative attributes of nature play a role in reducing stress, enhancing mood, and providing various health benefits [14].

The physiological effects of forest therapy are multifaceted and encompass both short-term and long-term changes. Research indicates that exposure to natural environments, such as forests, can have positive impacts on the autonomic nervous system, leading to decreased sympathetic nervous system activity and increased parasympathetic nervous system activity, accompanied by a reduction in cortisol levels [15]. This shift in the autonomic nervous system is often associated with relaxation and restoration. Furthermore, forest therapy is associated with improvements in cardiovascular health, including lowered blood pressure and heart rate variability [5]. The inhalation of phytoncides, natural compounds released by trees, is believed to contribute to these physiological changes, demonstrating the intricate connection between nature exposure and the human body's stress response system. Additionally, forest therapy has been linked to enhanced immune function, suggesting a potential preventive aspect for overall health [16].

Forest therapy exerts profound effects on psychological well-being, impacting various aspects of cognition, emotion, and mental health. Attention Restoration Theory (ART) suggests that engaging with nature, such as in forest therapy, enables the cognitive mechanisms responsible for directed attention to rejuvenate, resulting in enhanced concentration and diminished mental fatigue. Moreover, the practice is associated with positive changes in mood states [5]-[12]. The psychological benefits extend to improvements in creativity and problem-solving skills, indicating that time spent in nature can enhance cognitive flexibility and divergent thinking [17].

Mood states refer to the prevailing emotional condition or overall emotional tone experienced by an individual at a particular point in time. Unlike emotions, which are specific reactions to stimuli, mood states are more enduring and provide a general backdrop to an individual's emotional experience. They encompass a range of feelings such as happiness, sadness, anger, anxiety, confusion, and calmness. The Profile of Mood States (POMS) is a validated psychological measurement, and a widely used psychological assessment tool designed to measure various mood states. It was developed by psychologist McNair, Lorr, and Droppleman [18].

The questionnaire aims to assess an individual's mood by measuring distinct factors or subscales. The POMS questionnaire includes six mood subscales:

1. Tension-Anxiety: Measures feelings of nervousness, restlessness, and edginess.
2. Depression-Dejection: Assesses feelings of sadness, hopelessness, and overall depressive mood.
3. Anger-Hostility: Measures the intensity of feelings related to anger, irritability, and frustration.
4. Vigor-Activity: Assesses the overall level of energy, enthusiasm, and vigor.
5. Fatigue-Inertia: Measures feelings of tiredness, lethargy, and inertia.
6. Confusion-Bewilderment: Assesses the clarity of thought and feelings of confusion or bewilderment.

The effect of forest therapy on the mood states of young adults in Ulaanbaatar

Participants typically rate their current mood on a Likert scale, indicating the intensity of each mood state they are experiencing. The scores from each subscale are then combined to provide an overall profile of an individual's mood.

3. SURVEY OVERVIEW

3.1. PARTICIPANTS

In the spring of 2022, we conducted an experiment including two forest therapy programs in two different forest settings near Ulaanbaatar, on two separate dates. Eleven young adults ranging in age from 17 to 26 have participated in the first forest therapy program (m=4, f=7). Sixteen young adults ranging in age from 17 to 26 have participated in the second forest therapy program (m=7, f=9). A total of 27 people have participated. Prior to commencing the experiment, the participants received comprehensive information about the study's objectives and procedures. Throughout the study duration, participants were instructed to abstain from alcohol consumption, and their intake of caffeine was carefully regulated.

3.2. SITES OF EXPERIMENT

The first forest therapy program was carried out on the southern part of the Bogd Khan Mountain in Ulaanbaatar on March 27, 2022. The gathering point, located in the city center, was 48 kilometers away from the forest, and the drive took approximately 62 minutes. The southern part of Bogd Khan Mountain provides a natural and picturesque forested environment.

The second forest therapy program was conducted at the Gorkhi Terelj National Park, situated to the west of Ulaanbaatar, on April 17, 2022. The gathering point, located in the city center, was 51 kilometers away from the forest, and it took approximately 70 minutes to reach the forested area by car. Both of the two sites selected in the experiments exhibited forest, undisturbed by buildings or human activity.

Table 1. Experiment Sites' Details

Experimental locations:	Bogd Khan Mountain	Gorkhi Terelj National Park
Date:	March 27, 2022	April 17, 2022
Forest physiognomy:	Siberian pine, Scots pine	Siberian larch
Weather:	Sunny, without strong wind, without precipitation	Sunny, light breeze (7-8km/h), without precipitation
Temperature (°C):	5±2	10.5±2.5

3.3. PROCEDURE

On the day preceding the forest therapy programs, all participants were requested to complete a preliminary questionnaire.

Experiment 1: In the first forest therapy program, participants were asked to gather at 9:00 AM at a designated meeting point and then drive to the southern part of Bogdkhan Mountain. The experiment officially commenced at 11:00 AM, following a briefing and

instructions provided to all participants. Participants embarked on a four-hour guided forest walk that included a lunch break in the middle. The route walked for this experiment is illustrated in Figure 1. During walk, participants were encouraged to immerse themselves in the natural surroundings, engage with the environment, and experience the forest. Following the forest therapy session, participants immediately completed the same questionnaire used in the pre-experiment assessment. After completing the questionnaire, participants were driven back to the gathering point, and the first experiment officially concluded.

Experiment 2: The second forest therapy program followed a similar schedule. Participants gathered at 9:00 AM and then drove to the forested area of the Gorkhi Terelj National Park. The experiment officially began at 11:10 AM, following introductory instructions. In this experiment, participants engaged in a three-hour guided forest walk that included a lunch break in the middle. The walking route for this experiment is illustrated in Figure 2. After the forest therapy session in the forested area of the Gorkhi Terelj National Park, participants completed the same questionnaire used in the pre-experiment assessment. Subsequently, participants were driven back to the gathering point, and the second experiment officially concluded.

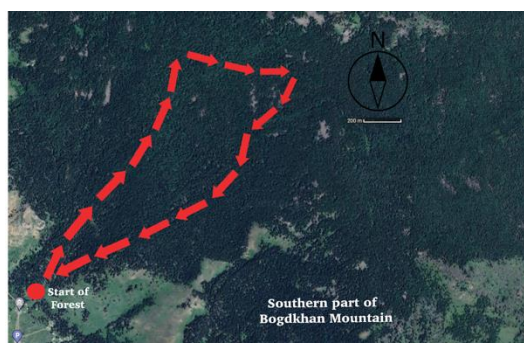


Figure 1. The route walked during a forest therapy program at the Southern part of Bogdkhan Mountain.



Figure 2. The route walked during a forest therapy program at the Gorkhi Terelj National Park.

3.4. MEASUREMENTS

To assess psychological responses to forest therapy, the five-point Likert Scale method in conjunction with the full-form Profile of Mood States (POMS) questionnaire was used. Participants completed the questionnaire, both on the day preceding the forest therapy session and immediately following it. The POMS questionnaire assesses the following five negative subscales: tension–anxiety (TA), depression–dejection (DD), anger–hostility (AH), fatigue–inertia (FI), confusion–bewilderment (CB) and one positive subscale: vigor–activity (VA). Questionnaire includes a list of 65 words that describe six different mood states, and

The effect of forest therapy on the mood states of young adults in Ulaanbaatar

individuals rate the extent to which each word reflects their current mood from strongly disagree (0 point) to strongly agree (4 point).

For example:

"I am tense."	0-strongly disagree	1	2	3	4-strongly agree
"I feel anxious."	0-strongly disagree	1	2	3	4-strongly agree
"I feel energetic."	0-strongly disagree	1	2	3	4-strongly agree
"I feel hopeless."	0-strongly disagree	1	2	3	4-strongly agree
"I am irritated."	0-strongly disagree	1	2	3	4-strongly agree
"I feel exhausted."	0-strongly disagree	1	2	3	4-strongly agree

The calculation of the Total Mood Disturbance (TMD) score was determined using following formula:

$$\text{TMD} = [(TA) + (DD) + (AH) - (VA) + (FI) + (CB)]$$

3.5. DATA ANALYSIS

The data collection was exclusively paper-based, with subsequent data entry into Microsoft Excel. The phase of data analysis was executed using SPSS Statistics Version 28. The two forest therapy programs, marked by distinct differences in location, environmental conditions, and weather, were individually analyzed. A paired samples t-test was used to assess the differences between pre-test and post-test measurements. Subsequently, a combined evaluation was performed to comprehensively assess the collective impact.

Cohen's d was used to calculate the effect size (ES). A value around 0.2 is considered as a small effect, around 0.5 is considered as a medium effect, around 0.8 is considered as a large effect. To measure the degree of association between the two individual experiments and changes in mood states, an independent samples t-test was employed.

4. RESULTS

4.1. THE FIRST EXPERIMENT

Table 2 displays the outcomes of the paired sample t-test conducted to assess the mood state differences among participants from the first forest therapy program between the pre-test and post-test measures. The analysis showed noteworthy alterations in various mood states measured by the Profile of Mood States (POMS) scale following the forest recreation program.

Following participation in the program, the POMS scale indicated a statistically significant decrease in the four negative mood states out of five. These include tension–anxiety ($t = 10.39$, $p < 0.001$), depression-dejection ($t = 6.024$, $p < 0.001$), and anger–

hostility ($t = 2.72$, $p = 0.011$), along with confusion-bewilderment ($t = 7.35$, $p < 0.001$). However, the last negative mood state, fatigue-inertia ($t = 0.91$, $p = 0.192$) did not exhibit a notable change due to the forest therapy program. Moreover, a significant increase was noted in one positive mood state, vigor-activity ($t = -6.34$, $p < 0.001$).

Furthermore, effect size analysis revealed the greatest impact on the mood states of vigor-activity ($ES = -1.75$) and tension–anxiety ($ES = 1.18$), signifying that these specific characteristics were notably affected by the forest therapy program. The overall TMD score also exhibited a considerable decrease (mean difference = 4.051, rate of change = -98.06%).

Table 2. The paired sample t-test result, examining mood state differences among participants from the first forest therapy program.

Psychological Indices (Experiment 1) n = 11	Pre-test	Post-test	t	P	Paired Differences	Rate of Change (%)	ES
	Mean±SD	Mean±SD			Mean		
Mood States (Profile of Mood States)							
Tension-Anxiety	1.23±0.63	0.45±0.5	10.39	<.001***	0.778	-63.41%	1.18
Depression-Dejection	0.89±0.63	0.3±0.41	6.02	<.001***	0.588	-66.29%	0.84
Anger-Hostility	0.73±0.68	0.39±0.3	2.72	0.011*	0.341	-46.58%	0.33
Vigor-Activity	1.23±0.73	2.55±0.78	-6.34	<.001***	-1.318	107.32%	-1.75
Fatigue-Inertia	1.04±0.85	0.94±0.77	0.91	0.192	0.104	-9.62%	0.13
Confusion-Bewilderment	1.47±0.65	0.55±0.38	7.35	<.001***	0.922	-62.59%	1.42
Total Mood Disturbance (TMD)	4.13±3.52	0.08±2.65	10.83	<.001***	4.051	-98.06%	0.95

Note: ES: Effect Size; * $p < 0.05$, *** $p < 0.001$

4.2. THE SECOND EXPERIMENT

A paired sample t-test results, examining psychological differences among participants from the second forest therapy program between the pre-test and post-test measures are displayed in Table 3. Analysis revealed significant changes in various mood states measured by the Profile of Mood States (POMS) scale following the forest therapy program. Following the program, a statistically significant decrease was observed in four negative mood states measured by the POMS scale: tension–anxiety ($t = 8.71$, $p < 0.001$), depression–dejection ($t = 2.10$, $p = 0.0263$), anger-hostility ($t = 2.94$, $p = 0.005$), and confusion-bewilderment ($t = 11.64$, $p < 0.001$). In addition, a significant increase was noted in one positive mood state, vigor-activity ($t = -7.79$, $p < 0.001$). However, similar to the findings in the first experiment, the level of mood state fatigue-inertia ($t = -0.23$, $p = 0.4107$) did not exhibit notable changes due to the forest therapy program in the second experiment.

Moreover, the effect size analysis demonstrated that the forest recreation program had a considerable impact on mood states, with the most substantial effects observed in vigor-activity ($ES = -2.14$), confusion-bewilderment ($ES = 1.82$), and tension–anxiety ($ES = 1.21$).

The effect of forest therapy on the mood states of young adults in Ulaanbaatar

These results indicate that these particular mood state characteristics were notably influenced by the forest therapy program in the second experiment. The overall TMD score also exhibited a considerable decrease (mean difference = 3.493, rate of change = -113.31%).

Table 3. The paired sample t-test results, examining mood state differences among participants from the second forest therapy program.

Psychological Indices (Experiment 1) n = 16	Pre-test	Post-test	t	P	Paired Differences	Rate of Change	ES
	Mean±SD	Mean±SD			Mean	(%)	
Mood States (Profile of Mood States)							
Tension-Anxiety	1.09±0.57	0.42±0.49	8.71	<.001***	0.667	-61.47%	1.21
Depression-Dejection	0.88±0.63	0.54±0.76	2.10	0.0263*	0.346	-38.64%	0.49
Anger-Hostility	0.58±0.42	0.3±0.62	2.94	0.005**	0.281	-48.28%	0.47
Vigor-Activity	1.8±0.61	3.1±0.61	-7.79	<.001***	-1.297	72.22%	-2.14
Fatigue-Inertia	0.87±0.46	0.91±0.84	-0.23	0.4107	-0.045	4.60%	-0.06
Confusion-Bewilderment	1.46±0.55	0.52±0.44	11.64	<.001***	0.946	-64.38%	1.82
Total Mood Disturbance (TMD)	3.08±2.49	-0.41±3.3	7.45	<.001***	3.493	-113.31%	1.1

Note: ES: Effect Size; * p < 0.05, ** p < 0.01, *** p < 0.001

4.3. EXPERIMENTAL SITES AND CHANGES IN MOOD STATES

Table 4 presents the results of the Independent Samples t-test assessing the relationship between the two individual forest therapy programs and changes in mood states from pre-test to post-test. The analysis revealed no statistically significant mean differences in mood states between the two different forest therapy program. This indicates that the variations in environments did not result in significant changes in the participants' mood states during the study period. The absence of statistically significant findings suggests that the differing locations and weather did not exert a substantial influence on the participants' mood states within the parameters of this research.

Table 4. The results of the Independent Samples t-test assessing the relationship between the experimental sites and changes in mood states.

Group Statistics	Changes in Mood States		Mean Difference	t-test for Equality of Means t	Sig p
	Site 1	Site 2			
	n=11	n=16			
	Mean	Mean			
Mood States (Profile of Mood States)					
Tension-Anxiety	0.78	0.67	0.11	0.999	0.328
Depression-Dejection	0.59	0.35	0.24	1.125	0.271
Anger-Hostility	0.34	0.28	0.06	0.384	0.704
Vigor-Activity	-1.32	-1.30	-0.02	-0.081	0.936
Fatigue-Inertia	0.10	-0.04	0.15	0.586	0.563
Confusion-Bewilderment	0.92	0.95	-0.02	-0.17	0.867
Total Mood Disturbance (TMD)	4.05	3.49	0.56	0.863	0.396

Note: significant at p < 0.05

4.4. COMBINED EVALUATION

The Independent Samples t-test results, as displayed in Table 4, indicated no statistically significant difference in the mean of mood states between the two separate forest therapy program. Subsequently, a paired samples t-test was used to assess the combined data from participants across both programs, as detailed in Table 5. This merged analysis aimed to comprehensively assess the collective impact from the combined data across diverse experimental settings.

The combined evaluation revealed a statistically significant decrease in four negative mood states measured by the Profile of Mood States (POMS) scale: tension–anxiety ($t = 13.01$, $p < 0.001$), depression–dejection ($t = 4.19$, $p < 0.001$), anger–hostility ($t = 4.08$, $p < 0.001$), and confusion–bewilderment ($t = 13.62$, $p < 0.001$). Additionally, a notable increase was observed in the positive mood state of vigor–activity ($t = -10.24$, $p < 0.001$).

Consistent with findings from separate experiments, the level of mood state fatigue–inertia ($t = 0.13$, $p = 0.449$) did not exhibit significant changes due to the forest recreation program. The effect size was most pronounced for Confusion–Bewilderment ($ES = 2.62$), tension–anxiety ($ES = 12.50$), and vigor–activity ($ES = -1.97$), underscoring the substantial impact of the forest recreation program on these three specific mood states. The overall TMD score also exhibited a considerable decrease (mean difference = 3.72, rate of change = -106.01%).

Table 5. The paired sample t-test results, examining mood state differences among participants from both experiments.

Psychological Indices (Both experiments combined) n = 27	Pre-test	Post-test	t	p	Paired Differences	Rate of Change (%)	ES
	Mean	Mean			Mean		
Mood States (Profile of Mood States)							
Tension-Anxiety	1.15±0.59	0.44±0.48	13.01	<.001***	0.71	-62.03%	2.50
Depression-Dejection	0.89±0.62	0.44±0.64	4.19	<.001***	0.44	-50.14	0.81
Anger-Hostility	0.64±0.53	0.34±0.51	4.08	<.001***	0.31	-47.60	0.79
Vigor-Activity	1.57±0.71	2.88±0.72	-10.24	<.001***	-1.31	83.19	-1.97
Fatigue-Inertia	0.94±0.64	0.92±0.80	0.13	0.449	0.02	-1.70	0.03
Confusion-Bewilderment	1.47±0.58	0.53±0.41	13.62	<.001***	0.94	-63.89	2.62
Total Mood Disturbance (TMD)	3.51±2.93	-0.21±3.01	11.77	<.001***	3.72	-106.01	2.27

Note: ES: Effect Size; *** $p < 0.001$

5. DISCUSSION

5.1. EXPERIMENTS

The present study investigates the effects of forest therapy, on the psychological well-being of young adults in Ulaanbaatar, Mongolia. With a rising incidence of psychological

disorders over recent years, intensified by severe air pollution challenges, the exploration of nature-based interventions, such as forest therapy could be helpful.

The results obtained from the two distinct forest therapy programs conducted at different forest settings near Ulaanbaatar offer valuable insights into the potential benefits of forest therapy. The significant reductions in negative mood states: tension-anxiety, depression-dejection, anger-hostility, and confusion-bewilderment, alongside the notable increase in positive mood state: vigor-activity, following the forest therapy program align with existing research suggesting the positive impact of nature-based interventions on psychological well-being.

The consistency of outcomes in both forest therapy programs reinforces the robustness of the observed effects, underlining the efficacy of forest therapy in positively influencing specific mood states, particularly tension-anxiety and vigor-activity. These findings echo prior research attributing forest therapy to a decline in anxiety, and an overall positive effect on mood states [7] - [12]. It's worth noting that neither experiment revealed changes in the fatigue-inertia scale, despite measurements taken right after the long walk in forest, which might have played a role in causing momentarily fatigue. This result also repeats the prior research regarding fatigue-inertia [5]. The lack of change in fatigue suggests that any momentary tiredness experienced after the forest walk did not contribute significantly to the participants' overall mood disturbance. This underscores the robustness of the observed positive effects.

The overall Total Mood Disturbance score decreased. Forest therapy had a comprehensive positive impact on participants' mood states, as indicated by the reduction in the Total Mood Disturbance score. This suggests a holistic improvement in psychological well-being.

The absence of statistically significant mean differences between the diverse experimental sites indicates that variations in the environmental conditions, such as differences in locations and weather, did not distinctly affect the participants' mood states. This suggests that the core benefits of forest therapy were not substantially influenced by these environmental variations.

5.2. LIMITATIONS

This study was conducted using a sample size that was comparatively small, primarily focusing on young adults in Ulaanbaatar. This limited scope might restrict the generalizability of the findings to a broader population or other age groups. By not analyzing gender-specific responses to forest therapy, the study may overlook potential variations in how males and females respond to forest therapy. Physiological measurements such as heart rate, cortisol levels, blood pressure, or other biomarkers can offer insights into the physiological changes induced by forest therapy. The absence of these measurements limits the comprehensive assessment of participants' physical responses to the forest therapy. The absence of a control group restricts the ability to attribute the observed changes in mood states solely to the forest therapy. Without a control group for

comparison, it becomes challenging to establish a cause-and-effect relationship directly between the intervention and the changes noted in participants' mood states. The study primarily focuses on the immediate effects of forest therapy conducted over a short period. This restricted timeframe might not fully capture the long-term psychological effects of forest therapy. This study was carried out during the spring season in Mongolia. Different seasons might have varied effects on individuals' psychological responses and well-being. For instance, the impact of nature-based interventions such as forest therapy could potentially vary across seasons due to changes in weather, environment, and light exposure. Additionally, Ulaanbaatar experiences heightened air pollution during colder seasons, particularly in winter. The exclusion of other seasons might limit the comprehensive understanding of how forest therapy impacts mood states under varying pollution levels.

6. CONCLUSION

The study aimed to evaluate the impact of short forest therapy programs on the mood states of young adults in Ulaanbaatar, Mongolia. 27 participants were participated in two distinct forest therapy programs conducted at separate natural sites. Assessments were conducted before and after each program using Profile of Mood States questionnaire which assesses six subscales: tension-anxiety, depression-dejection, confusion-bewilderment, vigor-activity, fatigue-inertia and anger-hostility. Both individual and combined analyses regarding experimental sites revealed significant improvements in participants' mood states after forest therapy program. Result of this study suggest that a singular session of forest therapy offers psychological benefits for young adults.

1. Significant reductions were observed in tension-anxiety, depression-dejection, confusion-bewilderment, and anger-hostility, four out of five negative subscales of POMS. Forest therapy demonstrated a consistent positive impact on various negative mood states, highlighting its potential as a therapeutic intervention for alleviating psychological distress. Exploring the duration of mood improvements and conducting studies that investigate how long the positive effects on mood states persist after a forest therapy session is crucial. Understanding the duration of these reductions will contribute to establishing the frequency needed for sustained benefits.
2. Increased feeling of vigor-inertia, which is only positive subscale of POMS. Vigor-activity subscale assesses the overall level of energy and enthusiasm. Forest therapy not only reduced negative mood states but also contributed to a positive enhancement of participants' overall energy and vitality. The significant increase in feelings of vigor suggests a positive impact on overall energy and enthusiasm. Further investigation into the specific components of forest therapy sessions contributing to heightened vigor is warranted. Analyzing activities, natural elements, or participant interactions can provide a nuanced understanding, informing the design of more targeted interventions.

The effect of forest therapy on the mood states of young adults in Ulaanbaatar

3. It's worth noting that neither experiment revealed changes in the fatigue-inertia scale, despite measurements taken right after the long walk in forest, which might have played a role in causing momentarily fatigue. Despite the forest walk, the lack of change in fatigue warrants closer examination. Future studies should explore contributing factors to post-forest walk fatigue, considering variables such as physical exertion, psychological factors, or other elements that may influence fatigue levels. This investigation can refine our understanding of the complex interplay between forest exposure and fatigue.
4. The overall Total Mood Disturbance score decreased. The decrease in Total Mood Disturbance underscores the potential of forest therapy to positively impact overall mood. To ascertain the long-term effects, longitudinal studies are encouraged. Investigating whether the observed improvements are sustained over an extended period will provide crucial information for the development of effective and enduring mental health interventions.
5. The absence of statistically significant mean differences regarding the diverse experimental sites. Which is indicating that variations in the environmental conditions, such as differences in locations, weather, temperature, and forest physiognomy did not distinctly affect the participants' mood states in the present study. This suggests that the core benefits of forest therapy were not substantially influenced by these environmental variations. Future research should focus on identifying specific environmental elements contributing significantly to positive and negative mood effects. Analyzing features such as biodiversity, air quality, or visual aesthetics can uncover key components, guiding the refinement of forest therapy practices.

Findings in the present study highlight the potential of forest therapy as a positive influence on the mood states of young adults residing in Ulaanbaatar. The study advocates for integrating nature-based interventions in urban environments, especially in regions dealing with pollution-induced mental health stressors.

While further exploration is necessary, the study underscores the promising role of forest therapy in promoting psychological well-being among young adults facing environmental challenges. This emphasizes the need for continued research and the potential for implementing nature-based interventions in urban landscapes to support mental health in polluted environments.

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The effect or forest therapy on the mood states of young adults in Ulaanbaatar

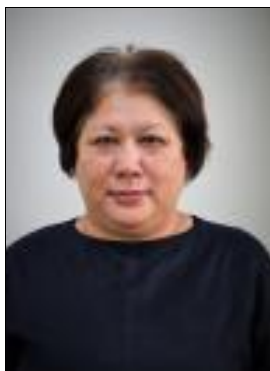
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