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Nature Tourism and Mental Well-Being: Insights from a Controlled Context on Reducing Depression, Anxiety, and Stress

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Abstract: Recent studies have underscored the importance of tourism in enhancing individuals' mental well-being through engagement with nature. This article examines the impact of nature-based tourism on alleviating symptoms of depression, anxiety, and stress among a group of 67 university students who exhibited extremely severe levels of these disorders. Participants were assessed both before and after a nature tourism experience in the Tinajillas Río Gualaceño Protected Forest, Ecuador. Mental health changes were evaluated using the DASS-21 scale, with assessments conducted pre- and post-activity, revealing significant reductions in depression, anxiety, and stress levels, with large and clinically relevant effect sizes. However, a 6-month follow-up indicated that these long-term benefits diminished and no longer held clinical significance, suggesting the need for more frequent interventions to sustain positive effects. This study concludes that nature-based tourism serves as an effective non-pharmacological intervention for improving mental well-being in the short term, although its sustainability requires continuous interaction with nature. These findings provide empirical support for nature-based tourism as a mental health strategy and highlight the importance of integrating it into public health policies and tourism management strategies.

Keywords: nature-based tourism; mental well-being; depression; anxiety; stress; sustainable mental health



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1. Introduction

The impact of globalisation and technological advancements, combined with contemporary challenges such as urban stress and global health crises, has deepened the disconnection between people and nature [1]. This separation not only alters the human relationship with the natural environment but also significantly contributes to the deterioration of mental health, manifesting in rising levels of disorders such as depression, anxiety, and stress [2]. The COVID-19 pandemic provided an exceptional context for exploring how nature-based activities can influence mental well-being, particularly during a period characterised by restrictions that exacerbated stress and anxiety levels [1,3–6]. During times of social crisis, the value attributed to natural spaces tends to increase [1]. This dynamic enabled this study to assess the impact of interventions in an extreme scenario where the need for emotional support was at its peak [7].

Simultaneously, the pandemic profoundly affected global tourism, halting its development in many countries [8]. Nevertheless, engagement with nature through various forms of tourism emerged as a key factor in revitalising the sector. However, this recovery also raised concerns about the irreversible degradation of natural resources, often sacrificed in favour of economic gains [9].

Studies on tourism-related well-being [8,10–15] primarily focus on how travel experiences contribute to physical, mental, and emotional health, fostering the growth of a wellness-oriented tourism market segment [11]. However, before fully harnessing this potential, it is essential to determine whether nature-based tourism experiences can specifically impact mental health disorders such as depression, anxiety, and stress, particularly in global crisis contexts.

In this regard, university students represented an ideal group for analysing how nature-based activities can serve as an effective intervention in extreme circumstances. The COVID-19 pandemic exacerbated common stressors, such as academic demands, by shifting learning to a virtual environment. This shift introduced new challenges, including social isolation, technological limitations, and economic uncertainty, significantly increasing stress, anxiety, and depression levels within an already vulnerable population.

Given the challenges of involving tourists in studies of this nature, as they prioritise enjoying their travel experiences, an alternative approach was adopted to ensure the study's feasibility. A group of individuals with suitable characteristics for the required controlled context was identified, allowing for a systematic investigation of the intervention's effects on mental health.

This study contributes to the growing body of research that identifies tourism as a therapeutic tool [16], highlighting the role of social interactions and connections with nature in promoting psychological well-being [17]. It advances the literature by examining how structured tourism experiences can alleviate symptoms of mental disorders [17]. Furthermore, this study enhances understanding of how nature-based interventions can be applied in critical contexts such as the COVID-19 pandemic. Additionally, it recognises the potential of tourism to reduce the social and economic costs associated with poor mental health, thereby supporting the achievement of the Sustainable Development Goals (SDGs), particularly SDG 3, which aims to improve global health and well-being [18].

The hypothesis suggests that nature-based tourism experiences in a controlled setting involving individuals diagnosed with severe or extremely severe levels of depression, anxiety, and stress can significantly alleviate these conditions, improving mental well-being even months later. This study aims to evaluate how a structured nature-based tourism experience can reduce severe and extreme levels of depression, anxiety, and stress immediately after the experience and six months later.

2. Literature Review

2.1. Nature Tourism and Mental Well-Being

Chang and his colleagues [17] argue that the human desire to interact with nature has been extensively examined in various academic fields, such as gardening, pet ownership, and nature-based therapy [19–21]. However, tourism studies have not explored this relationship with the same breadth [22]. Rather than addressing the full spectrum of ways individuals engage with nature through tourism activities, research has often focused on narrower perspectives, such as immediate experiences in nature-based tourism (e.g., hiking or visiting national parks). This suggests that tourism studies could benefit from a more holistic approach, incorporating deeper elements of the human desire to connect with nature, as seen in other areas of research [17,23]

Tourism has the capacity to produce moderate to high well-being effects in tourists [24]. Indeed, nature tourism is characterised by interaction with unaltered or minimally impacted environments, where the primary motivation of visitors is the observation and appreciation of nature and cultural manifestations [7,25]. This typology promotes various modalities of tourism activities, such as rural tourism, agritourism, wellness tourism, adventure tourism, health tourism, and ecotourism, among others [26]. In any modality of nature tourism, the motivation of visitors is crucial, as the satisfaction derived from their experiences is intrinsically linked to the alignment of these with their prior expectations [25,27]. A variable that influences the perception of risk and safety is distance [28]. This factor is critical in individuals' decision-making processes when planning trips, as people tend to select destinations that appear safe and promise relaxing and comforting experiences [29,30]. Indeed, nature tourism can be undertaken both in proximity to one's residence, allowing for frequent visits, as well as in distant destinations, which may be visited only once in a lifetime.

Chang and his colleagues [17] recognise the potential of tourism to alleviate the social and economic burdens of poor mental health, contributing to the achievement of the Sustainable Development Goals (SDGs), particularly SDG 3, which seeks to enhance global health and well-being [18]. The World Health Organization in 2022 [24] asserted that mental well-being is essential for overall health, encompassing emotional, psychological, and social balance, thereby facilitating resilience in the face of challenges, personal development, work efficacy, and community contributions. Mental well-being not only signifies the absence of mental disorders but also denotes a dynamic internal equilibrium that must be cultivated. This is key to managing stress, adapting to change, and maintaining a positive outlook [7,14,27].

Authors [28] emphasise the importance of connection and engagement with nature in promoting mental health. This connection is evidenced by studies reporting significant emotional benefits and stress recovery in nature tourists [31]. Several authors corroborate that proximity to natural environments reduces stress, depression, and anxiety, thereby enhancing overall well-being [29,30,32]. Recently, a key aspect has been the COVID-19 pandemic, which modified travel motivations, underscoring the need to address individuals' sociopsychological aspects such as socialisation, reflection, and relaxation [32]. This highlights that travel is crucial for physical and mental well-being, as well as personal growth [30,31,33,34]. This underscores the profound connection between mental well-being and context, highlighting its relevance in tourism destination management. Nature tourism spaces acted as "mental sanctuaries", allowing individuals to temporarily escape from the stress associated with the pandemic [35].

Studies examining the relationship between tourism and mental well-being underscore the significance of recreational activities and contact with nature in enhancing mental health [31,36,37]. Seervi, in 2023 [37], suggested that nature tourism promotes well-being sustainably. Authors [33] highlight the importance of these natural environments for mental well-being, stressing the need to integrate environmental conservation into public health policies. Ke et al. [38] point out the significance of sustainable practices in managing ecosystems such as mangroves, indicating a link between conservation and mental health. Clissold et al. [13] found encouraging results regarding the restorative effects of nature. For instance, ecotourism promotes significant physical benefits, including stress reduction and maintenance of normal blood pressure and heart rate [34], emphasising the relevance of incorporating natural elements and nature tourism into public and personal health strategies. There is indeed a consensus regarding the positive impact of tourism, particularly nature tourism, on physical, mental, and social well-being, making it essential for public health [39]. The role of tourism in mental health and community well-being is linked

to emotional solidarity because it fosters meaningful connections between people, both visitors and residents, through shared experiences that generate empathy, mutual support, and a sense of collective belonging [40].

2.2. Nature-Based Tourism as a Strategy for Alleviating Stress, Anxiety, and Depression

The interaction of humans with nature and its influence on mental well-being has been extensively documented in the scientific literature. Buckley and Cooper [12] argue that mental health benefits arise from factors such as the destinations visited, activities undertaken, personal traits of tourists, and sensory, emotional, and experiential aspects, which enhance the intensity and persistence of positive memories. Research [11] illustrates that excursions in national parks contribute to an immediate improvement in happiness and a medium-term alleviation of stress, although long-term effects require further study. In 2017, authors [41] contended that interaction with natural environments is significant for health and well-being, particularly in reducing anxiety and depression. Suárez Bata [42] argues that tourism can serve as an effective adjunct in the treatment of depression by providing experiences that persist beyond the tourist visit, highlighting the importance of nature for emotional and mental recovery.

Authors [43] demonstrated that ecotherapy, through activities in nature—such as healing forests—was an intervention to alleviate conditions of depression, anxiety, and stress. The results during the treatment suggest that such forests can be an effective strategy for mitigating stress. This provided important data for policy formulation and the future development of “Healing Forest Ecotherapy”. A study was conducted about the effectiveness of forest bathing in improving mental well-being among adolescents, a group affected by an escalating mental health crisis, including anxiety and depression [44]. Employing a participatory action research method with 24 young people aged 16 to 18 over 3 weeks, the findings, assessed using the Warwick–Edinburgh Mental Well-Being Scale, revealed a significant increase in mental well-being, with moderate to high effects. Participants reported reduced stress and an increase in sensations of relaxation, peace, and happiness.

A study examined the effects of personalised forest walks, utilising an algorithm that considers variables such as age, usual physical activity, fatigue level, and chronic illnesses to design tailored exercise programmes for 59 subjects [45]. The results revealed significant improvements in physical and mental health, including reductions in blood pressure, body fat percentage, negative perceptions, and emotional exhaustion, demonstrating that forest walks benefit both physical and psychological health.

Marselle et al. [46] explored the therapeutic potential of group walks in natural settings to enhance resilience and mitigate the impacts of stress on mental health. Through multiple regression analysis, considering variables such as age, gender, and recent physical activity, it was evidenced that the benefits of these activities outweigh the adverse effects of stress in areas such as depression, positive affect, and mental well-being. These findings indicate that group walks in nature are highly beneficial for mental health and stress resilience.

2.3. Assessing Depression, Anxiety, and Stress Through the DASS-21 Instrument

Depression, anxiety, and stress constitute a triad of mental health disorders with significant prevalence and a marked impact on overall well-being. Depression is characterised by a persistent feeling of sadness and loss of interest or pleasure in normally enjoyable activities [47], affecting over 300 million people and ranking among the top five disorders causing disability. Its symptoms include constant sadness, sleep and appetite disturbances, and fatigue. It presents a prevalence of up to 18% in developed countries, being more common in women and primarily affecting young adults [48].

Anxiety, on the other hand, manifests through intense feelings of nervousness and fear, significantly impacting social, occupational, and personal functioning [49]. It can provoke physical and cognitive symptoms such as restlessness, irritability, fatigue, difficulty concentrating, increased heart rate, and chest and abdominal pain [50]. With a global prevalence of 7.3% and an increased risk in women, it is the most common mental disorder.

Stress, described as a disruption in normal physiological or psychological functioning, arises when personal resources are insufficient to meet the demands and pressures of the environment [51]. Initially considered in physical terms, its understanding was broadened by Walter Cannon (1939) and Hans Selye (1983), who identified the physiological fight-or-flight responses and a range of symptoms predisposing individuals to various illnesses, affecting quality of life and health.

In the recent literature concerning the evaluation of mental well-being, the DASS-21 scales have been recognised as a significant tool within the field of psychology. The Depression, Anxiety, and Stress Scales (DASS) were developed by Lovibond and Lovibond (1995) to “assess the presence of negative effects of depression and anxiety and achieve maximum discrimination between these conditions, whose clinical overlap has been reported by clinicians and researchers” [52]. Originally, these scales consisted of 42 items, which were subsequently condensed to a short version comprising 21 items [53]. Chauhan et al. [54] demonstrated their utility in monitoring the mental health of employees in the tourism industry, correlating it with levels of happiness and life satisfaction. They recommended the application of tools such as the WHO-5 Well-Being Index and the DASS-21 scale. A study underscores the importance of the DASS-21 scale, revealing that the factors assessed by this instrument have a significant correlation with mental well-being, reinforcing its relevance as a reliable and predictive measurement tool for researchers and professionals of mental health [55]. Also, a study highlights [56] changes in mental well-being during the pandemic, suggesting the relevance of the DASS-21 in capturing variations in psychological states during times of crisis.

Vujcic et al. [57] utilised the DASS-21 to assess the prevalence of these psychiatric disorders within a sample of students. Despite the limitation posed by a small sample size, the results indicate a notable relationship between sociodemographic variables and levels of stress, anxiety, and depression. This study underscores the utility of the DASS-21 as an effective instrument for identifying and addressing mental health issues in university populations. Septaviani et al. [43] employed the DASS-42 scale, an extended version of the DASS-21, to measure stress, anxiety, and depression among university students participating in ecotherapy. Trevino et al. [58] modified the DASS-21 instrument by incorporating the Academic Stress Scale (DASA) within a sample of students. Collectively, these studies consolidate the position of the DASS-21 as a cornerstone in the assessment and monitoring of psychological well-being.

The pandemic restrictions increased levels of stress, anxiety, and depression [59]. The pandemic limited contact with nature, adversely affecting mental health and transforming tourism [60,61]. Factors such as urban environments, fear of contagion, and the digitalisation of daily life contributed to psychological and physical disorders, particularly impacting young individuals due to restrictions on socialisation, which is crucial for their emotional development [62]. Indeed, outdoor activities during the pandemic provided a means of recovery for the tourism industry without the constraints of social distancing [32]. In light of the increase in post-pandemic mental health issues, nature tourism emerges as an essential tool for recovery, offering benefits such as stress reduction and mood enhancement [14,63]. Indeed, it was vital to foster relationships between tourists and nature to alleviate the risk of diminished well-being caused by social isolation due to factors such as quarantine measures [17].

2.4. Designing Nature-Based Tourism Experiences as Psychological Therapy

Non-pharmacological interventions are gaining recognition in mental health, particularly for treating anxiety, stress, and depression [64,65]. Nature-based tourism serves as an effective strategy for individuals with emotional disorders, provided it is carefully designed, taking into account key factors such as the environment, duration of the trip, and tourism services.

The selection of the environment is crucial in tourism experiences for individuals with high levels of stress, anxiety, and depression. It is fundamental to prioritise safety, accessibility, and landscape diversity, fostering a disconnection from everyday stress. Rural areas, national parks, and nature reserves, characterised by soothing sounds and rich biodiversity, promote psychological well-being. Spaces that combine forests, mountains, and bodies of water are particularly effective in reducing stress. Furthermore, accessibility, appropriate infrastructure, and quality of air free from pollutants are essential for enhancing the mental well-being of participants.

The distance to the tourist destination is critical for participants' experiences, as long journeys can exacerbate stress and anxiety. It is advisable to limit travel to 1–3 h, as this reduces fatigue and facilitates a swift immersion into nature, maximising therapeutic benefits. Shorter distances also encourage frequent repetition of these experiences, creating cumulative effects on mental well-being and simplifying logistics, thereby reducing organisational burdens. Furthermore, the duration of the trip should balance exposure to nature with necessary time for rest and recovery, with a recommended duration of 3 to 7 h to allow for effective immersion without leading to exhaustion. The first hour is particularly pivotal, enabling a gradual transition from the everyday environment to a therapeutic setting through mindfulness techniques or conscious breathing.

Transportation to and from the destination should be comfortable, direct, and free from prolonged interruptions or unnecessary transfers that could heighten anxiety. Private transport is ideal, as it provides a more controlled and relaxing environment; thus, training transportation staff to manage anxiety-inducing situations is essential for ensuring participants' well-being. The guide's role in nature tours for individuals with high stress, anxiety, and depression is also crucial, requiring training in both the natural environment and stress management techniques. Guided activities should be conducted at a leisurely pace, allowing for moments of silence and mindfulness practices that help participants focus on the sensory stimuli of their surroundings. Additionally, food offerings in tourism experiences should enhance physical and emotional well-being by providing fresh, local, seasonal, and preferably organic foods rich in key nutrients for mental health. Meals should be served in tranquil settings, ideally outdoors, to improve digestion and reduce stress, while mindful eating can further contribute to relaxation and overall well-being. A well-designed tourism experience generates significant and emotional memories that can be relived and reinterpreted over time, prolonging their effects on psychological well-being [66,67]. Situations beyond control, such as weather (rain), could influence perceptions, memory construction, and the overall enjoyment of the tourism experience [68], either positively or negatively.

2.5. Tourism Experience Setting: Tinajillas Río Gualaceño Municipal Conservation Area

The Tinajillas Río Gualaceño area (Figure 1), situated approximately 55 km from the city of Cuenca, encompasses 31,959.35 hectares. Located in the Ecuadorian Amazon within the Indanza Parish, Limón Indanza Canton, in the Morona Santiago Province, it extends over an additional area of 32,183.00 hectares. This region is distinguished by its ecological significance, primarily for the conservation of biological, scenic, genetic, and cultural resources, as well as essential natural assets such as soil, water, and climate. Recognised as an area with potential social opportunities for the sustainable and human development

of its inhabitants, it plays a critical role in conserving the natural forest and preserving water resources.

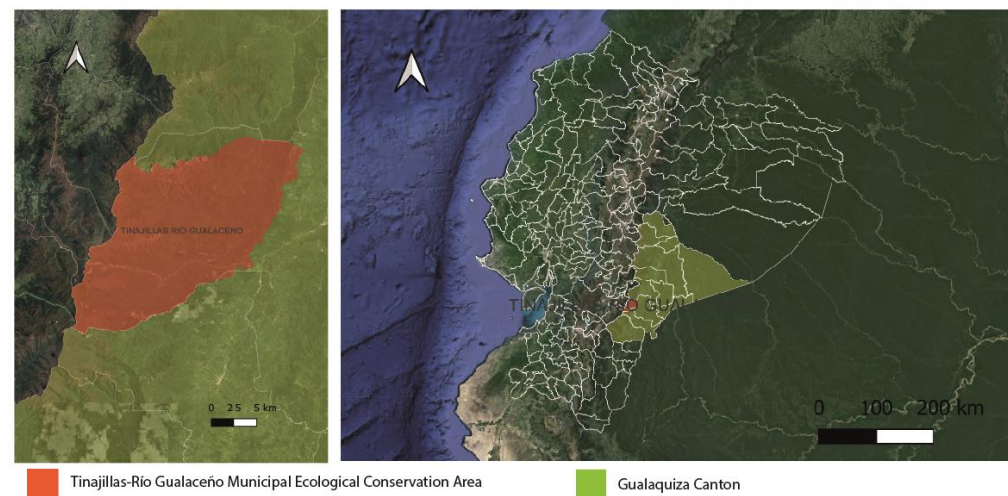


Figure 1. Location of Tinajillas Río Gualaceño (left) experiences during this study (right).

The management of this protected area is a shared responsibility between the National Environmental Authority, the Ministry of Environment, and the Municipal Government of Limón Indanza. One of its key functions includes supplying potable water to various communities and conserving the flora and fauna, which remain protected as long as the natural forest exists.

To safeguard the existing natural forest and the water resources it supports, it is imperative to prevent the uncontrolled exploitation of desirable timber species by industry and to curb the indiscriminate hunting of wildlife, which is often traded on international markets. Such activities have historically led to the extinction of valuable flora and fauna species in other regions. The area features an easily accessible tourist trail that lasts approximately one hour, offering visitors stunning natural scenery and an insight into the region's robust ecological framework.

3. Methodology

This study employed a quantitative descriptive approach using the DASS-21 test [58] administered at three different time points. This type of analysis provides valuable data to enhance the understanding of how nature-based tourism experiences can impact mental well-being, enabling the characterisation of a complex phenomenon within a specific group under exceptional circumstances. Furthermore, it lays the foundation for future research that may incorporate more sophisticated analytical approaches or causal models. The researchers used a criterion-based sampling method, focusing on the presence of severe and extremely severe levels in at least one dimension of the emotional disorders under study.

This study was part of a project approved by the Research Bioethics Committee in the Health Area of the University of Cuenca (COBIAS) in compliance with the regulations of the Ministry of Public Health of Ecuador. Once the project's ethics protocol was approved, the research team, composed of professionals in tourism and clinical psychology, established contact with the student welfare departments of the participating higher education institutions. In the extreme context of the COVID-19 pandemic, marked by lockdown measures, any contact with nature could reveal positive effects on mental well-being. However, this study, conducted at three time points—during the direct influence of lockdown and in the post-lockdown period—enabled a comprehensive evaluation of the impact of nature-based

tourism. As tourists were not included in the sample due to their focus on enjoying their trips and reluctance to participate in research, a voluntary sample of scholarship university students from two institutions was selected. These participants were diagnosed with severe and extremely severe levels of the emotional disorders examined in this study. Although this sample is not representative of the tourist population or the general public, this study provides preliminary evidence in a controlled context, laying the groundwork for future research involving more diverse and representative populations.

The research team obtained authorisation to work with scholarship students from both universities, comprising 289 students from the University of Cuenca and 218 from the University of Azuay. Participation in this study was entirely voluntary, with invitations sent via email. An online informational meeting was subsequently conducted through Zoom to outline the project's objectives, scope, and requirements, as well as the informed consent process. Detailed information, including the informed consent form, was sent to the students, who signed it to confirm their understanding and acceptance of the study terms.

Of the 507 scholarship students invited from two local universities in Cuenca, Ecuador, 214 voluntarily completed the DASS-21 test between February and April 2022. From this group, 97 students were identified as having severe or extremely severe levels of depression, anxiety, or stress. However, only 67 students chose to proceed voluntarily with this study. At the first time point, the DASS-21 self-report (depression, anxiety, and stress) was administered to the 67 participants prior to the nature-based tourism experience. The second time point involved re-administering the DASS-21 test after the participants had completed the nature-based tourism intervention designed for those with severe mental health symptoms (see Section 2.4). Cohen's *d* effect size was subsequently calculated to assess whether the experience could serve as an effective non-pharmacological treatment for the studied disorders. The third time point occurred 6 months after the tourism experience, during which the DASS-21 test was administered again to evaluate the stability and effect size of the results. A total of 57 of the 67 students freely and voluntarily participated in this follow-up assessment (see Table 1).

Table 1. Participant selection and study process based on DASS-21 application.

Steps	Number of Participants	Participation Criteria
Step 1	507	Scholarship students from two universities
Step 2	214	Students voluntarily complete the DASS-21 self-report
Step 3	97	Students diagnosed with severe or extremely severe emotional disorders
Step 4	67	Students with severe or extremely severe emotional disorders agree to participate in the structured tourism experience *
Step 5	67	Students with severe or extremely severe emotional disorders complete the DASS-21 self-report after the structured tourism experience *
Step 6	57	Students with severe or extremely severe emotional disorders complete the DASS-21 self-report 6 months after the structured tourism experience *

Note: * Administration of DASS-21.

The decision to use online surveys was complemented by a mixed-method approach that included telephone calls to participants [69]. This method combined the efficiency and reach of digital platforms with the accessibility and personalisation of telephone contact. Telephone calls made it possible to reach individuals with limited access to the internet or technological devices, mitigating the bias of digital exclusion and increasing the representativeness of the sample. Additionally, this approach enabled real-time clarification of doubts and ensured a higher response rate, improving the quality and completeness of the data. In this way, the restrictions imposed by the COVID-19 pandemic did not compromise the diversity or integrity of the sample [70].

The data collection instrument used was the DASS-21, which consists of 21 items designed to assess levels of depression, anxiety, and stress [58,59]. The scale has demonstrated appropriate psychometric properties in Spanish-speaking samples [59]. For the Ecuadorian population, internal consistency was as follows: anxiety $\alpha = 0.79$; depression $\alpha = 0.89$; and stress $\alpha = 0.80$ (60).

The internal consistency (reliability) of the DASS-21 was assessed, with its 21 questions (7 per clinical dimension) administered to 214 participants (n). Reliability was evaluated using hierarchical omega, yielding $\Omega = 0.78$. The theoretical three-factor model (depression, anxiety, and stress) was also tested using the “DWLS” estimator (diagonally weighted least squares), with excellent results (SRMR = 0.054; RMSEA = 0.00; GFI = 0.99; NFI = 0.98; and NNFI = 0.99), confirming the multidimensionality of the instrument (Figure 1).

The study data were analysed using the Statistical Package for the Social Sciences (SPSS) version 27 (Figure 2). An exploratory descriptive analysis (EDA) was conducted, followed by paired *t*-tests to examine differences in clinical dimensions (depression, anxiety, and stress). Cohen’s *d* effect size was calculated for the first and second time points, as well as the second and third time points, following Cohen’s (1998) guidelines: small effect sizes ≈ 0.2 , medium ≈ 0.5 , and large ≈ 0.8 .

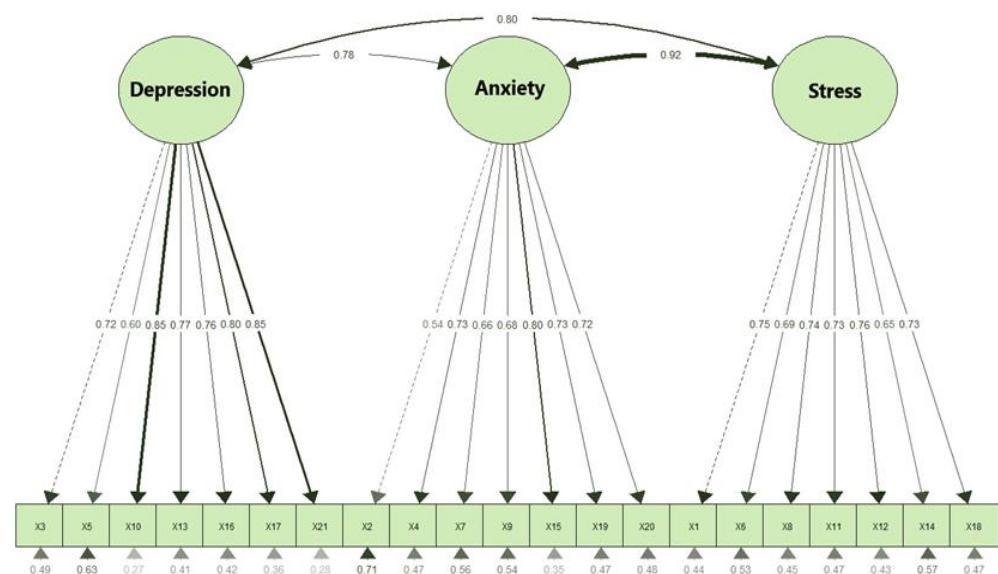


Figure 2. Theoretical model tested with three-factor CFA for the DASS-21 instrument.

4. Research Results

To evaluate the internal consistency of the DASS-21, which consists of 21 questions and 7 items for each clinical dimension, a sample of 214 participants was assessed, and reliability was estimated using the hierarchical omega coefficient. The result obtained was $\Omega = 0.78$, indicating very good reliability for the instrument. Additionally, the theoretical model of three factors (depression, anxiety, and stress) was tested using the “DWLS” (diagonally weighted least squares) estimator, resulting in the following fit indices: SRMR ≈ 0.054 ; RMSEA ≈ 0.00 ; GFI ≈ 0.99 ; NFI ≈ 0.98 ; and NNFI ≈ 0.99 . These results support the multidimensionality of the instrument and the appropriateness of the proposed measurement model.

4.1. Exploratory and Descriptive Analysis: Unveiling Key Insights

The sociodemographic data (Table 2) provide an overview of the characteristics of the students diagnosed with severe and extremely severe emotional disorders (N = 67) who

participated in the structured tourism experience. Additionally, the table includes data for students (N = 57) who completed a follow-up assessment 6 months later.

Table 2. Sociodemographic characteristics of university students assessed by the DASS-21.

Category	Students Diagnosed with Emotional Disturbance		6-Month Follow Up	
N	N = 67		N = 57	
Gender				
Male	12	17.9%	10	17.5%
Female	55	82.1%	47	82.5%
Prefer not to say	0	-	0	-
Age				
≤20 years	37	55.2%	31	54.4%
21 and 22 years	15	22.4%	17	29.8%
23 years	5	7.5%	4	7.0%
>23 years	8	11.9%	5	8.8%
Minimum value	2		2	
Maximum value	32		32	
SD	2.512		2.39	
Marital status				
Single	66	98.5%	57	100%
Married	1	1.5%	0	-
Common law	0	-	0	-
University				
University of Cuenca	50	74.6%	47	82.5%
University of Azuay	17	25.4%	10	17.5%
Medical conditions				
Yes	7	10.4%	7	12.3%
No	60	89.6%	50	87.7%
Psychological treatment				
Yes	10	14.9%	9	15.8%
No	57	85.1%	48	84.2%
Employment status				
Employed	11	16.4%	7	12.3%
Unemployed	56	83.6%	50	87.7%
COVID-19 diagnosis				
Yes	13	19.4%	19	33.3%
No	54	80.6%	38	66.7%
Medicine consumption				
Yes	5	7.5%	5	8.8%
No	62	92.5%	52	91.2%

For the group of students who participated in the structured tourism experience, the following trends are observed:

In terms of gender, the proportion of women is clearly predominant at 82.1%, while men represent 17.9%. This highlights the continued trend of a higher prevalence of depression, anxiety, and stress among women. Regarding age, the majority of participants were ≤20 years (55.2%), followed by the 21–22 years group (22.4%), and a smaller proportion aged >23 years (11.9%). The standard deviation (SD) of 2.512 indicates a slight dispersion in age, with a minimum value of 2 and a maximum of 32, confirming a predominantly young and homogeneous group.

For marital status, 98.5% of participants identified as single, with only 1.5% reporting being married. Concerning university affiliation, the University of Cuenca accounted for 74.6% of participants, while the University of Azuay represented 25.4%, reflecting a predominance of students from one institution.

In terms of medical conditions, 10.4% reported health issues, while 89.6% had no relevant medical conditions. The proportion of students receiving psychological treatment was low, at 14.9%, indicating a lack of prior therapeutic intervention. Regarding employment status, 83.6% of participants were unemployed, with only 16.4% reporting employment. For COVID-19 diagnosis, 19.4% of participants had tested positive, while 80.6% reported no diagnosis. Lastly, 7.5% reported medication use, suggesting limited reliance on pharmacological treatments at the time of the intervention.

In the column corresponding to the 6-month follow-up assessment ($N = 57$), several trends and changes emerge:

The gender distribution remains stable, with 82.5% women and 17.5% men, reflecting the continued predominance of female participation. In terms of age, participants aged ≤ 20 years account for 54.4%, while the 21–22 years and >23 years groups show slight decreases to 29.8% and 8.8%, respectively. The standard deviation (SD) decreases slightly to 2.39, with a minimum value of 2 and a maximum of 32, indicating a slight reduction in age dispersion compared to the previous measurement.

For marital status, 100% of participants identified as single, maintaining stability in this category. University participation shows an increase for the University of Cuenca, reaching 82.5%, while representation from the University of Azuay declines to 17.5%, suggesting possible attrition or a lack of follow-up among some students.

The prevalence of medical conditions remains relatively stable, with 12.3% reporting health issues and 87.7% without significant medical conditions. Notably, the proportion of students receiving psychological treatment increases slightly to 15.8%, which may reflect greater awareness of the need for emotional support following the intervention.

Regarding employment status, the unemployment rate remains high at 87.7%, while the proportion of employed participants decreases to 12.3%. For COVID-19 diagnosis, there is an increase to 33.3%, underscoring the ongoing impact of the pandemic on this vulnerable population. Finally, medication use rises slightly to 8.8%, although it remains low overall, suggesting that the structured tourism experience may have contributed to reducing reliance on pharmacological treatments. Overall, the trends observed suggest that the structured tourism experience may have positively influenced emotional well-being, contributing to a reduction in pharmacological dependency and fostering greater awareness of the need for psychological support.

4.2. Effect of Nature-Based Tourism Experiences on Depression, Anxiety, and Stress Disorders

The results in Table 3 indicate that the tourism experience had a significant and positive impact on reducing levels of depression, anxiety, and stress. All changes in pre- and post-experience means are statistically significant. The effect sizes (d) range from large to very large (1.31 to 2.06), indicating that the observed improvements in these clinical variables are both statistically and clinically meaningful.

The significant reduction in mean depression levels before and after the tourism experience, with a t -value of 10.792 and a p -value of ≤ 0.001 , demonstrates that the decrease in depression levels is statistically significant. The effect size ($d = 1.31$) suggests a large effect, indicating that the tourism experience had a substantial impact on reducing depression levels.

Similarly, the decrease in anxiety levels is also significant, with a t -value of 15.589 and a p -value of ≤ 0.001 , indicating a statistically significant reduction. The effect size ($d = 1.90$) suggests a very large effect, showing that the tourism experience had a strong impact on reducing anxiety levels.

Table 3. Mean differences in clinical variables (depression, anxiety, and stress) pre- and post-tourism experience.

Variable	Mean	N	SD	t	p	d
Pre-Experience Depression Level	24.45	67	10.542	10.792	≤ 0.001	1.31
Post-Experience Depression Level	8.45	57	8.758			
Pre-Experience Anxiety Level	26.81	67	6.392	15.589	≤ 0.001	1.90
Post-Experience Anxiety Level	8.84	57	8.062			
Pre-Experience Stress Level	29.34	67	6.452	16.888	≤ 0.001	2.06
Post-Experience Stress Level	10.39	57	8.307			

Note: M = mean; SD = standard deviation; Cohen's d = small effect size ≈ 0.20 ; moderate effect size ≈ 0.50 ; and large effect size ≈ 0.80 .

The reduction in stress levels is also significant, with a t-value of 16.888 and a p-value of ≤ 0.001 , indicating a statistically significant decrease. The effect size (d = 2.06) suggests a very large effect, highlighting that the tourism experience had a powerful impact on reducing stress levels.

4.3. Six-Month Follow-Up of the Study Group

Table 4 shows that p-values across all dimensions exceed 0.05, indicating no statistically significant differences between levels immediately after the tourism experience and 6 months later. Although effect sizes range from moderate to small, they are not considered clinically relevant. The sample consists of 57 participants, as 10 individuals opted out of the follow-up.

Table 4. Mean differences in clinical variables (depression, anxiety, and stress) pre- and post-tourism experience.

Variable	Mean	N	SD	t	p	d
Post-Experience Depression Level	9.09	57	9.150	−1.254	0.215	−0.427
Follow-Up Depression Level	10.70	57	4.547			
Post-Experience Anxiety Level	9.16	57	8.443	−1.254	0.144	−0.458
Follow-Up Anxiety Level	10.98	57	4.215			
Post-Experience Stress Level	10.77	57	8.749	−0.900	0.372	−0.379
Follow-Up Stress Level	11.84	57	4.178			

Note: M = mean; SD = standard deviation; Cohen's d = small effect size ≈ 0.20 ; moderate effect size ≈ 0.50 ; and large effect size ≈ 0.80 .

Regarding depression levels, there was an increase at the 6-month follow-up (from 9.09 to 10.70), though the t-value is not statistically significant ($p > 0.05$). Cohen's effect size (d = −0.427) indicates a moderate effect but not one that is clinically relevant. Anxiety levels also increased similarly at the 6-month follow-up. The t-value is not statistically significant ($p > 0.05$), and the effect size (d = −0.458) suggests a moderate effect, though not clinically relevant. Stress levels also rose during follow-up. The t-test is not statistically significant ($p > 0.05$), and the effect size (d = 0.379) suggests a small to moderate effect.

These results suggest that the immediate benefits gained following the tourism experience did not persist in the long term.

5. Discussion

This study demonstrates that engaging with nature through structured tourism experiences promotes mental well-being by significantly reducing levels of depression, anxiety, and stress. Statistically significant differences in these mental health parameters between

the post-tourism experience and a 6-month follow-up suggest that the immediate benefits garnered from the tourism activities were sustained over the medium term, indicating that the intervention had enduring effects, thus achieving the study's objectives.

The data robustly support the hypothesis that nature-based tourism experiences, conducted in a controlled environment with volunteer university students, substantially alleviate depression, anxiety, and stress, thereby enhancing mental well-being. The results indicate statistically significant reductions in depression ($t = 10.792, p \leq 0.001$), anxiety ($t = 15.589, p \leq 0.001$), and stress ($t = 16.888, p \leq 0.001$) following the tourism experience. The effect sizes were large for depression ($d = 1.31$) and very large for anxiety ($d = 1.90$) and stress ($d = 2.06$), suggesting a substantial impact on mental health. However, at the 6-month follow-up, p -values exceeded 0.05, indicating that the observed differences were no longer statistically significant over the long term. The effect sizes ($d = -0.379$ to -0.458) were small to moderate, suggesting that the immediate benefits diminished over time and were not clinically relevant at follow-up. Nonetheless, these findings imply that nature-based tourism experiences yield significant short-term improvements in mental well-being and, in some cases, medium-term benefits. However, sustaining these effects over the long term may require additional or more frequent interventions.

The COVID-19 pandemic added a layer of complexity to this study. On one hand, it provided a unique setting to observe how nature-based tourism experiences could impact mental health. On the other hand, pandemic-related restrictions increased levels of stress, anxiety, and depression [59]. Despite this, data from the 6-month post-tourism experience showed that the effects persisted, albeit with smaller effect sizes ($d = -0.379$ to -0.458). This highlights the physical and mental health benefits of contact with nature, as supported by various studies [11,30,34]. Our research specifically involved a structured tourism experience, which, according to several authors, when well-designed, generates significant and emotional memories that can be relived and reinterpreted over time, extending their psychological benefits [66,67].

The core finding of our study is not solely the relationship between activities in nature and mental well-being, as posited by several scholars [11,30,34]. Rather, the innovation lies in proposing tourism as a practical vehicle that integrates these benefits within a specific experiential framework, with implications for both the management of tourism territories and public health policies. The study's results can be used to advocate for the integration of nature tourism into public mental health policies. This could involve collaboration among health, tourism, and environmental ministries or departments to create programmes that utilise natural spaces as therapeutic resources [11,71].

Nature-based tourism interventions hold significant potential for integration into mental health programmes, providing an effective strategy for psychological well-being [12]. Although the pandemic introduces external factors that could influence outcomes, such as confinement and increased baseline stress [59], the design of a structured tourism experience controlled for specific variables within the controlled context with volunteer university students. Indeed, the tourism experience was significantly influential because, despite careful planning, factors such as rain and lack of mobile connectivity added an unexpected but authentic component to the interaction with nature [68]. This could influence perceptions, memory construction, and overall enjoyment of the tourism experience, which deserves further study.

The findings have applicability beyond the pandemic context, highlighting the value of nature-based tourism as a well-being tool in any situation where social contact or normal routines are restricted, such as in isolated communities, congested urban environments, or even therapies for people with limited access to natural spaces. These interventions offer an opportunity for local communities and protected areas to develop tourism products that

focus on the relationship between nature tourism and mental health [12]. In effect, host communities develop tourism experiences based on existing natural elements, avoiding the need to create artificial scenarios. This approach leverages available resources to promote the conservation of natural areas and generate sustainable livelihoods for local communities. Additionally, these experiences can provide participants with meaningful experiences that contribute to strengthening their mental health. Moreover, emotional solidarity between residents and visitors emerges when positive emotions derived from contact with nature, cultural activities, or simply enjoying a tranquil environment are shared, strengthening social bonds and community cohesion [40].

This research expands the understanding of the tourist gaze [23], moving beyond traditional interactions between tourists, providers, and hosts by exploring the potential of structured tourism as a tool for addressing emotional disorders such as depression, anxiety, and stress [17]. Indeed, our experience did not focus solely on the hedonic aspects typically associated with travel but sought to integrate immersive elements (e.g., mindfulness) specifically designed to meet participants' mental well-being needs. To fully achieve its therapeutic potential, it is essential that the organisation of such experiences rigorously considers the components of the tourism offering, adapting them to individuals' psychological requirements.

In terms of practical implications, from the perspective of local communities, our experience demonstrated an opportunity to prioritise nature conservation over investments that involve extensive modifications to the environment. Essentially, it generates a positive and transformative impact on visitors, destinations, communities, and the ecosystems involved [72]. Within the conservation area, no additional expenses or invasive interventions were undertaken; instead, existing resources such as trails, viewpoints, and handrails were utilised to ensure access without compromising the environment's integrity. Equally vital was the emphasis on the quality of key elements within the structured tourism experience (e.g., food, travel duration, disconnection from electronic devices, transportation, and mindfulness activities). Although uncontrollable factors such as rain occurred, they contributed to the authenticity of the natural experience.

Also, we believe that tourism operators and destination managers should focus on designing attractive and structured nature tourism experiences to maximise mental health benefits. This could include incorporating activities that promote conscious interaction with nature and including guides trained in mindfulness techniques and environmental therapy. Indeed, training staff and tour guides in the basic understanding of the effects of tourism on mental health could improve the quality of the experience and assist in identifying and supporting visitors who could particularly benefit from these experiences. At the destination level, tourism products specifically focused on mental health, such as wellness retreats or adventure tourism packages with psychological therapy components, can be developed [7].

The limitations of this study mainly relate to the sample used. Working exclusively with university students limits the generalisation of the results to other demographic groups. This restriction may affect the representativeness of the findings and their applicability in broader contexts. However, the use of a controlled group, such as university students, offers several advantages. Firstly, it is a relatively homogeneous population in terms of age, educational level, and certain social characteristics, which reduces variability and facilitates the interpretation of the results. Also, continuous participation of all individuals over time could not be guaranteed. This resulted in limitations both in the continuity of the tourism experiences and in the conduct of longitudinal measurements. However, this limitation opens opportunities for future research that includes more continuous

and sustained tourism interventions to explore whether the beneficial effects on mental well-being diminish over time or if there are factors that influence their maintenance.

6. Conclusions

In conclusion, this study confirms that nature-based tourism experiences have a significant impact on reducing levels of depression, anxiety, and stress, thereby promoting the mental well-being of participants in the short term. The results show immediate and statistically significant improvements following the tourism experience, with substantial effect sizes. However, at 6 months, the benefits decrease and lose statistical significance, highlighting the need for additional or repeated interventions to maintain long-term effects.

These conclusions underscore the potential of nature-based tourism as a practical and accessible tool for promoting mental health, especially in high-need contexts such as health crises or environments with limited access to natural spaces. Additionally, this approach has implications for public policy design, emphasising the importance of integrating nature tourism into mental health programmes and community development strategies.

The structured design of these experiences, based on simple activities in existing natural environments, represents an opportunity for local communities and protected areas. These initiatives can foster the conservation of natural resources, generate sustainable livelihoods, and offer participants memorable experiences that strengthen their mental health.

Nature-based tourism, when well-designed through structured experiences and centred on participants' needs, emerges as an effective tool for mental well-being and a model of responsible, sustainable tourism development that benefits individuals, local communities, and the ecosystems involved.

Finally, this study opens opportunities for future research to explore more continuous and sustained interventions, as well as their effectiveness in different demographic groups, beyond university students. This will enable the development of more inclusive and tailored strategies, expanding the applicability of the results to various social and geographic contexts.

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