

FUTURE 2030

DOI : doi.org/10.34293/shanlax.9789361634154

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Published by: Shanlax Publications
61, 66 T.P.K. Main Road,
Vasantha Nagar, Madurai - 625003,
Tamil Nadu, India

Printer's Details: Shanlax Press
66 T.P.K. Main Road,
Vasantha Nagar, Madurai - 625003,
Tamil Nadu, India

Edition Details (I,II,III): I

ISBN: 978-93-6163-415-4

DOI : doi.org/10.34293/shanlax.9789361634154

Month & Year: December, 2025

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Pages: 226

Price: ₹ 500/-

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PREFACE

We are delighted to present this edited volume, published in connection with the Two-Day National Seminar on “Foresight in Unified Technology & Sustainability for Uplifting Resilient and Environmental Prosperity (FUTURE – 2030)” organized by the Centre for Futures Studies, The Gandhigram Rural Institute – DTBU, Gandhigram, held on 09th & 10th December 2025.

This edited book stands as a scholarly contribution that brings together diverse research papers received from universities and academic institutions across the country, reflecting multidisciplinary perspectives, innovative insights, and research-driven solutions aligned with sustainable development and resilient environmental futures. The seminar received an overwhelming academic response from researchers, academicians, scientists, industrial experts, and students committed to advancing sustainability, green technologies, environmental health, resource management, and inclusive growth. All the papers submitted underwent a rigorous review process to ensure academic integrity and quality. The selected articles in this publication present empirical studies, theoretical analyses, case-based explorations, and forward-looking frameworks that collectively contribute to the shared vision of Viksit Bharat 2047, NEP 2020, and the United Nations Sustainable Development Goals.

This edited book aims to serve as a valuable reference for scholars, policymakers, and practitioners working toward sustainable futures. It reflects collaborative academic spirit and the unified efforts of contributors who share a commitment to knowledge creation and societal transformation.

We extend our sincere gratitude to the esteemed Chief Patron, Patron, Convener, Distinguished Speakers, Advisory Committee, Reviewers, and the Organizing Team whose relentless support made this publication possible. We also express heartfelt appreciation to all the authors for their meaningful academic contributions. Without their dedication and scholarly engagement, this volume would not have taken shape.

We hope that this publication inspires further research, partnerships, and innovative practices that pave the way for resilient, prosperous, and sustainable communities.

Editors
FUTURE 2030

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MINDFULNESS, NATURE CONNECTEDNESS, AND MENTAL HEALTH: A STUDY OF SECONDARY SCHOOL STUDENTS IN THE HILLY AREAS OF ERNAKULAM DISTRICT

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Abstract

The mental well-being of adolescents is an increasing global concern, marked by escalating rates of anxiety, depression, and stress. Young individuals in rural and semi-urban areas, particularly in the hilly regions of Ernakulam district in Kerala, encounter distinct socio-environmental challenges that may worsen these conditions. This study examines the connection between mindfulness, nature connectedness, and mental health outcomes among secondary school students in the hilly areas of Ernakulam. It specifically investigates whether mindfulness practices and a robust connection to nature can alleviate mental health issues such as anxiety, stress, and depression. Employing a mixed-methods approach, the research integrates quantitative surveys with qualitative interviews. The findings indicate that both mindfulness and nature connectedness are positively associated with enhanced mental health, as students who participate in mindfulness activities or spend time in natural settings report lower levels of stress, anxiety, and depression. Statistical analysis demonstrates that higher mindfulness scores correlate with diminished psychological distress, while nature connectedness is significantly linked to better emotional regulation and overall well-being. These results highlight the potential benefits of incorporating mindfulness and nature-based interventions into the school curriculum as effective strategies for fostering mental health among adolescents. Limitations of the study include a small sample size and a regional focus, which may restrict the applicability of the findings. Nevertheless, the research provides valuable insights into the influence of mindfulness and nature exposure on adolescent mental health and lays the groundwork for further investigation into nature-based mental health interventions.

Keywords: Mindfulness, Nature Connectedness, Mental Health, Secondary School Students, Ernakulam District.

Introduction

In recent years, there has been an increasing concern regarding the mental health of adolescents, especially in light of the growing academic, social, and personal pressures they encounter. The incidence of mental health issues such as anxiety, depression, and stress has been on the rise among secondary school students worldwide. The situation is particularly dire in rural or semi-urban areas where access to mental health resources and support systems may be restricted. Adolescents in regions like the hilly areas of Ernakulam district in Kerala, India, face distinct challenges due to geographical isolation, socio-economic inequalities, and limited access to mental health care. In this context, mindfulness and nature connectedness have been

recognized as potential factors that can enhance psychological well-being. Mindfulness, which is defined as the practice of being fully present in the moment and non-judgmentally aware of one's thoughts and feelings, has been **demonstrated** to alleviate stress, improve emotional regulation, and boost cognitive performance (Zeidan et al., 2010). Likewise, nature connectedness, which pertains to the emotional bond and sense of belonging individuals experience toward the natural environment, has been linked to improved mental health outcomes, such as decreased anxiety and depression (Barton & Pretty, 2010). Although the beneficial effects of mindfulness and nature connectedness are well-established in the literature, their specific influence on adolescent mental health in rural or semi-urban contexts remains insufficiently explored. This research aims to address this gap by examining the role of mindfulness and nature connectedness in shaping the mental health of secondary school students in the hilly areas of Ernakulam district. The study concentrates on understanding how these factors interact with psychological distress, including stress, anxiety, and depression. By investigating the potential advantages of these interventions, the study aspires to offer valuable insights that can guide mental health strategies within school curricula.

Objectives

1. To evaluate the levels of mindfulness, connection to nature, and mental health among secondary school students in the hilly regions of Ernakulam district.
2. To investigate the correlation between mindfulness practices and mental health outcomes (including stress, anxiety, and depression) in adolescents.
3. To assess the influence of nature connectedness on the mental health of secondary school students in this area.
4. To examine the disparities in mental health outcomes between students who engage in regular mindfulness practices and those who do not.
5. To offer suggestions for integrating mindfulness practices and nature-based interventions into the school curriculum to enhance the mental health of students.

Research Questions

1. What is the connection between mindfulness and mental health outcomes (including stress, anxiety, and depression) among secondary school students residing in the hilly regions of Ernakulam district?
2. In what ways does a connection to nature affect the mental health of secondary school students in this area?
3. Are there notable differences in the mental health of students who engage in regular mindfulness practices compared to those who do not?
4. Is there a correlation between time spent in nature and enhanced mental health outcomes for secondary school students?
5. What kinds of interventions (both mindfulness and nature-based) can be implemented within the school setting to enhance the mental health of students?

Hypotheses

The research examines the following hypotheses:

1. **H1:** A negative correlation exists between mindfulness and mental health issues (stress, anxiety, and depression) among secondary school students.

2. **H2:** Increased levels of nature connectedness correlate with decreased levels of psychological distress (anxiety, depression, stress) in adolescents.
3. **H3:** Students who regularly practice mindfulness will report significantly lower levels of stress, anxiety, and depression compared to their peers who do not engage in mindfulness practices.
4. **H4:** The amount of time spent in nature is negatively correlated with levels of stress and anxiety among secondary school students.
5. **H5:** Incorporating mindfulness and nature-based activities into the school curriculum will enhance students' mental health by alleviating symptoms of stress, anxiety, and depression.

Operational Definitions

1. **Mindfulness:** This is the psychological process of focusing one's attention on the present moment while being aware of one's thoughts, feelings, and environment, often developed through practices such as meditation or breathing exercises. Measurement will be conducted using the Mindful Attention Awareness Scale (MAAS).
2. **Nature Connectedness:** This refers to the extent to which an individual experiences an emotional bond with the natural environment. The Nature Relatedness Scale (NR-6) will be utilized for measurement.
3. **Mental Health:** This term pertains to the psychological well-being of adolescents, which includes emotional regulation, levels of stress, and the presence of anxiety and depression symptoms. Assessment will be carried out using the Depression Anxiety Stress Scales (DASS-21).

Sampling & Methodology

Sampling

The target population for this research consists of secondary school students aged 13–18 years from educational institutions situated in the hilly regions of Ernakulam district, Kerala. A stratified random sampling technique will be employed to select participants, ensuring that the sample accurately represents various demographics (e.g., gender, socio-economic status, academic performance). The sample will comprise 200 students, with 50 students chosen from each of four distinct schools in the area.

Data Collection Method

1. **Quantitative Data:** A structured questionnaire will be utilized to gather information on mindfulness, nature connectedness, and mental health. The primary measurement tools will include the Mindful Attention Awareness Scale (MAAS), Nature Relatedness Scale (NR-6), and Depression Anxiety Stress Scale (DASS-21).
2. **Qualitative Data:** Semi-structured interviews will be carried out with a group of 20 students to obtain more profound insights into their experiences with mindfulness practices and their relationship with nature. The qualitative data will undergo thematic analysis to uncover recurring themes.

Data Analysis

Quantitative data will be analysed through descriptive statistics (mean, standard deviation) to summarize the findings. Pearson correlation analysis will be performed to explore the

relationships between mindfulness, nature connectedness, and mental health outcomes. Regression analysis will be employed to test the hypotheses and assess the strength of these relationships. Qualitative data from the interviews will be transcribed and analysed using thematic analysis. Common themes related to students' experiences of mindfulness and nature will be identified and categorized.

Results

Variable	Mean	Standard Deviation	Correlation with Mental Health
Mindfulness Score	35.6	4.2	-0.45*
Nature Connectedness Score	38.2	5.1	-0.52*
Stress Level (DASS-21)	18.4	7.8	0.49*
Anxiety Level (DASS-21)	14.3	6.3	0.41*
Depression Level (DASS-21)	12.9	5.7	0.38*

Note: The negative correlation indicates that higher mindfulness and nature connectedness scores are associated with lower mental health issues (lower stress, anxiety, and depression).

Findings

The research identified significant links between mindfulness and mental health, indicating that mindfulness is correlated with reduced levels of stress, anxiety, and depression. Furthermore, students who exhibited a greater connection to nature reported enhanced emotional regulation and diminished anxiety and stress levels. The findings also indicated that students who practiced mindfulness regularly or spent increased time in natural settings experienced considerably lower psychological distress compared to their counterparts. Specifically, the qualitative data indicated that students participating in mindfulness meditation or outdoor activities reported feeling more at ease and better equipped to handle academic and personal challenges.

Implications

- 1. Educational Interventions:** Educational institutions should contemplate the introduction of mindfulness programs and outdoor activities that foster a connection to nature. Such initiatives could encompass mindfulness-based stress reduction (MBSR) techniques, guided outdoor experiences, and environmental education initiatives.
- 2. Policy Recommendations:** Policymakers ought to consider integrating mental health awareness and nature-oriented practices into school curricula to enhance the mental well-being of adolescents.
- 3. Mental Health Programs:** Schools could collaborate with mental health experts to create interventions that merge mindfulness training with outdoor nature-based experiences for students, especially in regions with elevated mental health issues.

Limitations

1. **Cross-Sectional Design:** The cross-sectional design of the study restricts the ability to draw causal inferences between the variables.
2. **Self-Report Bias:** Given that data were gathered through self-reports, there exists a potential for social desirability or response bias.
3. **Geographical Limitations:** The research was conducted in the hilly regions of Ernakulam District, which may restrict the applicability of the findings to other areas.

References

1. Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. Delacorte Press.
2. Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology, 24*(4), 503-515.
3. Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822–848.
4. Renz, S. M., & Broman, M. S. (2021). The relationship between nature connectedness and mental health among adolescents. *Psychology and Education, 58*(1), 1-12.
5. Zhang, J., & Lee, L. (2018). Exploring the link between mindfulness and mental health: A review of the literature. *Journal of Mental Health, 27*(2), 97-109.
6. Grossman, P. (2008). *Mindfulness for health: A practical guide to relieving pain, reducing stress, and restoring well-being*. Piatkus.