

The Effect of Nature Connectedness on Cognitive Functions and Perceived Stress: A Gender-Based Analysis

Manya Shukla^{1,*}, Smriti Sethi²

Abstract

In today's fast-paced world, young adults face increasing cognitive demands and heightened stress levels due to academic, professional, and social pressures. At the same time, modern lifestyles have led to a decline in meaningful interactions with nature, which may impact both cognitive function and stress management. The present study, entitled "The Effect of Nature Connectedness on Cognitive Functions and Perceived Stress: A Gender-Based Analysis," aimed to explore the effects of nature connectedness on perceived stress and cognitive functions while examining gender differences. A sample of 100 participants (50 males and 50 females) completed the Nature Connectedness Scale, Perceived Stress Scale, and a cognitive function assessment. The findings revealed significant gender differences, with females reporting higher levels of nature connectedness ($M = 51.26$, $SD = 5.50$) and better cognitive functions ($M = 48.32$, $SD = 16.87$) compared to males ($M = 48.92$, $SD = 7.36$ and $M = 41.70$, $SD = 13.99$, respectively). Contrary to expectations, the relationship between nature connectedness and cognitive functions was weak and negative for both genders, reaching statistical significance only among females ($r = -.279$, $p < .05$). Additionally, a weak but significant negative correlation between nature connectedness and perceived stress was found among females ($r = -.272$, $p < .05$), while no significant relationship was observed in males. Regression analysis indicated that nature connectedness was a significant predictor of cognitive function in females ($B = -0.857$, $p = .050$, $R^2 = 0.078$) but did not predict perceived stress in either gender. These findings suggest that while females exhibit greater nature connectedness and cognitive performance, the anticipated positive relationship between nature connectedness and cognitive functions is not supported. The study highlights gender-specific patterns in how nature connectedness influences psychological outcomes and underscores the need for future research to explore additional variables and longitudinal designs to fully understand these complex relationships.

Keywords: Cognitive functions, gender differences, nature connectedness, perceived stress, psychological outcomes

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INTRODUCTION

Nature and Nature Connectedness

Nature encompasses living organisms, ecosystems, and their interactions, sustaining life and contrasting with human-made environments. Nature connectedness refers to an emotional and mental bond with the natural world [1]. This connection improves well-being, reduces stress, and enhances cognitive functions, such as attention and memory, while promoting pro-environmental behaviors [2]. Activities such as spending time outdoors and practicing mindfulness can strengthen this bond, which is crucial for personal and environmental well-being in an increasingly urbanized world.

Stress

Stress is the body's response to overwhelming demands, which activates the hypothalamic–pituitary–adrenal (HPA) axis and releases cortisol [3]. Acute stress is short-term and can enhance performance, whereas chronic stress may cause health problems such as heart disease and anxiety and the transactional model distinguishes between problem-focused coping, which addresses stressors, and emotion-focused coping, which manages emotions. Effective stress management includes exercise, mindfulness, and social support [4].

Cognition and Cognitive Functions

Cognition involves mental processes such as perception, memory, attention, and decision-making. Influenced by biological and environmental factors, these functions guide behavior and adapt over time. Key processes include attention, memory (Baddeley, 2000), and executive functioning. While cognitive decline can occur with age, activities such as mental stimulation and physical exercise can preserve cognitive health.

Correlation Between Nature Connectedness, Perceived Stress, and Cognitive Functions

Nature connectedness positively influences stress reduction and cognitive performance. For young adults facing academic stress, it enhances mindfulness and emotional regulation and reduces cortisol levels. Attention Restoration Theory suggests that nature restores mental energy and improves focus. Strengthening nature connectedness may improve mental health and cognitive abilities in young adults [5].

Theoretical Framework

This study is grounded in attention restoration theory (ART), the biophilia hypothesis, and the transactional model of stress and coping. ART suggests that natural environments help restore depleted attention and improve cognitive performance. The biophilia hypothesis posits an innate human tendency to seek connections with nature that can enhance well-being. The transactional model explains how individuals perceive and cope with stress, in which nature connectedness may act as a psychological buffer. These frameworks support the idea that nature connectedness can influence stress levels and cognitive functions, with possible gender differences in how these effects manifest.

Rationale of the Study

Young adults face increasing cognitive demands and stress due to academic and social pressures, while modern lifestyles reduce meaningful interactions with nature. Although natural environments can improve cognition and reduce stress, the role of nature connectedness in these outcomes is less well understood. This study examined how nature connectedness influences perceived stress and cognitive function in young adults. The findings may offer insights into mental health interventions, educational strategies, and lifestyle changes that enhance well-being through nature engagement.

REVIEW OF LITERATURE

Ding et al. (2025) conducted a study of 418 breast cancer patients from a tertiary oncology hospital in Beijing and explored the link between perceived stress and cognitive function. Latent profile analysis revealed two stress profiles: a 'high self-esteem—low-stress group' and a 'low sense of control—high-stress group.' Middle-aged patients (40–55 years) in the high-stress group showed poorer cognitive function, whereas older patients with strong social support were more likely to belong to the low-stress group. These findings suggest that psychosocial resources, such as social networks, may help protect against stress-related cognitive decline, particularly in middle-aged working populations.

Explored the relationship between perceived stress and brain fog, focusing on how nature connectedness and mindfulness might influence this connection. The results showed that higher stress levels were linked to increased brain fog, but feeling connected to nature helped to weaken this effect. While overall mindfulness did not directly predict or moderate brain fog, the 'Acting with Awareness'

aspect of mindfulness reduced the impact of stress on cognitive clarity. These findings suggest that both nature connectedness and mindful awareness may help protect against the mental cloudiness caused by stress [6, 7].

Wullenkord et al. (2024) conducted a study on climate anxiety based on data from 2,052 German-speaking participants and identified four groups: those severely affected by climate anxiety (8.5%), those anxious but less impacted (17.5%), those experiencing anxiety while functioning well (41%), and those without climate anxiety (33%) [8]. The findings revealed that younger individuals, men, and those with a strong connection to nature were more likely to be severely affected. This person-centered approach offers valuable insights into how nature's connectedness shapes the way people cope with climate anxiety.

Found that nature exposure positively impacts quality of life (QoL) by enhancing mental restoration, reducing stress, and fostering nature connectedness. Their study of 924 urban and rural Lithuanian residents (73.6% women; mean age 40 years) showed a direct link between nature exposure and better QoL ($\beta = 0.14$; $p < 0.001$). Nature connectedness also improved psychological ($\beta = 0.079$; $p < 0.05$) and environmental ($\beta = 0.082$; $p < 0.05$) well-being. These findings suggest that increasing access to nature and connection can enhance QoL across different living environments.

Reviewed 14 studies that investigated the effects of short-term nature exposure on students' cognitive performance across educational levels, from elementary school to university. In 12 of the 14 studies, passive exposure to green spaces for 10–90 min was associated with cognitive benefits, particularly in restoring directed attention after mental fatigue. These findings suggest that offering students breaks in green environments after mentally demanding tasks could be a cost-effective way to enhance cognitive performance [9].

Conducted A study of 1,206 young adults and found that mild to moderate stress was linked to mental health symptoms, supporting the hormesis hypothesis, suggesting that moderate stress can enhance cognition and resilience. Cognitive function partly explained the link between stress and externalizing behaviors but not internalizing behaviors. These findings suggest that moderate stress may have adaptive benefits for the organism.

Conducted a cross-sectional study of 192 nondemented older adults (aged 60–95 years) and explored the relationship between perceived stress, Mediterranean diet adherence, and cognitive function. Higher perceived stress was linked to poorer executive functioning ($B = 1.75$, $SE = 0.67$, $p = 0.009$), but only in those with low adherence to the mediterranean diet. This association was not observed at moderate or high diet adherence levels. Perceived stress did not affect episodic memory, regardless of the diet. These findings suggest that following a Mediterranean diet may help protect executive functioning from the negative effects of stress.

Conducted a study of 429 elderly patients undergoing elective, noncardiac surgery and found that neuroticism strongly predicted depression, although this effect weakened after adjusting for other factors [2]. Perceived stress and cognitive function partially mediated this association, with stress having a stronger influence. The model explained 67% of the variance, emphasizing the key role of stress and cognition in the neuroticism-depression relationship [10].

METHODOLOGY

Aim

This study aimed to explore how nature connectedness impacts perceived stress and cognitive function in young adults.

Objectives

1. To study the gender differences between males and females in terms of nature connectedness, perceived stress, and cognitive functions.

2. To study the relationship between nature connectedness and cognitive functions among males and females.
3. To study the relationship between nature connectedness and perceived stress among males and females.
4. To study nature connectedness as a predictor of cognitive functions and perceived stress.

Hypotheses

- *H1*: There will be a significant gender difference between males and females in terms of nature connectedness, perceived stress, and cognitive function.
- *H2*: There will be a significant positive relationship between nature connectedness and cognitive function in men and women.
- *H3*: There will be a significant negative relationship between nature connectedness and perceived stress in both males and females.
- *H4*: Nature connectedness significantly predicts cognitive function and perceived stress among males and females.

Research Design

A research design is a structured plan that guides the research process while controlling variables to ensure validity. This study used an explanatory design to formulate hypotheses, followed by descriptive and correlational designs to investigate the research questions. An exploratory design was used to review the literature, identify research gaps, and develop hypotheses for empirical testing.

Variables

1. Independent variable—Nature connectedness.
2. Dependent variable—Perceived stress and cognitive functions.

Sample and its Selection

Twenty research papers and literature reviews that studied nature connectedness, perceived stress, and cognitive functions over the last decade were studied, and eight were shortlisted. Connectedness to nature scale (CNS). The perceived stress scale (PSS) and cognitive functions assessment by Broadbent et al. (1982) were printed out and filled out by 100 participants (50 females and 50 males).

Inclusion Criteria

The study will include young adults aged 17–28 years who are enrolled in an academic institution or engaged in professional work. Participants must be language proficient, have some exposure to nature (direct or indirect), and provide informed consent to participate.

Exclusion Criteria

The study will exclude individuals outside the age range of 18–30 years, those lacking language proficiency, those with minimal nature exposure, and anyone unwilling to provide informed consent or complete the study procedures.

Description of the Tool Employed

The CNS is a 14-item measure that assesses emotional and cognitive bonds with nature, with high reliability ($\alpha = 0.79$ – 0.90) and strong validity. The PSS measures how unpredictable and overwhelming life feels, with the 10-item version (PSS-10) showing high reliability ($\alpha = 0.74$ – 0.91) and predicting psychological distress. The cognitive assessment questionnaire (CAQ) evaluates attention, memory, and executive functioning, with tools such as the cognitive failures questionnaire (CFQ) showing high reliability ($\alpha = 0.75$ – 0.95) and strong validity. These measures reliably assess nature connectedness, perceived stress, and cognitive function.

Procedure

Ethics approval was obtained, and informed consent was obtained before data collection. Data were gathered through an online survey (Google Forms) shared via social media, e-mail, and other platforms.

Participants completed a demographic questionnaire, followed by three standardized measures: the CNS, the perceived stress scale (PSS-10), and a CAQ assessing attention, memory, and executive functioning. Statistical analyses were performed to examine correlations, mediating effects, and group differences to explore whether higher nature connectedness was linked to lower stress and better cognitive function in young adults.

RESULT

The independent samples *t*-test (Tables 1–6) shows that females scored significantly higher than males in cognitive functions ($t = 2.316, p < 0.05$) and perceived stress ($t = 4.355, p < 0.05$). Correlation analysis revealed a significant negative relationship between nature connectedness and both perceived stress ($r = -0.272, p < 0.05$) and cognitive functions ($r = -0.279, p < 0.05$) for females, but no significant correlations for males. Regression analysis (Figure 1–4) indicated that nature connectedness explained 3.9% of the variance in perceived stress and cognitive function, although the predictive power was weak ($R^2 = 0.039$). These results suggest stronger associations between nature connectedness, stress, and female cognition.

Correlation Between Nature Connectedness and Perceived Stress Among Females and Males

This section examines gender-specific patterns in the relationship between nature connectedness and perceived stress, highlighting variations in stress perception and coping strategies between females and males.

Correlation Between Nature Connectedness and Cognitive Functions Among Females and Males

This section analyzes gender-based differences in the relationship between nature connectedness and cognitive function, highlighting how this association varies between females and males.

Table 1. Independent samples *t*-test comparing males and females on cognitive function, nature connectedness, and perceived stress.

	Mean		SD		t-value	Sig
	Males	Females	Males	Females		
Cognitive functions	41.70	48.32	13.99	16.87	2.316	-0.427
Nature connectedness	48.92	51.26	7.36	5.50	1.801	-0.360
Perceived stress	18.94	24.44	6.04	6.58	4.355	-0.871

Table 2. Correlation between nature connectedness and perceived stress of females.

Females	Nature connectedness	Perceived stress
Nature connectedness	1	-.272
Perceived stress	-.272	1

*Correlation is significant at the 0.05 level.

Table 3. Correlation between nature connectedness and perceived stress of males.

Males	Nature connectedness	Perceived stress
Nature connectedness	1	.113
Perceived stress	.113	1

*Correlation is not statistically significant at the 0.05 level.

Table 4. Correlation between nature connectedness and cognitive functions of females.

Females	Nature connectedness	Cognitive functions
Nature connectedness	1	-.279*
Cognitive functions	-.279*	1

*Correlation is negatively significant at the 0.05 level

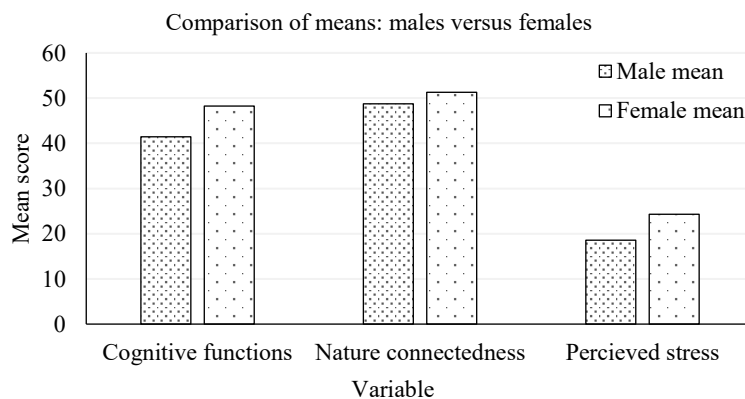
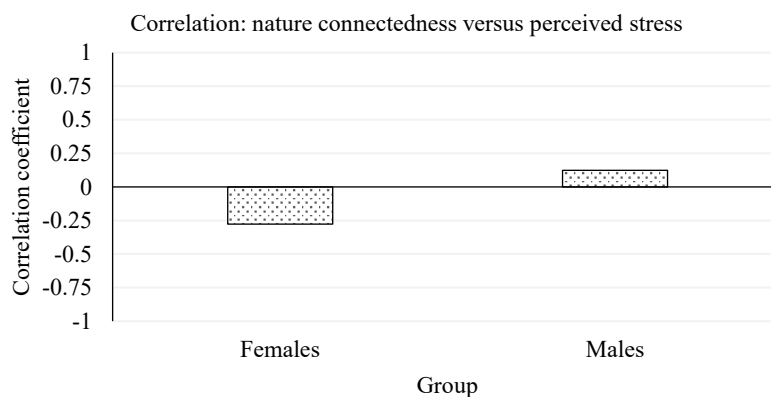
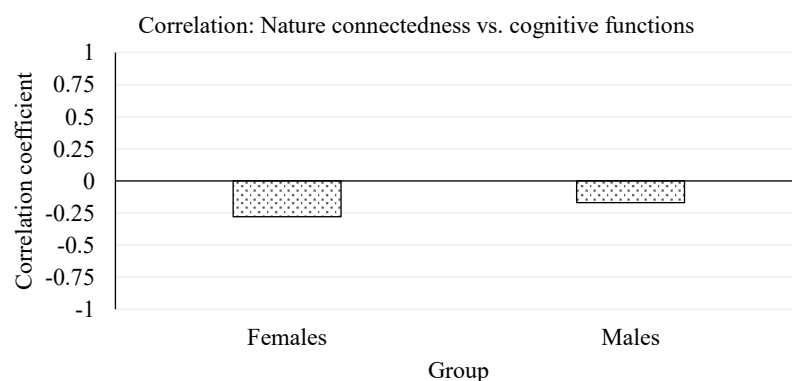
Table 5. Correlation between nature connectedness and cognitive functions of males.

Males	Nature connectedness	Cognitive functions
Nature connectedness	1	-.176
Cognitive functions	-.176	1

*Correlation is not significant at the 0.05 level.

Table 6. Regression analysis between nature connectedness, perceived stress and cognitive function among young adults (females and males).

Model	R	R square	Adjusted R square
1	.198a	.039	.019

**Figure 1.** Comparison of mean scores for cognitive functions, nature connectedness, and perceived stress between males and females.**Figure 2.** Correlation between nature connectedness and perceived stress.**Figure 3.** Correlation between nature connectedness and cognitive function.

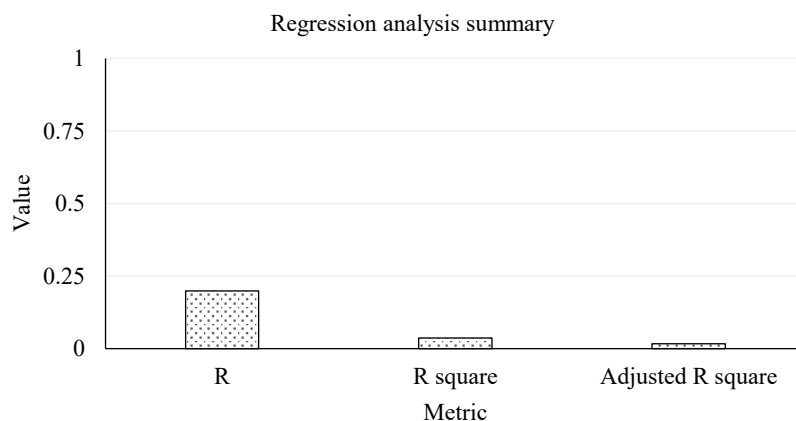


Figure 4. Graphical representation of regression analysis between nature connectedness, perceived stress, and cognitive function among young adults (females and males).

DISCUSSION

This study explored the relationships between nature connectedness, perceived stress, and cognitive function across genders and revealed notable differences. Females scored higher on both nature connectedness ($M = 51.26$, $SD = 5.50$) and cognitive function ($M = 48.32$, $SD = 16.87$) than males ($M = 48.92$, $SD = 7.36$; $M = 41.70$, $SD = 13.99$, respectively), with a statistically significant difference in cognitive function ($p = .023$). However, no significant gender differences were observed in perceived stress, suggesting that both genders experience similar stress levels despite differences in cognitive performance and nature connectedness.

The connection between nature connectedness and cognitive function was generally weak and negative for both men and women, suggesting that feeling more connected to nature was associated with a slight decrease in cognitive performance. Additionally, for females, a stronger negative relationship emerged, indicating that those who felt more connected to nature also tended to experience lower levels of perceived stress ($r = -.272$, $p < .05$), suggesting that higher nature connectedness is associated with lower stress levels. However, this relationship was not significant for men, implying that the psychological benefits of nature connectedness may be more pronounced for women.

Regression analysis showed that nature connectedness only weakly predicted cognitive function and perceived stress in females, whereas it did not significantly predict these outcomes in males. These findings highlight gender differences in the influence of nature connectedness on cognitive and emotional outcomes. Females may experience stress reduction through nature connectedness, although it appears to slightly hinder cognitive performance, whereas males do not show significant effects. This emphasizes the need to consider gender-specific and contextual factors when examining the psychological impact of nature connectedness.

CONCLUSION

This study sheds light on the intricate connections between nature connectedness, perceived stress, and cognitive function, and uncovers key differences between the sexes. Women, in particular, tended to report stronger feelings of connection to nature and demonstrated higher cognitive performance and perceived stress than men, with significant gender differences observed in cognitive function and stress. While nature connectedness was weakly associated with reduced stress in females, it did not show significant effects on males, and contrary to expectations, increased nature connectedness was linked to slightly lower cognitive performance. These findings suggest that the psychological benefits of nature may vary by gender, emphasizing the need for further research to explore the underlying mechanisms and contextual factors. Understanding these dynamics can inform mental health interventions and promote nature-based strategies for reducing stress and enhancing cognitive well-being.

Limitations

1. *Self-report bias*: Reliance on self-report questionnaires may lead to response bias.
2. *Limited sample*: The focus on young adults (18–30 years) limits the generalizability to other age groups.
3. *Cross-sectional design*: The cross-sectional approach prevents establishing causal relationships.
4. *Uncontrolled variables*: Environmental and cultural factors were not controlled, affecting results.
5. *Online data collection*: The online survey may have excluded individuals with limited digital access, causing sampling bias.

Future Research Recommendations

1. *Use objective measures*: Incorporate objective cognitive tests for more accurate results.
2. *Longitudinal Studies*: Conduct long-term studies to explore changes over time.
3. *Diverse samples*: Include broader age groups and cultural backgrounds for better generalizability.
4. *Experimental designs*: Use experimental methods to test the direct effects of nature exposure.
5. *Explore moderators*: Study factors like coping strategies to explain gender differences.

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