

# Effects of Forest Therapy using Virtual Reality on Psychological Distress : The Next Step to the Mobile Health Care System of Digital Therapeutics Device

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## Abstract

Due to COVID-19, modern people's interest in the quality of life has increased. The purpose of this study is to study the effect of forest therapy using virtual reality (VR) in general population under depression and anxiety. This review aims to expand the mental health therapy by overcoming the limitations of space based on virtual reality. A literature search was done using the Korean academic information search service, Research Information Service System, as well as Google Scholar to identify which measures were used to assess factors relating to forest therapy on depression. In addition, this review aims to discuss the advantages and disadvantages of forest therapy via virtual reality in the field of depression. In the era of the fourth industrial revolution, research should be actively conducted to increase the use of mobile networks and healthcare by incorporating the emergence of various modern technologies such as augmented reality (AR), 3D industry, and virtual reality. More research should be preceded for the purpose of improving the quality of modern people in a convergent and complex direction through mobile-based mental health care management. The findings of this study can serve as a basis of introducing a mobile healthcare system to reduce depression and anxiety of modern people through forest welfare. In order to lay a foundation for adopting virtual reality, continuous research and advanced technology will be required.

## 1. Background

The coronavirus disease pandemic of 2019 (COVID-19) has impacted the lives of billions of people around the world. Due to COVID-19 pandemic's blockade and social distancing, there is a growing interest in the quality of life of modern people. According to the World Health Organization (WHO), health includes both mental and physical health, and our brains have a significant impact on both physical and mental health. By merging the rise of various new technologies into medicine, research should be actively performed to increase the usage of mobile networks and healthcare. Recently, in the case of YouTube, the number of views on natural landscapes that many people have not visited has risen dramatically. Moreover, there are existing research that support the impact of forest healing programs on depression and social anxiety.

The natural environment provides physiological and psychological benefits to individuals as well as societies as a whole [1]. However, due to rapid urbanization, an increasing number of people in industrialized societies are spending their time in environments that lack natural elements. Stressful work situations and commuting may also interfere with nature experiences, thus requiring other methods of psychological and physiological healing. Similarly, many people may lack the physical fitness of mobility to access natural areas. Therefore, it is beneficial to evaluate the efficacy of therapies that imitate natural environments using virtual reality technology.

Although awareness of the health and psychological benefits of forest healing has grown, few systematic reviews have been conducted to determine whether forest healing is effective in relieving mental diseases other than depression and stress. Because individuals living in cities are at a higher risk of long-term stress and mental health problems [2], psychological benefits of forest treatment should be validated for modern

people's health promotion and healing and put into practice in convergent medicine. Also, due to COVID-19 pandemic, while limitations were not expressly aimed at older individuals, day-to-day routines that provided socializing, such as a trip to the grocery shop, were restricted [3]. Thus, this study is required to investigate strategies to improve potential for forest health utility by overcoming space constraints based on virtual reality.

In the era of fourth industrial revolution, research should be actively carried out to enhance the use of mobile networks and healthcare by incorporating the rise of many current technologies such as augmented reality (AR), 3D industry, autonomous driving, and virtual reality (VR). Given the rising prevalence of mental illness diagnosis and disability, virtual reality has the potential to assist more people. The purpose of this study is to look into the benefits of forest healing via virtual reality in the general population of Republic of Korea.

Direct forest therapy in nature will be digitized to utilize content using Korea's forest resources, the "Forest of Healing" sites around Korea. This study aims to investigate and analyze the possibility of expanding the mental health self-management system using medical technology against the background of nature via virtual reality in Korea.



Figure 1. The Novel Approach to Forest Therapy via Virtual Reality

## 2. Methods

Recently, there has been a lot of interest in forest healing across the world. In Korea, forest cover 62.6% of total land area. According to Basic Forest Statistics Results by Korea Forest Service, Korea's forest area continues to be the fourth-largest among OECD countries, following Finland (73.7%), Sweden (68.7%) and Japan (68.4%). Due to growing interest, Korea Forest Welfare Institute ought to develop these resources through forest welfare, including forest therapy, forest education, and forest welfare research.

There are total of eight Forest of Healing sites in Korea: Sanum(Gyeonggi-do), Jansung (Jeollanam-do), Cheongtaesan (Gangwon-do), Daegwallyeong (Gangwon-do), Gapyeong (Gyeonggi-do), Minjoojisan (Chungcheongbuk-do), Jangheung (Jeollanam-do), and Seogwipo (Jeju Island). We expect to select at least three to five sites to digitalize each Forest of Healing into the virtual reality. Moreover, Figure 2 from the Korea Forest Welfare Institute's website depicts forest environmental elements such as sunlight, landscape, temperature, phytocide, food, sound, humidity, and anions. These are known to produce human effects such as improved health, comfort, and immunity improvement.



Figure 2. Forest Environmental Factors

This study expects to control some of the forest environmental components while developing forest therapy into virtual world: varied scenery of each Forest of Healing for visual action, phytocide for olfactory action, and various sound from particular Forest of Healing for auditory action.

The depressive episodes in adults will be assessed before and after the virtual reality session using K-Montgomery-Asberg Depression Rating Scale (KMADRS) as well as Patient Health Questionnaire-9 (PHQ-9) will be performed.

The Quality of Life Scale (QOLS) developed by American psychologist John Flanagan will be used to measure individual's quality of life before the start of the study and at the last visit of the study [4].

The Subjective Vitality Scale was used to assess a person's sense of energy and vitality, consists of six items scored on a 7-point Likert scale [5].

## 3. Results and Discussion

Results and data learned through literature review suggest that when the qualities of two environments are comparable, a nature walk through a virtual forest has about the similar beneficial outcomes as a walk through a real forest [6]. Also,

talking a walk in a virtual setting improved one's emotional state, and that this effect was mediated by a stronger sense of connection to nature [7]. However, we believe that additional study of virtual reality versus real world settings of utilizing Forest of Healing sites in Korea could benefit general population in Korea, through mobile-based mental health management.

The goal is to ensure that the people gain the necessary knowledge and values about forests through various forest experience activities, thereby contributing to the long-term preservation of forests, the development of the state and society, and the enhancement of the people's quality of life.

It is also considered that the physiological and psychological advantages of forest treatment should be validated for the efficacy of modern people's health promotion and healing and put into practical use in convergent medicine.

Resonating with previous studies, virtual reality nature experiences may become an appropriate compensation for those who are unable to visit real nature for any reason. For example, The COVID-19 pandemic has interrupted daily life, leaving many people in a psychological distress. People had been unable to visit or take trip due to social distancing. While it is known that nature provides comfort to enhance mental health, access to it has been limited due to the pandemic. It is necessary to take the next step to the mobile health care system using virtual reality, which may provide a safe way to interact with nature.

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