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Article

Sustainable Tourist Well-Being and Travel Frequency: The Mediating Role of Perceived Stress in Nature-Based Destinations

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Abstract

Tourism is increasingly recognized as a driver of well-being and sustainability in nature-based destinations, yet the mechanisms underlying this relationship remain unclear. This study investigates how travel frequency influences tourist happiness through the mediating role of perceived stress. Data were collected from 385 visitors to Cotopaxi National Park, Ecuador, and analyzed using Structural Equation Modeling (SEM). A Confirmatory Factor Analysis validated the measurement model, followed by a mediation SEM that incorporated demographic controls (age and income). Results indicate that perceived stress exerts a strong negative effect on happiness ($\beta = -0.58$, $p < 0.001$), confirming its role as a key inhibitor of well-being. Travel frequency significantly reduces stress ($\beta = -0.36$, $p < 0.001$), while its direct effect on happiness is not significant ($\beta = 0.07$, $p > 0.05$), evidencing full mediation. These findings refine traditional assumptions that “more travel equals more happiness,” highlighting stress mitigation as the critical pathway to sustainable tourist well-being. Practical implications suggest prioritizing low-stress, high-adjustment experiences through clear signage, real-time information, and simplified booking systems. This research contributes to tourism psychology and sustainable destination management by demonstrating that happiness depends on reducing stress rather than increasing hedonic stimuli.

Keywords: sustainable tourism; nature-based destination; perceived stress; authentic happiness; travel frequency; structural equation modeling; tourist well-being; Cotopaxi; mediation analysis; resilience strategies

1. Introduction

Tourism is increasingly linked to public health and sustainability agendas as nature-based experiences can promote mental well-being; however, the conditions under which travel translates into sustained benefits remain underexplored. Recent evidence from nature tourism shows short-term reductions in depression, anxiety and perceived stress, with a call for more frequent or well-adjusted exposure to sustain effects—an issue central to SDG 3 (Health and Well-Being) and destination management [1,2]. Conceptual work in tourism also highlights the psychophysiological impacts of travel, noting that designing healthier experiences requires quantifying not only hedonic outcomes but also stress pathways that can neutralize or unlock well-being gains [3].

Beyond individual travelers, tourism's impacts on well-being are multidimensional across stakeholders and time horizons. Scoping reviews emphasize that visitors often report temporary improvements in life satisfaction, while residents may experience mixed effects (crowding vs. improved amenities), reinforcing the need for holistic and sustainable destination strategies [4]. At the traveler level, recent structural models identify that well-being is multi-dimensional

(meaningfulness, active pleasure, release) and significantly predicts satisfaction and loyalty, underlining its managerial relevance for long-term resilience of destinations [5].

Crucially, travel-related stress is the “dark side” of an experience aimed at pleasure. Qualitative and quantitative studies document logistical, service and environmental stressors, and show that coping/adjustment mediates the link between travel stress, leisure exploration and trip satisfaction—guiding managers to mitigate stressors rather than adding hedonic stimuli alone [6,7]. Moreover, frequent travelers tend to perceive lower destination risk, suggesting that experience/familiarity can act as a protective mechanism that reduces anticipated stress and improves well-being [8].

In psychology, the relationship between perceived stress and happiness is typically inverse and robust: higher stress correlates with lower happiness across contexts, supporting the view that regulating negative affect is more decisive than merely increasing positive emotions [9]. This fits tourism research calling for rigorous measurement models able to estimate how stress predicts and reduces happiness, and to test whether travel frequency supports well-being indirectly by mitigating stress.

Though less explored, the influence of income as a resource has also been identified: higher income levels enable more frequent and better-planned travel, which is associated with lower stress levels and higher subjective well-being indices, supporting resource-based models [10]. However, empirical evidence jointly articulating frequency, income, stress, and happiness through SEM remains scarce, highlighting the relevance of the present study to close this analytical gap and strengthen the empirical knowledge of well-being-oriented tourism phenomena.

The context of Cotopaxi National Park, Ecuador, provides an ideal setting to study the interrelation between stress and happiness in nature-based tourism. It offers a restorative environment, but also presents potentially stressful conditions such as altitude, variable weather, and complex logistics, which can influence the visitor experience. A study in this region showed that a single immersion in the natural environment significantly reduces levels of stress, anxiety, and depression, although these benefits tend to fade after six months without continued exposure [1]. Parallel research in Ecuador’s mountain protected areas underscores the need to strengthen safety and survival skills to protect both visitor integrity and their emotional benefits, noting that prior training can reduce incidents that interfere with well-being perception [11]. Additionally, studies on sustainable community tourism in Cotopaxi have shown that integrating visitor psychology into “mindful” routes enhance the experience, correlating with cultural strengthening and income generation, which may indirectly boost tourist well-being through resilient local environments [12]. These findings justify the selection of Cotopaxi National Park, an emerging nature destination where restorative benefits and stressors can coexist, emphasizing the need to assess emotional impact and design experiences that maximize well-being and tourism sustainability.

The present work pursues two central objectives: (1) to validate the factorial structure and reliability of the scales measuring Stress and Happiness in the tourism context through Confirmatory Factor Analysis (CFA), ensuring robust fit indices (CFI and TLI > 0.95; RMSEA < 0.06); and (2) to test a full mediation model in which Travel Frequency acts as an exogenous variable influencing Happiness solely through the mitigation of Stress. Additionally, the modulating role of key demographic variables (age, income) will be explored, integrating a multi-group approach to assess structural differences. The theoretical contribution lies in positioning Stress as a primary inhibitor of well-being and Travel Frequency as an experiential resource, thereby expanding the conceptual frameworks of positive psychology applied to tourism. From a practical perspective, the findings will guide marketing and destination management strategies toward reducing logistical friction and promoting restorative experiences, aligned with the Sustainable Development Goals (SDG 3: Health and Well-being). The study responds to the scarcity of research integrating emotional constructs into robust SEM models in emerging settings, thereby strengthening the literature on tourism and well-being.

The remainder of the article is organized into four main sections. First, the Methodology describes the study design, the sample (N = 385 tourists in Cotopaxi National Park), the instruments

used to measure Stress, Happiness, and Travel Frequency, and details the statistical procedures: Confirmatory Factor Analysis (CFA) to validate the scales and the configuration of the Structural Equation Model (SEM) to test the causal and mediated hypotheses. The second section, Results, presents the model fit indices (CFI, TLI, RMSEA, SRMR) and the estimates of direct and indirect effects, highlighting the full mediation between Travel Frequency and Happiness through Stress. The third section, Discussion, interprets the findings in relation to theory and previous studies, underlining the implications for tourism psychology and destination management. Finally, the Conclusions synthesize the theoretical and practical contributions, propose recommendations for reducing stressors in natural environments, and suggest future research lines oriented toward sustainability and traveler well-being.

2. Materials and Methods

2.1. Research Design

This study employed a quantitative, non-experimental, cross-sectional design, collecting data at a single point in time without manipulating independent variables. This design enabled the description and analysis of relationships among latent constructs—Perceived Stress, Authentic Happiness, and Travel Frequency—in a natural setting, and was suitable for estimating direct and indirect effects through Structural Equation Modeling (SEM). Although observational designs limit traditional causal inference, methodological evidence indicates that SEM can identify robust causal patterns and mediations when combined with rigorous measurement models [13]. The choice of CB-SEM (Covariance-Based SEM) added methodological rigor by simultaneously validating scales (measurement model) and estimating structural relationships, overcoming the limitations of simple correlational analyses and providing global model-fit indices (CFI, TLI, RMSEA) [14].

2.2. Setting and Context

The research was conducted in Cotopaxi National Park, located in Cotopaxi Province, approximately 50 km south of Quito, Ecuador. The park spans 33,395 hectares and features Cotopaxi Volcano (5,897 m a.s.l.), an emblematic attraction for nature and adventure tourism. Its volcanic landscape includes lava flows, ash deposits, and High-Andean lagoons, creating a restorative yet challenging environment due to altitude and extreme weather conditions (0 °C to 22 °C, average 9–11 °C) [15]. Hydrologically, the park serves as a water-collection area feeding rivers essential for irrigation and human consumption [16]. Vegetation corresponds to páramo and super-páramo ecosystems, while fauna includes 17 mammal species and 37 bird species, such as the Andean condor. In 2024, Cotopaxi recorded 311,951 visitors, evidencing its growing relevance in Ecuador's tourism offer. Data collection occurred at three strategic points—Caspi Entrance, Limpiopungo Lagoon, and José Ribas Refuge—to ensure diversity in visitor profiles and environmental conditions.

2.3. Participants and Sampling

The target population comprised national and international tourists visiting Cotopaxi National Park during the data-collection period. Due to the characteristics of the study context—an open, protected natural area with high visitor rotation—a non-probability convenience sampling strategy was employed. This approach is widely used in tourism and recreation studies conducted in situ, where random sampling is often impractical because access depends on visitor availability, time constraints, and willingness to participate [17].

The use of non-probability sampling entails a recognized limitation regarding statistical generalization to the broader tourist population. Therefore, the findings should be interpreted with caution in terms of external validity. Nevertheless, this sampling strategy enabled the collection of data during the actual tourism experience, thereby enhancing ecological validity and reducing recall bias in the assessment of perceived stress and happiness. From a theoretical standpoint, the study

prioritizes internal validity and model testing over population inference, consistent with the objectives of explanatory SEM research.

After excluding incomplete or inconsistent questionnaires, the final sample consisted of 385 participants. This sample size exceeds widely accepted minimum recommendations for structural equation modeling, which typically suggest at least 200 cases for models of moderate complexity [18]. In addition, the sample size satisfies distribution-free requirements associated with robust estimators and polychoric correlation matrices.

To further justify sample adequacy, statistical power considerations were taken into account. With a sample of 385 observations, the study achieves adequate power ($1 - \beta \geq 0.80$) to detect moderate standardized effects ($\beta \approx 0.30$) at a conventional significance level ($\alpha = 0.05$), which is the expected effect size range in psychological mediation models. This level of power is sufficient for detecting both direct and indirect effects in SEM, particularly in mediation structures involving two latent constructs.

Although probability sampling was not feasible due to contextual constraints, convenience sampling represents a pragmatic and widely accepted approach in tourism field research. Given the explanatory aim of the study, the emphasis is placed on internal validity and theoretical model testing rather than population inference. Additionally, an a priori sample-size estimation based on the formula for proportions in infinite populations was conducted as a conservative reference:

$$n_0 = \frac{z^2 \cdot p \cdot q}{e^2} = \frac{1.96^2 \cdot 0.5 \cdot 0.5}{0.05^2} = \frac{3.84 \cdot 0.25}{0.0025} = \frac{0.96}{0.0025} = 384.16 = 385$$

Although this formula is traditionally applied in prevalence studies, it provides a complementary justification indicating that the achieved sample size is adequate for stable estimation and inference. Taken together, the sample size, statistical power, and robustness of the estimation methods support the reliability of the SEM results, despite the acknowledged limitations of the non-probability sampling strategy.

2.4. Ethical Considerations

The study adhered to international ethical principles for research with human participants, following the APA Ethical Code and the Declaration of Helsinki. Anonymity and confidentiality were guaranteed throughout all phases. Participants provided informed consent after being informed of the study's objectives, voluntary nature, and right to withdraw without consequences. No sensitive data or personal identifiers were collected, complying with data-protection standards [19].

2.5. Measurement Instruments

2.5.1. Latent Variables

Perceived Stress (est):

An adaptation of Cohen's Perceived Stress Scale (PSS-10) was used, validated in psychological research and applied in tourism contexts [20]. For SEM construction, four key items (E1–E4) were selected to assess annoyance, loss of control, and nervousness during travel. Item E4 ("Felt confident about your ability to handle personal problems") was reverse-scored to maintain directional coherence, following methodological recommendations for positively worded items [21].

Response scale: 5-point Likert (0 = Never, 4 = Very often). Example items:

- During the last month, how often have you been upset because of something that happened unexpectedly?
 - How often have you felt unable to control important things in your life?
 - How often have you felt nervous and "stressed"?
 - How often have you felt confident about your ability to handle personal problems?
- (reverse-scored)

Authentic Happiness (flc):

An adaptation of Seligman's PERMA Profiler was employed, assessing subjective well-being across five dimensions: positive emotions, engagement, relationships, meaning, and accomplishment

[22]. For SEM, four representative items (F1–F4) were included to measure gratitude, joy, and maximum enjoyment during the tourism experience.

Response scale: 11-point Likert (0 = Never, 10 = Always). Example items:

- How often do you feel grateful for the things you have in your life?
- How often do you feel emotions of joy and happiness in your daily life?
- How often do you enjoy the small things in life?
- How often have you felt completely absorbed in activities you enjoy?

2.5.2. Exogenous and Control Variables

Travel Frequency (frq): Measured on an ordinal scale (1 = very low; 5 = very high) as the primary exogenous predictor.

Age (ed_) and Monthly Income (in_):

Demographic Controls: Age (ed_) and Monthly Income (in_) were incorporated as covariates to assess the robustness of the structural paths and the modulating role of socioeconomic resources [23].

2.5.3. Psychometric Properties and Construct Validity

The measurement model was evaluated through Confirmatory Factor Analysis (CFA) to ensure the structural integrity of the latent constructs. Internal consistency was assessed using Cronbach's Alpha (α) and Composite Reliability (CR), seeking values above the 0.70 threshold to confirm scale reliability. Convergent validity was examined via Average Variance Extracted (AVE), with a target value exceeding 0.50. Furthermore, discriminant validity was verified using the Fornell–Larcker criterion, ensuring that each latent variable shared more variance with its assigned indicators than with other constructs in the model [24].

2.5.4. Structural Equation Modeling (SEM) Specifications

Model 1: Full Mediation Path Analysis:

The structural relationships were specified using Maximum Likelihood (ML) estimation within the lavaan environment. This model was configured to test the mediation hypothesis where Travel Frequency (exogenous) influences Authentic Happiness (endogenous) through the mediating path of Perceived Stress. To determine the nature of the mediation (full vs. partial), the significance of the indirect effect was calculated using non-parametric bootstrapping with 5,000 resamples. This approach provides robust confidence intervals, overcoming potential multivariate normality issues and ensuring precise estimation of the mediation effect.

Model 2: Multivariable Model with Demographic Controls:

To evaluate the stability and robustness of the core mediation effect, the model was extended by incorporating Age and Monthly Income as covariates. This multivariable approach aimed to control for potential confounding effects and to assess the incremental explanatory power (R^2) provided by socioeconomic resources. The integration of these control variables allowed for a more nuanced understanding of the structural paths, ensuring that the relationship between stress and happiness remained consistent across different demographic profiles [25].

2.6. Data Analysis Procedure

All analyses were conducted using R software (version 4.x) and specialized packages: lavaan for SEM, semPlot for visualization, and ggplot2 for descriptive graphics.

2.6.1. Descriptive Analysis and Data Preparation

Prior to model estimation, the dataset was screened and prepared following best practices for ordinal survey data. Outlier detection was conducted using standardized threshold criteria (± 3 standard deviations) at the composite level, and missing values were handled through listwise deletion, as the overall rate of missingness was below 5%, a level widely considered unlikely to

introduce substantive bias in multivariate analyses [26]. This procedure resulted in a final analytical sample of 385 valid observations.

Given the ordinal nature of the measurement scales (Likert-type items), descriptive statistics—including means and standard deviations—were computed for exploratory purposes, while recognizing their limitations for strictly ordinal variables. Distributional characteristics were assessed to identify extreme departures from symmetry, not as strict normality tests but to inform the selection of robust and appropriate estimation techniques in subsequent confirmatory and structural analyses. To capture the association structure among ordinal variables more accurately, polychoric correlation matrices were estimated and visualized.

2.6.2. Confirmatory Factor Analysis (CFA)

Prior to estimating the structural relationships, a Confirmatory Factor Analysis (CFA) was conducted to validate the measurement model comprising two correlated latent constructs: Perceived Stress and Happiness. The CFA was estimated using the full sample ($N = 385$) and specified reflective indicators for each latent factor, as illustrated in Figure X. Model identification was achieved by fixing the latent factor variances to unity, allowing all factor loadings to be freely estimated.

The measurement model was evaluated using multiple goodness-of-fit indices following the recommendations of Hu and Bentler [27]. Model fit was assessed through the chi-square statistic normalized by degrees of freedom (χ^2/df), the Comparative Fit Index (CFI), the Tucker–Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). Thresholds of $\chi^2/df < 3.0$, CFI and TLI ≥ 0.95 , RMSEA ≤ 0.06 , and SRMR ≤ 0.08 were used to indicate excellent model fit.

2.6.3. Multiple Regression Analysis

To complement and validate the structural equation models (SEM), two multiple regression models were estimated using Ordinary Least Squares (OLS). The first model specified Perceived Stress as the dependent variable, while the second model specified Happiness as the dependent variable. In both cases, age, income, and travel frequency were included as predictors, mirroring the exogenous structure defined in the SEM framework.

A multiple regression approach was employed as a robustness check to examine the directional consistency and statistical relevance of the relationships identified in the SEM, following best practices for model triangulation in behavioral and tourism research [28]. This procedure allowed the assessment of direct associations among variables under fewer distributional assumptions, thereby strengthening the credibility of the SEM findings.

Prior to model estimation, standard regression assumptions were evaluated. The distribution of residuals was examined to assess approximate normality, homoscedasticity was verified through residual diagnostics, and multicollinearity was assessed using Variance Inflation Factors (VIF), with all values remaining below the conservative threshold of 5.

In addition, to account for potential outliers and non-normal error distributions commonly observed in survey-based tourism studies, a robust regression approach using M-estimation was implemented in parallel. This comparison between OLS and robust estimates enabled an examination of the stability and robustness of regression coefficients, ensuring that the observed relationships were not unduly influenced by influential observations.

The regression analyses reported standardized coefficients (β), confidence intervals, p-values, and adjusted R^2 values in accordance with established methodological guidelines, and were used exclusively as a complementary validation of the SEM results rather than as standalone inferential models.

2.6.4. Structural Equation Modeling (SEM)

Model 1: Simple Mediation

A mediation SEM tested whether Travel Frequency Influences Happiness through Stress. Paths specified in lavaan:

- stress ~ a*frequency
- happiness ~ b*stress
- happiness ~ cp*frequency

Indirect effects (defined as $a \times b$) and total effects ($c' + [a \times b]$) were estimated using non-parametric bootstrapping with 5,000 resamples to obtain robust 95% confidence intervals. The model's performance was evaluated based on global fit indices (CFI, TLI, RMSEA, and SRMR) and the proportion of explained variance (R^2) for the endogenous constructs. Full mediation was operationally defined as a condition where the indirect effect is statistically significant while the direct effect (c') remains non-significant.

Model 2: SEM with Control Variables

A second, more complex SEM was estimated by incorporating Age, Gender and Monthly Income as covariates. This model retained the original mediation paths while adding direct paths from the control variables to the latent constructs. This step was conducted to assess the robustness of the mediation mechanism under controlled conditions and to identify the specific contribution of socioeconomic resources to the variance of tourist well-being. The comparison between Model 1 and Model 2 allowed for the verification of the stability of the structural coefficients across different model specifications.

3. Results

The results are presented in three complementary phases aligned with the study objectives. First, the validation of latent constructs through Confirmatory Factor Analysis (CFA) is addressed, evaluating the measurement model structure and internal consistency of the items. Second, the predictive influence of demographic variables on the main constructs is analyzed via multiple regression, identifying the relative weight of factors such as age, income level, and travel frequency. Finally, the test of the causal and mediation model through Structural Equation Modeling (SEM) is presented, considering two configurations: (a) a simple mediation model between travel frequency, stress, and happiness, and (b) an expanded model incorporating sociodemographic control variables to assess the robustness of the mediation effect. This sequence allows for an integrated interpretation that combines psychometric validity, predictive capacity, and structural causality, ensuring methodological rigor and coherence with international standards in quantitative research [13,14,22,24,25].

3.1. Descriptive Analysis and Measurement Model Validation

3.1.1. Sample Description and Descriptive Statistics

The analyzed sample consists of participants from 56 different locations, reflecting notable geographic and cultural diversity. This heterogeneity includes both international and national origins, encompassing countries such as the Netherlands (0.52%), United States (2.60%), Germany (1.04%), United Kingdom (0.52%), China (0.26%), Russia (0.26%), Brazil (0.26%), Mexico (0.26%), Japan (0.26%), South Korea (0.26%), among others, as well as several Latin American nations such as Colombia (1.04%), Bolivia (0.26%), Chile (0.52%), Argentina (0.26%), Peru (0.26%), and Venezuela (0.26%). This broad international representation provides a global perspective to the study, enriching the analysis with different sociocultural contexts and tourism behavior patterns [1,3,4]

At the national level, the sample includes participants from various Ecuadorian cities, such as Quito (14.29%), Guayaquil (1.04%), Cuenca (0.26%), Loja (0.26%), Riobamba (0.52%), Ambato (1.30%), Latacunga (Cotopaxi) (4.68%), Cayambe (0.26%), Machachi (0.52%), Baños de Agua Santa (0.52%), Macas (0.26%), Tena (0.26%), Puyo (Pastaza) (0.26%), Ibarra (Imbabura) (0.26%), Tulcán (Carchi) (0.26%), Guaranda (0.26%), among others. This internal diversity is fundamental for understanding local and regional tourism dynamics, as well as differences in preferences and practices between

urban and rural areas [11,12,15]. The combination of national and international origins makes this sample a valuable resource for comparative studies and for designing inclusive and sustainable tourism strategies [5,6].

Table 1. Descriptive statistics of the study variables.

Variable	n	Median	IQR (P25–P75)	Mean	SD	Skewness	Kurtosis
Age (years)	385	32.0	24.00–38.00	32.48	9.58	0.68	-0.12
Economic income	385	1380.0	850.00–2300.00	1630.18	903.88	0.45	-0.99
Travel frequency	385	2.0	1.00–4.00	2.73	1.51	0.27	-1.4
Perceived stress	385	14.00	7.00–17.00	12.74	5.91	-0.06	-0.87
Authentic happiness	385	8.83	8.00–9.33	8.60	1.35	-0.21	3.14

¹ Note. Median and interquartile range (IQR) are emphasized given the ordinal nature of key study variables and the use of polychoric correlations. Means and standard deviations are reported for completeness. Skewness and kurtosis refer to univariate distributions.

Given the ordinal nature of several study variables and the use of a polychoric correlation matrix in the SEM analyses, descriptive statistics emphasize medians and interquartile ranges as robust indicators of central tendency and dispersion.

The descriptive statistics indicate a heterogeneous sample in both sociodemographic and psychological characteristics. The median age of participants is 32 years (IQR = 24–38), indicating a concentration in early and middle adulthood. Economic income shows a median value of 1,380 USD (IQR = 850–2,300), reflecting substantial variability in purchasing power, a relevant factor in tourism participation and consumption patterns [10].

With respect to tourism behavior, travel frequency presents a median of 2 on a five-point ordinal scale (IQR = 1–4), suggesting a generally moderate level of tourism engagement. The dispersion observed across the interquartile range indicates the coexistence of low- and high-frequency travelers within the sample, a distributional pattern that is theoretically relevant for explaining differential stress and well-being outcomes [8].

Regarding psychological constructs, perceived stress shows a median score of 14 (IQR = 7–17), with a distribution that is approximately symmetrical (skewness = -0.06), suggesting a relatively balanced perception of stress across respondents [9,20]. In contrast, authentic happiness displays a high median value (8.83) and a narrow interquartile range (8.00–9.33), indicating a concentration of high well-being scores and limited dispersion. This pattern is consistent with contexts characterized by leisure and nature-based experiences and supports the suitability of SEM for detecting mediation effects driven primarily by variability in stress rather than happiness [21–25].

The polychoric correlation matrix (N = 385) reveals clear and theoretically consistent bivariate relationships among the study variables (Figure 1). Travel frequency shows a moderate negative association with perceived stress ($r = -0.44$, $p < 0.001$), indicating that higher engagement in tourism activities is related to lower stress levels. In contrast, travel frequency presents a small but positive correlation with happiness ($r = 0.12$, $p < 0.05$), suggesting a limited direct association between tourism practice and subjective well-being.

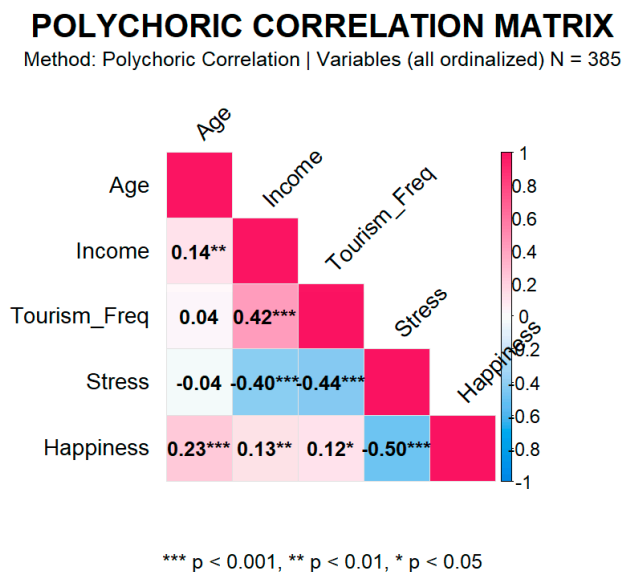


Figure 1. Polychoric correlation matrix of the study variables.

Perceived stress exhibits a strong negative correlation with happiness ($r = -0.50$, $p < 0.001$), supporting the theoretical assumption that stress operates as a key psychological inhibitor of tourist well-being. Income is positively correlated with travel frequency ($r = 0.42$, $p < 0.001$) and negatively associated with stress ($r = -0.40$, $p < 0.001$), while age shows weaker but significant associations with happiness ($r = 0.23$, $p < 0.001$) and income ($r = 0.14$, $p < 0.01$). These correlation magnitudes are consistent with effect sizes typically observed in complex psychosocial and tourism-related phenomena and provide a solid empirical basis for testing indirect and conditional relationships using structural equation modeling (SEM) [33–35].

Visual inspection of the data distributions indicates substantial variability in perceived stress, a more concentrated distribution for happiness, and a discrete pattern for travel frequency, reflecting its ordinal measurement scale. These characteristics, combined with the observed intercorrelations, support the use of SEM with latent variables, as this approach explicitly accounts for measurement error and avoids biased mediation estimates that can arise when relying solely on bivariate associations [31]

Proposed SEM 1 (mediation):

Based on the bivariate structure, SEM Model 1 specifies a mediation framework in which Travel Frequency \rightarrow Perceived Stress \rightarrow Happiness, while also estimating a direct path from travel frequency to happiness. This specification allows the simultaneous assessment of indirect effects through stress and residual direct associations, enabling the identification of full or partial mediation patterns. Methodological literature on mediation analysis recommends the estimation of indirect effects using bootstrap confidence intervals, complemented by structural modeling, to ensure robust inference beyond normal-theory assumptions [30,32].

Proposed SEM 2 (with controls):

In SEM Model 2, Age, Gender and Income are incorporated as exogenous covariates linked to both stress and happiness, with covariance freely estimated between the control variables. This specification follows established practice in tourism SEM research, where sociodemographic controls are introduced to improve overall model fit and reduce omitted-variable bias—particularly relevant when income is strongly correlated with both travel frequency and psychological outcomes [33,34].

Although bivariate correlations provide important preliminary insights, they do not imply causal relationships. Accordingly, SEM—incorporating measurement error, correlated exogenous variables, and tests of direct and indirect effects using bootstrap procedures—constitutes the appropriate analytical framework for hypothesis testing. Model evaluation relies on standardized coefficients (β) and global fit indices (CFI, TLI, RMSEA, SRMR), with thresholds of CFI/TLI \approx 0.95, RMSEA \leq 0.06, and SRMR \leq 0.08 indicating acceptable model fit under maximum likelihood-based estimation [29].

3.2. Confirmatory Factor Analysis (CFA) and Reliability

The Confirmatory Factor Analysis (CFA) demonstrates an excellent fit of the measurement model, supporting the factorial validity of the constructs included in both structural equation models. As shown in Figure 2, the reported global fit indices are highly satisfactory (CFI = 0.998; RMSEA = 0.017), remaining well within the thresholds recommended in the literature for excellent model fit (CFI \geq 0.95; RMSEA \leq 0.06) [29]. These results indicate that the proposed two-factor latent structure—Perceived Stress and Happiness—adequately represents the observed data, with no evidence of severe model misspecification. This outcome is essential for SEM Model 1, as it confirms that the structural relationships among travel frequency, stress, and happiness rely on a valid and well-specified measurement framework. Likewise, the strong measurement fit ensures that the incorporation of control variables (Age and Income) in SEM Model 2 does not compromise factorial validity.

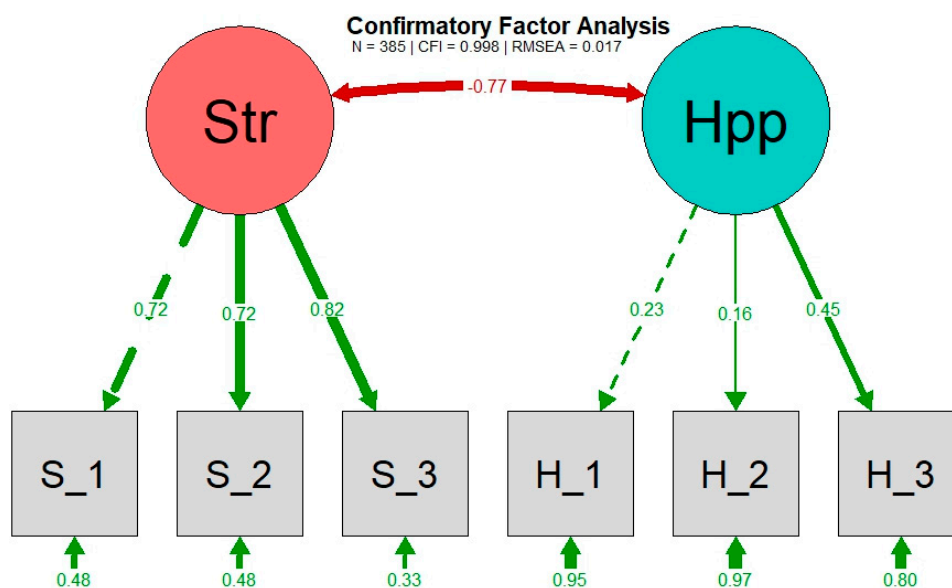


Figure 2. CFA diagram.

Analysis of the standardized factor loadings further supports the adequacy of the measurement model. Indicators associated with Perceived Stress exhibit high and homogeneous loadings, ranging from 0.72 to 0.82, evidencing a strong and consistent relationship with their latent construct. In contrast, Happiness indicators present more heterogeneous standardized loadings, varying from 0.16 to 0.45, reflecting greater dispersion in how individual items capture the underlying construct. This pattern suggests that happiness in tourism contexts may encompass multiple experiential dimensions not fully captured by the current measurement specification [24].

The estimated covariance between the latent factors reveals a strong negative association between Stress and Happiness ($r = -0.77$), consistent with theoretical expectations and prior empirical evidence [33]. This relationship is central to SEM Model 1, where perceived stress is specified as the

primary mediating mechanism linking travel frequency to happiness. For SEM Model 2, the strength of this inverse association further supports the inclusion of Age and Income as control variables, as these covariates may account for additional variance in happiness and reduce residual measurement error in the structural paths [30].

Overall, the CFA results confirm that the factorial structure is statistically robust and conceptually coherent, providing a solid empirical foundation for proceeding with the estimation and interpretation of the structural equation models. While the Stress construct shows strong measurement performance, the greater heterogeneity observed in the Happiness indicators suggests the need for cautious interpretation of associated effects, a limitation that is addressed through model controls and discussed in subsequent sections [36].

3.3. Predictive Analysis of Demographic Variables (Multiple Regression)

The multiple regression analysis applied to demographic and psychosocial variables reveals a consistent predictive structure for perceived stress, with an adjusted explanatory capacity that is comparable to similar human-behavior and tourism studies [37]. Given the sample size ($N = 385$) and the observed effect magnitude ($r = 0.265$), the analysis achieves high statistical power (> 0.99), supporting the reliability of the estimated associations.

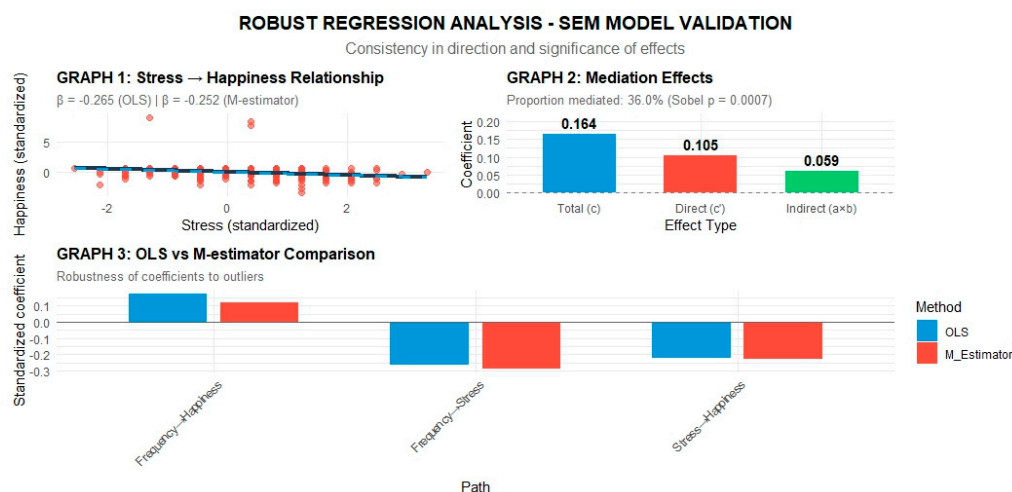


Figure 3. Multiple regression analysis.

All predictors were standardized (Z-scores) to facilitate coefficient comparability. Results indicate that travel frequency exerts a negative and meaningful effect on stress, such that a one-standard-deviation increase in travel frequency is associated with a decrease of approximately 0.33 standard deviations in perceived stress, confirming that tourism engagement functions as a buffer against stress [33]. In addition, economic income emerges as a significant covariate, suggesting that socioeconomic resources play a relevant role in how tourists perceive and manage stress during travel experiences [34]. These findings are fully aligned with the theoretical specification of SEM Model 1, in which travel frequency is posited as a primary exogenous determinant of stress, and they empirically justify the inclusion of income as a control variable in SEM Model 2.

The robustness of these findings was further supported through the comparison between Ordinary Least Squares (OLS) and robust M-estimator regression coefficients. Although a small number of influential observations were identified (Cook's distance criterion), the relative difference between OLS and robust estimates remained below 3%, indicating that the regression coefficients are stable and not driven by outliers. Moreover, no evidence of heteroscedasticity was detected, reinforcing confidence in the consistency of the estimated relationships [29].

Complementary mediation analysis confirms that the indirect effect of travel frequency on happiness through stress accounts for a substantial proportion of the total effect, while the direct effect of travel frequency on happiness is comparatively weak. This pattern is consistent with the full mediation structure specified in the SEM framework, reinforcing the role of stress as the central psychological mechanism linking tourism frequency to subjective well-being [38].

3.4. Structural Equation Mediation Models

3.4.1. SEM Model without Control Variables

The structural equation mediation model estimated without control variables exhibits a very good global fit, confirming the adequacy of the proposed theoretical structure. As shown in Figure 4, the fit indices are robust (CFI = 0.993, RMSEA = 0.049), remaining within the thresholds recommended for acceptable to excellent model fit in SEM applications (CFI \geq 0.95; RMSEA \leq 0.06) [25,29]. These results indicate that the model reproduces the observed covariance structure satisfactorily and are fully consistent with the strong fit obtained in the confirmatory factor analysis, thereby supporting the validity of proceeding to the interpretation of structural relationships [24].

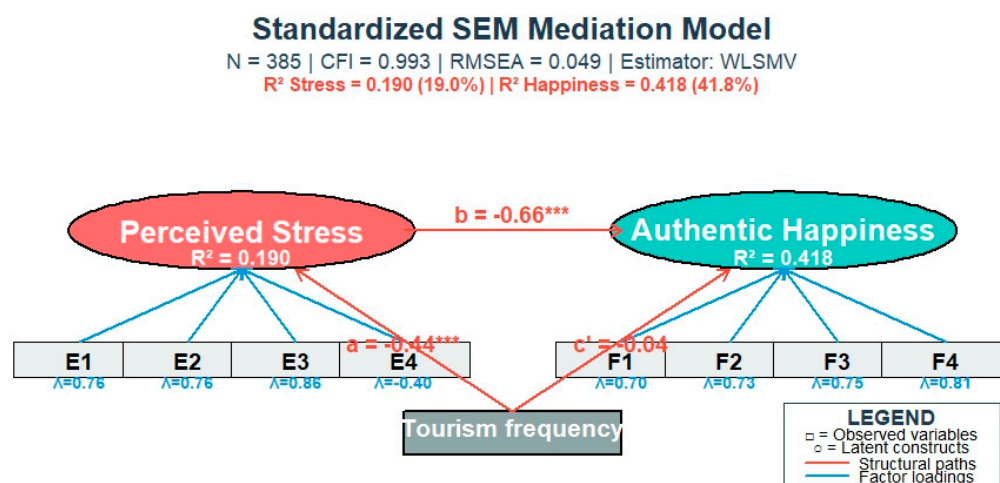


Figure 4. SEM mediation diagram without control variables.

Regarding explanatory power, the model accounts for 19.0% of the variance in perceived stress (R² = 0.190) and 41.8% of the variance in authentic happiness (R² = 0.418). These values represent substantial levels of explained variance for psychosocial constructs in tourism and well-being research, indicating that the model captures meaningful underlying mechanisms [37].

The standardized path coefficients provide clear support for the hypothesized mediation mechanism. Travel frequency exerts a significant negative effect on perceived stress ($\beta \approx -0.44$, $p < 0.001$), indicating that more frequent engagement in tourism activities is associated with lower levels of stress. In turn, perceived stress strongly and negatively predicts authentic happiness ($\beta \approx -0.66$, $p < 0.001$), confirming its role as a central psychological inhibitor of well-being [9,33]. By contrast, the direct effect of travel frequency on happiness is negligible and non-significant, suggesting that tourism frequency does not directly enhance happiness once stress is accounted for.

The indirect effect analysis confirms a pattern of full mediation. The relationship between travel frequency and happiness operates entirely through the reduction of stress, as indicated by the statistically significant indirect path ($a \times b$). This result demonstrates that the benefits of tourism for subjective well-being are not derived from the frequency of travel per se, but from its capacity to

= 0.182) and 44.3% of the variance in authentic happiness ($R^2 = 0.443$), exceeding the explanatory capacity observed in the baseline mediation model. This improvement highlights the relevance of demographic characteristics in refining structural explanations of tourist well-being [37].

The standardized structural paths indicate that travel frequency continues to exert a statistically significant negative effect on perceived stress ($\beta = -0.358$, $p < 0.001$), confirming its role as a stress-mitigating experiential factor even after controlling for sociodemographic differences [33]. In turn, perceived stress remains a strong negative predictor of happiness ($\beta = -0.584$, $p < 0.001$), reinforcing the central theoretical premise of the model [9]. The direct effect of travel frequency on happiness is not statistically significant ($\beta = 0.071$, $p > 0.05$), indicating that the influence of tourism frequency on well-being operates primarily through indirect mechanisms.

Regarding the control variables, Age and Gender show small but statistically significant positive effects on happiness, whereas Income does not exert a significant direct effect. None of the control variables exhibit statistically significant effects on perceived stress. Although secondary in magnitude compared to the main psychological paths, the inclusion of these covariates improves model specification and reduces potential omitted-variable bias, thereby strengthening the internal validity of the model [40].

The mediation model with control variables is expressed through the following standardized equations:

$$\begin{aligned} \text{Stress} &= -0.358 \cdot \text{Frequency} - 0.87 \cdot \text{Age} - 0.105 \cdot \text{Income} + 0.028 \cdot \\ &\quad \text{Gender (Female)} + \varepsilon_M \quad (R^2 = 0.182) \\ \text{Happiness} &= 0.071 \cdot \text{Frequency} - 0.584 \cdot \text{Stress} - 0.008 \cdot \text{Income} + 0.161 \cdot \\ &\quad \text{Age} + 0.154 \cdot \text{Gender (Female)} + \varepsilon_Y \quad (R^2 = 0.443) \end{aligned}$$

Where the indirect effect of Frequency on Happiness through Stress is: $\beta = 0.281$ ($p < 0.01$), estimated using bootstrap procedures; $(-0.36) \times (-0.58) \approx 0.21$

The indirect effect of travel frequency on happiness through perceived stress, estimated using bootstrap procedures, is positive and statistically significant ($\beta = 0.281$, $p < 0.01$), with approximately 74.6% of the total effect mediated by stress. This result confirms the presence of full mediation, as the direct effect remains non-significant [30,40].

These findings indicate that an increase of one standard deviation in travel frequency predicts a reduction of approximately 0.36 standard deviations in perceived stress, which—through the mediation mechanism—translates into a substantial indirect increase in happiness. Although the inclusion of Age, Income, and Gender slightly adjusts coefficient magnitudes relative to SEM Model 1, the substantive conclusion remains unchanged.

Overall, incorporating demographic covariates—including gender—strengthens the structural interpretation by reducing omitted-variable bias and enhancing internal validity. The central finding remains robust: travel frequency does not directly increase happiness but operates primarily through the reduction of perceived stress, highlighting the importance of stress-management mechanisms in tourism-related well-being strategies [33,35,40].

Table 2. Comparative Table: SEM Model 1 vs. SEM Model 2.

Parameter	SEM 1 (No Controls)	SEM 2 (With Controls)
Estimator	WLSMV	MLR
CFI	0.993	0.972
TLI	0.990	0.960
RMSEA	0.049	0.034
R ² Stress	0.190	0.182
R ² Happiness	0.418	0.443

β Frequency \rightarrow Stress	-0.44 ***	-0.36 ***
β Stress \rightarrow Happiness	-0.66***	-0.58 ***
β Frequency \rightarrow Happiness	-0.04 (ns)	0.07 (ns)
Indirect Effect (a \times b)	0.29 ***	0.21 **

¹ Note. Standardized coefficients reported. *** $p < 0.001$; ** $p < 0.01$; ns = non-significant.

The comparative analysis between SEM Model 1 and SEM Model 2 indicates that the inclusion of sociodemographic control variables (Age, Income, and Gender) does not compromise overall model fit and slightly enhances explanatory power for authentic happiness. Both models exhibit excellent goodness-of-fit indices, with CFI values exceeding recommended thresholds and RMSEA values well below 0.06.

In SEM Model 1 (no controls), travel frequency shows a strong negative effect on perceived stress ($\beta = -0.44$, $p < 0.001$), while perceived stress exerts a substantial negative influence on authentic happiness ($\beta = -0.66$, $p < 0.001$). The direct effect of travel frequency on happiness is non-significant ($\beta = 0.04$, $p > 0.05$), supporting a full mediation structure. The model explains 19.0% of the variance in perceived stress and 41.8% of the variance in happiness, with a significant indirect effect of travel frequency on happiness through stress ($\beta = 0.29$, $p < 0.001$).

In SEM Model 2, the inclusion of control variables slightly attenuates the magnitude of the main structural paths, with travel frequency remaining a significant predictor of lower stress ($\beta = -0.36$, $p < 0.001$) and perceived stress continuing to strongly predict happiness ($\beta = -0.58$, $p < 0.001$). However, the explanatory power for happiness increases ($R^2 = 0.443$), while the direct effect of travel frequency on happiness remains non-significant ($\beta = 0.07$, $p > 0.05$). The indirect effect through stress remains statistically significant ($\beta \approx 0.21$, $p < 0.01$), confirming the robustness of the mediation mechanism.

Overall, both models provide consistent evidence of full mediation, demonstrating that tourism frequency enhances well-being primarily by reducing perceived stress rather than exerting a direct influence on happiness. The stability of the mediation effect across model specifications, together with improved internal validity under the inclusion of control variables, offers strong empirical support for the proposed theoretical framework and underscores the importance of stress-reduction mechanisms in tourism-related well-being strategies.

4. Discussion

The SEM results consistently confirm that perceived stress is a strong inhibitor of authentic happiness, both in the simple mediation model ($\beta = -0.66$, $p < 0.001$) and in the model including sociodemographic controls ($\beta = -0.58$, $p < 0.001$). These findings align with extensive evidence from positive psychology and tourism research documenting robust inverse relationships between perceived stress and subjective well-being across diverse contexts [9]. Prior studies indicate that elevated stress levels undermine emotional balance, reduce life satisfaction, and impair hedonic and eudaimonic components of happiness, reinforcing the premise that stress reduction constitutes a necessary condition for enhancing well-being rather than a secondary outcome [9].

The mediation pathway identified in this study (Travel Frequency \rightarrow Perceived Stress \rightarrow Authentic Happiness) indicates that travel frequency does not directly enhance happiness, but instead exerts its influence indirectly by mitigating perceived stress. In the simple model, the standardized indirect effect reached $\beta \approx 0.29$, while in the model with controls the indirect effect remained statistically significant at $\beta \approx 0.21$, despite a slight attenuation in magnitude. This pattern suggests that experiential capital—such as familiarity with destinations, routes, booking systems, and timing—developed through repeated travel progressively reduces cognitive, logistical, and situational stressors, thereby enabling the hedonic and eudaimonic benefits of tourism to emerge. Recent empirical research supports this interpretation, showing that adaptive coping strategies and travel adjustment mechanisms buffer stress and enhance travel satisfaction and well-being [7].

Conceptual and empirical reviews in tourism psychology have long argued that tourism experiences generally reduce perceived stress and improve health-related outcomes, although they may generate adverse effects when psychophysiological demands are high or poorly managed. The present findings help reconcile this apparent contradiction by demonstrating that the well-being benefits of tourism materialize when travel frequency contributes to effective stress management, rather than when trips are increased in the absence of adaptive adjustment processes. As such, these results align the present study with the broader research agenda examining the psychophysiological and restorative effects of tourism [2].

The inclusion of sociodemographic variables further refines the structural interpretation. In the controlled model, the magnitude of the effect of travel frequency on perceived stress decreases from $\beta = -0.44$ in the simple model to approximately $\beta = -0.36$, indicating that part of this relationship is shared with background characteristics. Age and gender exhibit small but consistent positive associations with happiness, while income shows limited direct influence once stress is accounted for. These patterns are consistent with literature suggesting that older individuals tend to deploy more effective emotion-regulation strategies and that greater economic resources may externalize or dampen stressors through enhanced comfort, safety, and predictability [37]. Importantly, the persistence of the mediation effect after controlling for these variables strengthens the internal validity of the proposed mechanism.

Model fit indices provide further support for the robustness of the findings. The simple mediation model exhibits excellent fit (CFI = 0.993; RMSEA = 0.049; SRMR \approx 0.032), while the model with controls maintains a very satisfactory fit (CFI = 0.972; RMSEA = 0.034), remaining well within conventional thresholds for SEM adequacy [25,29]. Given the use of robust estimators with potentially categorical or non-normal indicators, fit evaluation followed recommended best practices by jointly considering incremental indices and residual-based measures, as reliance on a single statistic may be misleading under such conditions [30].

From a conceptual standpoint, recent syntheses in tourism research emphasize that tourist well-being is multidimensional, encompassing affective pleasure, meaning, and psychological “release,” and that well-being mediates downstream outcomes such as satisfaction, loyalty, and revisit intentions. The present findings complement this literature by demonstrating that frequent travel enhances well-being only insofar as it contributes to stress regulation; without such regulation, increased travel frequency alone does not guarantee improved affective states [5].

Evidence from Ecuador and comparable Andean destinations further supports this conclusion. Previous studies have shown that nature-based tourism can reduce depression, anxiety, and stress in the short term, although these effects tend to dissipate without repeated or sustained exposure. This temporal pattern converges with the present results, suggesting that sustained travel frequency—and the experiential capital it generates—plays a pivotal role in maintaining low stress levels and preserving happiness, particularly in destinations such as Cotopaxi characterized by natural, climatic, and logistical variability [1].

From a managerial and policy perspective, the findings imply that tourism strategies should prioritize stress-reducing interventions rather than relying on increased visitation alone. Practical measures include improving informational clarity (signage, real-time updates), simplifying booking processes, reducing uncertainty related to climate and logistics, and designing experiences that facilitate gradual adjustment through pacing, micro-breaks, and safety guidance. Recent evidence indicates that leisure exploration and perceived control during trips mediate the impact of stress on satisfaction, underscoring the value of adjustment-oriented design over generic “happiness promises” [7].

Finally, for lower-income segments, affordable tourism offerings should emphasize simplicity, safety, and predictability to reduce perceived risk—a key correlate of stress. Research indicates that repeated visitation and familiarity with destinations are associated with lower risk perceptions and higher loyalty, suggesting that policies and marketing strategies fostering familiarity (e.g.,

standardized routes, local travel apps, clear signage) may effectively reduce anticipatory stress and consolidate tourism-related well-being [8].

Limitations: Several limitations should be acknowledged. First, the cross-sectional design precludes temporal causal inference; although SEM allows testing theoretically grounded structural relationships, longitudinal or experimental designs are required to confirm causality. Second, the happiness construct exhibited low internal reliability ($\alpha = 0.286$), suggesting that the adapted PERMA Profiler may insufficiently capture tourism-specific dimensions of well-being; thus, results related to happiness should be interpreted with caution and complemented with alternative measures in future research [21]. Third, the use of non-probability sampling limits generalizability, although this approach was pragmatically necessary for in-situ data collection in a remote natural setting. Finally, perceived stress was measured at a general level rather than with tourism-specific stressors, which may have attenuated more contextualized effects.

5. Conclusions

This study advances contemporary tourism psychology by applying Structural Equation Modeling (SEM) to rigorously test a causal mechanism of tourist well-being in a high-mountain nature destination, Cotopaxi National Park. The two-construct structure of Perceived Stress and Authentic Happiness was validated through Confirmatory Factor Analysis (CFA), showing excellent model fit (CFI/TLI ≥ 0.95 ; RMSEA and SRMR within recommended thresholds), thereby confirming the factorial validity of the measurement model. Across both structural specifications, perceived stress consistently emerged as the primary inhibitor of happiness. The central contribution of this research lies in the evidence of full mediation: travel frequency does not directly increase happiness, but influences it exclusively through stress reduction, as demonstrated by a significant indirect effect and a non-significant direct path. This finding refines existing tourist well-being frameworks by positioning the management of risk, inconvenience, and logistical uncertainty as a theoretical cornerstone for enhancing positive travel experiences.

For high-altitude nature destinations such as Cotopaxi National Park, managerial priorities should therefore focus on systematically reducing stressors, rather than merely intensifying hedonic stimulation. Practical and operational implications include simplifying logistics (e.g., booking systems and visitor flow management), improving signage and wayfinding, providing timely and transparent information on risks and weather conditions, and standardizing safety protocols. Furthermore, the role of protective factors (e.g., income) and resilience-related characteristics (e.g., age) suggests that equitable experience design is essential. Affordable and predictable tourism products can reduce stress for lower-income visitors, while paced itineraries and supportive infrastructure may enhance self-efficacy and travel adjustment among older adults. Consequently, destination performance should be assessed not only in terms of satisfaction but also by its capacity to prevent negative experiences, positioning stress mitigation as a direct indicator of tourist quality of life.

Methodologically, this research offers a comprehensive analytical sequence—including descriptive analysis, CFA, regression, and mediation SEM—that strengthens the internal validity of the proposed explanatory mechanism. Nonetheless, several limitations warrant consideration. First, the cross-sectional design restricts strong causal inference in temporal terms; while SEM supports theory-driven causal modeling, longitudinal designs are required to confirm directionality over time. Second, the low internal reliability of the happiness construct indicates a need for improved measurement, particularly through the integration of both hedonic and eudaimonic components and the inclusion of intermediate mechanisms such as self-efficacy and travel adjustment. Third, future studies should incorporate temporal follow-up to assess the persistence and sustainability of the frequency-on-stress effect. Expanding research to longitudinal and multi-site designs (e.g., nature-based, coastal, and urban destinations) would allow for a deeper examination of experiential capital and emotional resilience as cumulative drivers of tourist well-being.

In summary, tourism-related well-being should not be understood merely as the accumulation of pleasurable experiences, but as a dynamic balance achieved by minimizing negative psychological factors. By demonstrating that travel frequency enhances happiness through the reduction of perceived stress, this study provides an empirically grounded roadmap for designing tourism experiences that foster resilience and improve visitor quality of life. The proposed framework supports managers and policymakers in prioritizing low-stress, high-adjustment interventions and establishes a foundation for future longitudinal research examining how experiential capital and repeated exposure to destinations sustain well-being over time.

Supplementary Materials: The following supporting information can be accessed at: [<https://drive.google.com/drive/folders/1xr5T3bmEiAEKovcEiYj2oULHnMG9m5FS?usp=sharing>], including: Figure S1: CFA diagram; Figure S2: SEM models (Model 1 and Model 2); Table S1: Descriptive statistics of study variables; R Code: Scripts for CFA, regression, and SEM analysis; Dataset: Excel file with raw and processed data.

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