

## **Impact of Nature Connectedness on Mental Health and Well-Being: An Interdisciplinary Study**

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**Abstract:** Background: Nature connectedness significantly impacts mental health and well-being, offering a non-pharmacological approach to help reduce symptoms of depression, anxiety, and stress. Objectives: The aim of this study was to explore the relationship between nature connectedness and mental health such as depression, anxiety, stress, well-being and emotional affects. Methods: A total of 588 participants (aged 18 years and over) were recruited from the general Saudi population to complete the Arabic version of Inclusion of Nature in Self (INS) scale, Depression Anxiety Stress Scales-21, and The Positive and Negative Affect Schedule. Results: Findings revealed that most participants reported a strong nature connectedness, with 38.1% selecting complete overlap. Moderate to strong connections were also found, while only a few reported lower connectedness. Moreover, mental health findings indicated that most participants maintain healthy psychological states, with a minority experiencing high depression, anxiety, or stress levels. Interestingly, a positive correlation between nature connectedness and psychological distress was found, suggesting that individuals with higher stress might seek nature as a coping mechanism. Furthermore, nature connectedness correlated positively with positive affect, enhancing emotional well-being but not necessarily reducing negative emotions. Furthermore, mediation analysis showed that positive affect partially mediates the relationship between nature connectedness and psychological distress, highlighting a complex interaction. Conclusion: The findings suggest that nature connectedness supports positive affect and may serve as a coping mechanism for psychological distress. However, it does not necessarily reduce negative emotions. Future research should explore its role in mental health intervention.

**Keywords:** *Nature Connectedness, Mental Health, Anxiety, Depression, Interdisciplinary Studies.*

### **1. Introduction**

Sustainable cities aim to foster a balanced relationship between human populations and their environments. This approach drives global research into mental health aspects such as depression, anxiety, stress, and overall well-being. Research has consistently demonstrated a significant link between nature connectedness and improved mental health outcomes (Martin et al., 2020). For instance, Piccininni et al. (2018) found that outdoor play and a sense of relatedness to nature predicted reductions in psychosocial symptoms, such as anxiety and mood

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disturbances, among Canadian adolescents. Similarly, Choe et al. (2020) showed that exposure to natural environments enhances the effectiveness of Mindfulness-Based Stress Reduction (MBSR) programs, leading to improved mental health, well-being, and a deeper connection with nature. Liu et al. (2022) also revealed that individuals with greater exposure to nature and stronger nature connectedness tend to exhibit better emotional states, reducing psychological distress.

Given the increasing evidence linking nature connectedness to mental health, this study investigates the relationship between nature connectedness and mental health including depression, anxiety, stress, well-being and emotional affects. Thus, this research aims to deepen our understanding of the role of nature connectedness in promoting mental health.

## 1.1. The Role of Nature Connectedness in Enhancing Mental Health

Nature connectedness, defined as an individual's subjective perception of their closeness to nature, has become an increasingly important focus in mental health research due to its influence on psychological well-being and resilience (Down et al., 2021). It includes feelings of love, a sense of belonging, and identification with the broader ecosystem (Coughlan et al., 2022).

Many existing theories concerning the effects of nature on wellbeing were originally developed several years ago. For example the biophilia hypothesis suggests that people have an innate need to affiliate with nature, and that satisfaction of this need results in well-being benefits such as improved positive affect; Stress Reduction Theory (SRT) predicts that decreased physiological and psychological stress responses result from exposure to nature and thus results in improved well-being, and Attention Restoration Theory (ART) predicts that exposure to nature helps reduce attentional fatigue thus leading to improved cognitive functioning and positive affect. (Pritchard et al., 2020).

Numerous studies have shown that nature connectedness positively impacts mental health, including reductions in depression, anxiety, stress, and improvements in overall quality of life. Piccininni et al. (2018) found that increased interaction with nature was linked to lower anxiety and depression levels among college students. Similarly, Choe et al. (2020) demonstrated that mindfulness practices conducted in natural settings led to significant improvements in mental health, such as reduced stress levels, increased emotional well-being, and enhanced mood, compared to indoor practices.

In a study conducted by Nisbet et al., (2019) investigated if mindfulness training may improve mood while exposing participants to outdoors in an urban environment. One hundred participants were randomly assigned to either an indoor, outdoor, or mindfulness-focused, 20-minute guided walk. Compared to those who walked indoors, those who went outdoors reported significantly higher levels of nature relatedness and happier emotions. Furthermore, participants who received mindfulness training outdoor reported greater awareness of their surroundings, stronger connectedness with nature, and less negative affect. However, spending time outdoors is not the only means of engaging with nature. For example, contact with nature can be categorised into incidental (such as exposure to greenspaces in one's neighbourhood), intentional (such as visits to natural areas), and indirect (such as watching nature programs on television). Consistent evidence suggests positive associations between living in areas with more natural elements (incidental contact) and various health and well-being benefits, as well as between recreational time in nature and improved health and well-being (Martin et al., 2020).

Meta-analyses and other studies further support the relationship between nature connectedness and mental health. Capaldi et al. (2014) found a positive correlation between nature connectedness and happiness, while Liu et al. (2022) showed that nature exposure and connectedness were associated with better mental well-being across urban and rural areas. Thomson and Roach (2023) emphasised that nature connectedness is linked to lower depression, anxiety, and stress, regardless of environmental or demographic factors.

Recognising the role of nature connectedness in mental health and well-being presents an opportunity to explore its full potential, moving beyond current knowledge gaps to develop effective interventions for improving mental health outcome.

### **1.2. Significance of study**

The importance of this interdisciplinary study lies in clarifying the relationship between psychology and environmental science by exploring human-nature connectedness and its impact on mental health, thereby contributing to a better understanding of how the surrounding natural environment influences psychological well-being. This study also enriches scientific research in the field of psychology by providing an interpretation of the complex and reciprocal relationship between the human mental health and the natural environment. Moreover, it opens avenues for developing new strategies aimed at enhancing connection with nature and increasing feelings of well-being and positive affect. This, in turn, highlights the importance of adopting a holistic approach in healthcare that considers the direct impact of the natural environment on mental health and well-being.

### **1.3. Current study**

The present study aims to examine the relationship between nature connectedness and mental health, including depression, anxiety, stress, well-being and emotional affects. It also seeks to identify specific factors that may mediate or moderate this relationship, such as frequency of nature exposure and engagement in nature-based activities. Therefore, this research aims to deepen our understanding of the impact of nature connectedness on mental health and well-being.

## **2. Main Study**

### **2.1. Materials and Methods**

#### **2.1.1 Participants**

A total of 588 participants (female n = 299, male n = 289) were included in this study. The majority (65%) were aged between 18 and 24 years, followed by 62 participants aged 25–34 years. Seventeen percent were between 35 and 54 years old (n = 100), and 7% were 55 years and older (n = 40). Regarding marital status, 67% identified as single, 27.6% as married, 4.8% as divorced or separated, and 0.7% as widowed. Educationally, 66.3% held university degrees and 19.7% had postgraduate education, while the remaining had lower educational levels, including primary education (0.3%), high school (11.2%), and diplomas (2.4%). Employment status revealed that 66.7% were students, 19.4% were employed, 9.5% were unemployed, and 4.4% were retirees. Concerning engagement with natural settings, 58.5% participated occasionally, 25.5% weekly, 14.3% monthly, and 1.7% daily. Lastly, 87.8% reported that interacting with natural environments significantly reduced stress, while 12.2% did not find such interactions beneficial. Furthermore, a majority 97.3% agreed that elements like greenery,

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sea waves, and sunsets contribute significantly to their sense of comfort and relaxation, whereas only 2.7% disagreed.

## 2.1.2. Measures

### 2.1.2.1. Nature Connectedness

*Inclusion of Nature in Self* (INS) scale developed by Schultz's (2002).

The scale is a widely used as a measure of an individual's sense of connection and relatedness to the natural environment. It is a single-item, pictorial measure of an individual's sense of connection and relatedness to the natural environment. It consists of a series of Venn diagrams depicting varying degrees of overlap between the self and nature. To answer the INS scale, participants choose the visual diagram that best corresponds to their own relationship with nature, with higher scores indicating a stronger subjective connection. The scale has been empirically validated and shown to have similar psychometric properties to the original INS scale. Specifically, it demonstrates good convergent validity with other measures of nature relatedness, such as the Nature Relatedness Scale (NR) (Kleespies et al., 2021).

### 2.1.2.2. Depression, Anxiety, and Stress:

*Depression Anxiety Stress Scales-21* (DASS-21) developed by Lovibond & Lovibond (1995).

The scale is self-report questionnaire designed to measure the severity of a range of symptoms common to depression, anxiety and stress. It is a widely used instrument to assess the negative emotional states of depression, anxiety and stress in both clinical and non-clinical populations. It can be used for screening, assessment, and monitoring of these mental health dimensions. The DASS-21 consists of 21 items, with 7 items dedicated to each of the 3 subscales: depression, anxiety, and stress. Respondents rate each item on a 4-point Likert scale from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time), based on their experiences over the past week. The total possible scores range from: 0 – 42 for each of the three subscales; Depression, Anxiety, and stress. These scores are then classified into severity levels: (Normal, Mild, Moderate, Severe, Extremely Severe). The scale has demonstrated good psychometric properties, with high internal consistency reliability for all subscales. It has also shown good convergent and discriminant validity when compared to other measures of depression, anxiety and stress. Cronbach's alpha for the current study was .949, indicating excellent internal consistency.

### 2.1.2.3. Well-Being Measurement

*The Positive and Negative Affect Schedule* (PANAS) developed by Watson, Clark, & Tellegen (1988). It is a widely used self-report questionnaire that measures two distinct dimensions of mood and emotion: positive affect (PA) and negative affect (NA). It is used for assessing current mood states and can be adapted to different time frames (e.g. right now, today, past week, past month, general). The PANAS consists of 20 items, with 10 items assessing positive affect and 10 items assessing negative affect. Respondents rate each item on a 5-point Likert scale from 1 (very slightly or not at all) to 5 (extremely), based on how much they have felt that way over a specified time. The PANAS has demonstrated good psychometric properties in both clinical and non-clinical samples (Heubeck & Wilkinson, 2019). In the current study Cronbach's alpha was .796, indicated a good level of reliability.

### 2.1.3. Procedure

The study sample included individuals from Saudi Arabia aged between 18 and 70 years. The survey was done online using Google Forms, and the link was shared via social media to reach a diverse group of participants in terms of age, education, marital status, and interests. Participation was completely voluntary, with all participants providing consent before taking part in the study. Also, they have the right to withdraw from participating at any time. Participants were also informed that they could withdraw from participating at any time. Their answers were kept anonymous and used only for research purposes.

## 3. Analysis and Results

### 3.1. Descriptive analysis:

The Modified Inclusion of Nature in Self (INS) scale measures participants' connection with nature through seven images showing varying levels of integration. More than a third of the participants (38.1%) selected the seventh image, indicating a strong connection to nature, followed by the fifth (18.7%) and fourth (17.3%) images. Only a small percentage chose the first (2.7%), second (5.1%), and third (7.8%) images, which indicate lower connection levels. Overall, the results suggest that most participants feel moderately to strongly connected with nature (see Table 1).

**Table 1**

*Descriptive analysis for The Modified Inclusion of Nature in Self (INS)*

You have seven different images in front of you. Please choose the best image that describes your relationship and connection with the natural environment		Frequency	Percent
First Picture		16	2.7
Second Picture		30	5.1
Third Picture		46	7.8
Fourth Picture		102	17.3
Fifth Picture		110	18.7
Sixth Picture		60	10.2
Seventh Picture		224	38.1
Total		588	100.0

With regard to the Depression, Anxiety, and Stress Scale (DASS-21), the findings (Table 2) show high levels of distress among participants, with mean scores of 45.70 for depression, 45.19 for anxiety, and 43.21 for stress. The considerable variability, indicated by standard deviations of 9.894 for depression, 9.195 for anxiety, and 9.680 for stress, reflects diverse experiences within the group. Notably, 17.3% of participants scored 56 or higher in the depression category, indicating a significant prevalence of severe psychological distress. Similar trends were found in the anxiety and stress sub-dimensions, with some respondents reporting levels indicating mental discomfort.

**Table 2**

*Descriptive analysis for DASS-21 Scale*

Sub-Dimensions	Mean	Std. Deviation
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Depression	45.70	9.894
Anxiety	45.19	9.195
Stress	43.21	9.680

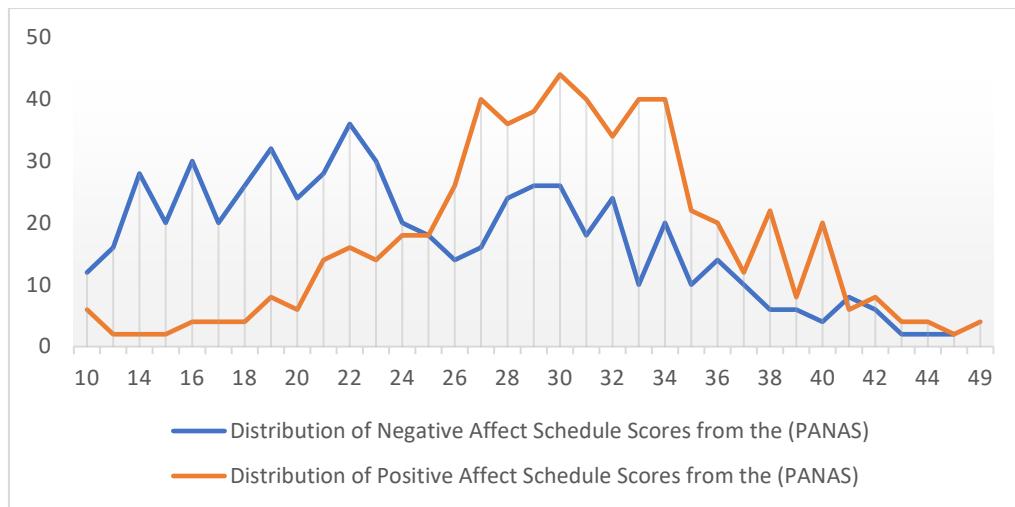
Regarding Positive and Negative Affect (PANAS), findings reveal significant insights into the emotional well-being of the respondents. The mean score for Positive Affect (30.20) indicates a moderately positive emotional state among participants, while the mean score for Negative Affect (22.58) suggests a lower level of negative emotions. The standard deviations for both dimensions—6.519 for Positive Affect and 7.868 for Negative Affect—indicate a reasonable variability in responses (Table 3). This variability suggests that while many individuals report positive emotional experiences, there is a noteworthy range of experiences, with some participants experiencing higher levels of negative emotions.

**Table 3**  
*Descriptive analysis for PANAS Scale*

Sub-Dimensions	Mean	Std. Deviation
Positive Affect Schedule	30.20	6.519
Negative Affect Schedule	22.58	7.868

The frequency distributions further illuminate the emotional landscape of the respondents (Figure 1). For Positive Affect, the highest frequencies occur around scores of 26 to 35, indicating that a substantial portion of individuals experience a moderate to high level of positive emotions. Conversely, the Negative Affect distribution shows a more pronounced clustering around lower scores, with fewer respondents reporting high levels of negative affect. The implications of these findings are significant. The relatively high Positive Affect scores suggest that many individuals are experiencing positive emotional states, which can be beneficial for overall mental health and well-being. However, the presence of negative affect, even at lower mean levels, underscores the importance of continued mental health support and interventions.

**Figure 1**  
*Comparative Distribution of Positive and Negative Affect Scores from the PANAS*



### 3.2. Correlation analysis:

A Pearson correlation analysis was conducted to examine the relationships between the Modified Inclusion of Nature in Self (INS) Scale, the Depression, Anxiety, and Stress Scale (DASS-21), and the Positive and Negative Affect Schedule (PANAS). The following table (Table 4) shows the results:

**Table 4**

*Correlations between the Modified Inclusion of Nature in Self (INS) Scale, Depression, Anxiety and Stress Scale (DASS-21), and Positive and Negative Affect Schedule (PANAS)*

		INS	DASS-21	PANAS
INS	Pearson Correlation	-	<b>.106**</b>	<b>.089*</b>
	Sig. (2-tailed)	-	.010	.032
	N	-	588	588
DASS-21	Pearson Correlation	<b>.106**</b>	-	<b>-.544**</b>
	Sig. (2-tailed)	.010	-	.000
	N	588	-	588
PANAS	Pearson Correlation	<b>.089*</b>	<b>-.544**</b>	-
	Sig. (2-tailed)	.032	.000	-
	N	588	588	-

\*Correlation is significant at the 0.05 level (2-tailed).

\*\*Correlation is significant at the 0.01 level (2-tailed).

The results show a small but statistically significant positive correlation between INS and DASS-21 ( $r = 0.106$ ,  $p = 0.010$ ), suggesting that a greater sense of inclusion of nature is slightly associated with higher levels of depression, anxiety, and stress. Moreover, a small but significant positive correlation was found between INS and PANAS ( $r = 0.089$ ,  $p = 0.032$ ), indicating that feeling more connected to nature is related to increased positive affect. Furthermore, a moderate negative correlation was found between DASS-21 and PANAS ( $r = -$

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0.544,  $p < 0.001$ ), indicating that higher levels of depression, anxiety, and stress are significantly associated with lower positive affect.

### 3.3. Regression analysis:

#### 3.3.1. DASS-21 (Depression subscale) Score

The regression analysis examined the relationship between the Modified Inclusion of Nature in Self (INS) Scale and the DASS-21 (depression sub-dimension). The results (Table 5) indicated that the INS scale is a significant predictor of depression scores, with an overall model fit of  $F(1, 586) = 9.173$ ,  $p = 0.003$ , demonstrating a statistically significant relationship. The model's  $R^2$  value of 0.015 suggests that approximately 1.5% of the variance in depression scores can be explained by the INS scale, implying that while the effect is small, it is significant.

The coefficient for the INS scale was 0.717 ( $p = 0.003$ ), indicating that for each one-unit increase in the INS score, depression scores increase by approximately 0.717 units (Table 5). This finding suggests that participants with a stronger sense of connection to nature tend to report slightly higher levels of depression. While this may initially seem unusual, it highlights the complex nature of how individuals' relationships with their environment may influence mental health.

**Table 5**

*Regression analysis of INS scale and DASS-21 scores (depression sub-scale)*

Predictor	B	Std. Error	Beta	t	p
Constant	41.922	1.312		31.961	<0.001
INS Scale	0.717	0.237	0.124	3.029	0.003

With regard to the DASS-21 (anxiety sub-scale), the results revealed a statistically significant relationship ( $F(1, 586) = 3.997$ ,  $p = 0.046$ ), indicating that the INS scale is a predictor of anxiety scores. The model's  $R^2$  value of 0.007 suggests that approximately 0.7% of the variance in anxiety scores can be explained by the INS scale, showing a small effect. The coefficient for the INS scale was 0.442 ( $p = 0.046$ ), meaning that for each one-unit increase in the INS score, anxiety scores increase by approximately 0.442 units. Although the effect size is relatively small, these findings suggest that a stronger connection to nature is associated with slightly higher anxiety levels (Table 6).

**Table 6**

*Regression analysis of INS scale and DASS-21 scores (anxiety sub-scale)*

Predictor	B	Std. Error	Beta	t	p
Constant	42.862	1.224		35.007	<0.001
INS Scale	0.442	0.221	0.082	1.999	0.046

Moreover, the results of DASS-21 (stress subscale) indicated a statistically significant relationship ( $F(1, 586) = 4.586$ ,  $p = 0.033$ ), suggesting that the INS scale is a predictor of stress scores. The model's  $R^2$  value of 0.008 implies that approximately 0.8% of the variance in stress scores can be explained by the INS scale, reflecting a small effect. The coefficient for the INS

scale was **0.498** ( $p = 0.033$ ), indicating that for each one-unit increase in the INS score, stress scores increase by approximately 0.498 units (Table 7). Although the effect size is small, this finding suggests that individuals with a stronger connection to nature may experience slightly higher stress levels.

**Table 7**

*Regression analysis of INS scale and DASS-21 scores (stress sub-scale)*

Predictor	B	Std. Error	Beta	t	p
Constant	40.587	1.288		31.504	<0.001
INS Scale	0.498	0.232	0.088	2.141	0.033

### 3.3.2. PANAS - Positive Affect

A linear regression analysis was conducted to examine the relationship between the Modified Inclusion of Nature in Self (INS) Scale and PANAS (positive affect sub-scale). The results indicated a statistically significant relationship ( $F(1, 586) = 26.138$ ,  $p < 0.001$ ), suggesting that the INS scale is a significant predictor of positive affect. The model's  $R^2$  value of **0.043** implies that approximately 4.3% of the variance in positive affect can be explained by the INS scale, indicating a small but meaningful effect. The coefficient for the INS scale was **0.786** ( $p < 0.001$ ), suggesting that for each one-unit increase in the INS score, positive affect increases by approximately 0.786 units (Table 8).

This finding highlights an association between greater connectedness to nature and increased positive affect. Despite the modest effect size, these results emphasise the potential benefits of nature connectedness in enhancing positive emotional experiences.

**Table 8**

*Regression Analysis of INS Scale and PANAS (Positive affect sub-scale)*

Predictor	B	Std. Error	Beta	t	p
Constant	26.060	0.852		30.581	<0.001
INS Scale	0.786	0.154	0.207	5.113	<0.001

On the other hand, results of the PANAS (negative affect sub-scale) indicated that the INS scale did not significantly predict negative affect ( $F(1, 586) = 1.801$ ,  $p = 0.180$ ). The  $R^2$  value of **0.003** suggests that approximately 0.3% of the variance in negative affect can be explained by the INS scale, reflecting a very small and statistically insignificant effect. The coefficient for the INS scale was **-0.254** ( $p = 0.180$ ), indicating that for each one-unit increase in the INS score, negative affect decreases by about 0.254 units, but this association is not statistically significant (Table 9). These findings imply that a stronger connection to nature does not have a meaningful impact on negative affect levels. This highlights the complexity of emotional responses and suggests that other factors may play a more significant role in influencing negative affect.

**Table 9**

*Regression Analysis of INS Scale and PANAS (Negative affect sub-scale)*

Predictor	B	Std. Error	Beta	t	p
INS Scale	-0.254	0.154	-0.165	-1.637	0.180

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Constant	23.928	1.050	22.798	<0.001
INS Scale	-0.254	0.189	-0.055	-1.342

### **3.4. Mediation Analysis**

Furthermore, the mediation analysis was conducted to explore the complex relationships between the Nature Connectedness Scale (INS), the DASS-21, and the PANAS Schedule. The analysis focused on assessing the direct and indirect effects of nature connectedness on psychological distress, with PANAS acting as a mediator.

**Table 10**

*Regression Analysis of PANAS on Nature Connectedness*

Variable	Coefficient (B)	Standard Error (SE)	t-value	p-value	95% Confidence Interval (LLCI - ULCI)
Constant	2.4994	0.0684	36.54	0.0000	2.3651 - 2.6338
INS	0.0266	0.0123	2.15	0.0316	0.0024 - 0.0508

The findings reveal a statistically significant positive relationship between the INS scale and PANAS (**B = 0.0266, p = 0.0316**). This suggests that higher levels of nature inclusion are associated with increased positive affect, as measured by PANAS. The model summary showed an **R<sup>2</sup>** value of **0.0079**, indicating that only about 0.79% of the variance in positive affect could be explained by the INS scale, signifying a small effect size (Table 10). However, despite the modest magnitude, the effect is significant, underscoring that fostering a stronger connection to nature can positively impact affective well-being.

**Table 11**

*Regression Analysis of DASS on INS and PANAS*

Variable	Coefficient (B)	Standard Error (SE)	t-value	p-value	95% Confidence Interval (LLCI - ULCI)
Constant	4.7100	0.1270	37.07	0.0000	4.4605 - 4.9596
INS	0.0578	0.0127	4.55	0.0000	0.0328 - 0.0827
PANAS_SF	-0.6902	0.0424	-16.29	0.0000	-0.7734 - -0.6069

The second model examined the direct effects of both INS and PANAS on the DASS scores, which measure depression, anxiety, and stress. The results indicate a significant negative association between PANAS and DASS scores (**B = -0.6902, p < 0.0001**), suggesting that increased positive affect is strongly related to reduced psychological distress, encompassing depression, anxiety, and stress. This demonstrates the protective role that positive emotions can play in protecting against mental health challenges. Additionally, the direct effect of INS on DASS was also found to be significant (**B = 0.0578, p < 0.0001**), suggesting that a stronger inclusion of nature is directly associated with higher levels of psychological distress. These

findings imply a dual effect, where nature inclusion may have both beneficial and complex impacts on mental health. The  $R^2$  value of **0.3198** in this model suggests that about 32% of the variance in DASS scores is explained by INS and PANAS together, which indicates a relatively strong combined effect of these predictors on psychological distress (see Table 11).

**Table 12***Direct and Indirect Effects of INS on DASS-21*

Effect Type	Effect	Standard Error (SE)	t-value	p-value	95% Confidence Interval (BootLLCI - BootULCI)
Direct Effect (INS → DASS)	0.0578	0.0127	4.55	0.0000	0.0328 - 0.0827
Indirect Effect (INS → PANAS → DASS)	-0.0184	0.0089	-	-	-0.0356 - -0.0007

As seen in Table 12, the direct effect of INS on DASS was found to be significant (**B = 0.0578, p < 0.0001**), indicating that nature inclusion has a direct influence on psychological distress. However, the indirect effect of INS on DASS, mediated through PANAS, approached significance but did not conclusively establish mediation (**Effect = -0.0184, BootLLCI = -0.0356, BootULCI = -0.0007**). This suggests that while positive affect partially mediates the relationship between nature inclusion and psychological distress, the mediation effect is relatively weak and requires further examination. The negative indirect effect suggests that greater nature inclusion may reduce distress through its effect on enhancing positive emotions, though the mediation is not strong enough to explain the entire relationship.

#### 4. Discussion

The results of nature connectedness indicate that most participants perceive a strong connection to nature, with slightly more than a third (38.1%) selecting the seventh image (i.e. Complete overlap and interconnectedness). Followed by 36% selecting images that represent moderate to strong bonds with nature. Only a small proportion chose images indicating lower connectedness suggesting that some individuals may face barriers to nature engagement. The strong feeling towards complete integration with nature reflects the findings of Holt et al., (2019) & Kleespies et al. (2021), which emphasise the importance of measuring connections to nature. This assessment highlights the role of emotional ties in enhancing psychological health, highlighting the significance of a strong connection with nature. Moreover, these findings highlight opportunities for interventions aimed at increasing nature connectedness, especially for those less integrated with nature.

Regarding the participants mental health, the findings showed that the majority of participants maintain a relatively healthy psychological state. However, only 17.3% of participants reported higher levels of psychological distress. This result, in general, is consistent with several studies (e.g. Gawrych, 2024; Chang et al., 2024; Liu et al., 2022) that reported the importance of nature connectedness in lowering depression, anxiety and stress levels, and highlighting the importance of regular visits to public green spaces.

Moreover, findings of correlation analysis provide valuable insights into the complex relationship between nature connectedness, mental health, and affect. In more details, a positive correlation between nature connectedness and psychological distress (depression, anxiety, and stress) was found, which is inconsistent with previous research suggested that nature connectedness is associated with improved mental health outcomes (Capaldi et al., 2014; Pritchard et al., 2020). This may give an indication that while individuals feel connected to nature, other contextual factors, such as life events or personal circumstances, may contribute to high levels of psychological distress. Other possible explanation may be that individuals with higher levels of stress are more likely to seek out nature as a coping mechanism to reduce stress and anxiety and enhance overall well-being. Our results also revealed a positive correlation between nature connectedness and positive affect. This generally aligns with previous studies (e.g. McMahan & Estes, 2015; Samus et al., 2020; Sobko & Brown, 2021), which reported that feeling connected to nature can enhance

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individual's emotional state positivity. However, despite many participants experiencing positive emotions, negative emotions still existed, suggesting a complex emotional pattern where positive affect may coexist with high distress. This coexistence may reflect an adaptive coping strategy, where participants attempt to maintain positive emotional states despite underlying distress. Moreover, high distress levels may be an indication of the presence of other stressors, such as urbanisation, limited green spaces, issues with air pollution, extreme summer heat, or maybe a reduced awareness, among some individuals, of the mental health benefits associated with nature connectedness.

Furthermore, our results reveal that nature connectedness was found to be a significant predictor of depression, anxiety, and stress scores. While these relationships were statistically significant, the effect sizes were quite small. This suggests that while there is a relationship between nature connectedness and these mental health indicators, the influence is relatively minor. Another critical aspect to consider is the potential bidirectional nature of the relationship between nature connectedness and mental health. It is possible that individuals experiencing higher levels of depression, anxiety, or stress may turn to nature as a coping mechanism, thereby reporting higher levels of connectedness. This could partially explain the observed positive association between nature connectedness and distress (Berto, 2014; Gawrych, 2024; Jimenez et al., 2021).

Moreover, our findings align with the broader literature suggesting that nature connectedness can enhance positive emotional experiences, supporting the results of previous studies reported that engaging with nature can contribute to emotional well-being (e.g. Iqbal & Mansell, 2021; Martin et al. 2020; and Nisbet et al., 2020). However, it has been noticed in our findings that nature connectedness alone is not a strong predictor of positive affect. This may indicate that while being connected to nature can enhance positive feelings, other factors, such as personal circumstances, social support, and environmental conditions, may play a critical role in shaping individuals' emotional well-being.

Conversely, findings of negative affect suggest that a stronger connection to nature does not meaningfully reduce negative affect, thus highlighting the complexity of emotional responses to nature. In more detail, it is possible that while nature connectedness can enhance positive emotions, it may not be sufficient to reduce negative emotions, which could be more influenced by other stressors or individual psychological factors. This consequently highlights the important role of nature connectedness in emotional well-being.

Furthermore, findings of mediation analysis showed that positive affect partially mediates the relationship between nature connectedness and psychological distress. Although this indirect effect was significant, it was not strong enough to fully explain the relationship between nature connectedness and psychological distress. The negative indirect effect suggests that greater nature connectedness may reduce distress by enhancing positive emotions, but the weak mediation effect indicates that this pathway is not sufficient on its own. This also stresses on the complex and multifaceted relationship between nature connectedness, emotional well-being, and psychological distress.

## 5. Conclusion and future directions

In conclusion, nature connectedness plays a complex role in supporting mental health, highlighting its importance but also its limitations. While it has the potential to enhance emotional well-being, it may not be sufficient alone to reduce psychological distress. This underscores the need to consider individual differences and contextual factors that influence how nature impacts mental health. Future research should focus on understanding the underlying mechanisms that mediate the relationship between nature connectedness and emotional well-being. It is also essential to explore how specific contextual factors, such as urbanization, environmental conditions, and individual life circumstances, may moderate these effects. Additionally, targeted interventions should be designed to promote nature engagement, especially for individuals facing barriers to accessing natural environments, to maximize the therapeutic benefits of nature connectedness. A deeper exploration of these dynamics will help develop effective ways to benefit from nature in improving mental health outcomes.

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## أثر التواصل مع البيئة الطبيعية على الصحة النفسية والرفاهية: دراسة بيئية

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المستخلص:

يؤثر الارتباط بالطبيعة بشكل كبير على الصحة العقلية والرفاهية، مما يوفر نهجاً غير دوائي للمساعدة في تقليل أعراض الاكتئاب والقلق والتوتر. هدفت هذه الدراسة إلى استكشاف العلاقة بين التواصل مع الطبيعة وتأثيره على الصحة النفسية مثل الاكتئاب والقلق والتوتر والرفاهية والتأثيرات العاطفية. تم جمع ٥٨٨ مشاركاً (بلغ أعمارهم ١٨ عاماً فأكثر) من عامة سكان المملكة العربية السعودية لاستكمال النسخة العربية من مقياس إدراجه الطبيعة في الذات (INS)، ومقاييس الاكتئاب والقلق والضغط النفسي (DASS-21) والتأثير الإيجابي والسلبي (PANAS). أظهرت النتائج أن معظم المشاركين يشعرون بارتباط قوي بالطبيعة، حيث اختار ٣٨,١٪ منهم التواصل الكامل مع البيئة الطبيعية، بالإضافة إلى وجود ارتباطات متوسطة إلى قوية في أغلب أفراد العينة، في حين أن عدد قليل فقط من المشاركين أشاروا إلى انخفاض ارتباطهم بالطبيعة. علاوة على ذلك، أشارت النتائج إلى أن معظم المشاركين يتمتعون بصحة نفسية جيدة، مع معاناة أقلية من المشاركين من مستويات عالية من الاكتئاب أو القلق أو الضغط النفسي. ومن المثير للاهتمام أنه تم العثور على علاقة إيجابية بين التواصل مع البيئة الطبيعية والضيق النفسي، مما يشير إلى أن الأفراد الذين يعانون من ضغوط أعلى قد يبحثون عن الطبيعة كآلية للتكيف. إضافة إلى ذلك، أشارت النتائج أيضاً إلى وجود علاقة إيجابية بين التواصل مع البيئة الطبيعية والمشاعر الإيجابية، مما يعزز الرفاهية العاطفية، ولكن ليس بالضرورة تقليل المشاعر السلبية. كذلك أظهر تحليل التوسيط أن التأثير الإيجابي يتوازن جزئياً في العلاقة بين التواصل مع البيئة الطبيعية والشعور بالضيق النفسي، مما يسلط الضوء على التفاعل المعقّد بين هذه المتغيرات. تشير النتائج إلى أن التواصل مع البيئة الطبيعية يدعم التأثير الإيجابي وقد يعمل كآلية للتكيف مع الصعوبات النفسية. ومع ذلك، فإنه لا يقل بالضرورة من المشاعر السلبية. يمكن للبحوث المستقبلية استكشاف دوره في علاجات الصحة النفسية.

**الكلمات المفتاحية:** التواصل مع البيئة الطبيعية، الصحة النفسية، القلق، الاكتئاب، الدراسات البيئية.