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Impact of Intelligent Tourism Systems on Traveler Stress Reduction and Life Satisfaction

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Research Article

Keywords: Digital Happiness, Intelligent Tourism Systems, Emotional Well-Being, AI Personalization, Traveler Life Satisfaction; Smart Tourism.

Posted Date: March 12th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-8764958/v1

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Additional Declarations: No competing interests reported.

Abstract

This study examines how Intelligent Tourism Systems (ITS) affect tourist stress and life satisfaction by shifting smart tourism research from efficiency to well-being. A quantitative cross-sectional study was conducted on 350 leisure travelers who had recently utilized ITS. The direct and indirect relationships between ITS usage, traveler stress, and life satisfaction were examined using SEM, confirmatory factor analysis, and hierarchical regression. Stress is used to link technology usage to well-being, and ITS utilization considerably reduces passenger stress and boosts life satisfaction. The study's cross-sectional design makes it difficult to draw causal conclusions, but it does suggest that longer-term experimental and longitudinal studies are needed to examine links over time and other psychological mediators like trust, perceived control, and emotional involvement. User-centered, low-friction, emotionally intelligent tourism technology may help establish sustainable destinations. These devices should alleviate cognitive overload and promote passenger well-being. The Stimulus-Organism-Response paradigm and stress-coping theory are used to define digital happiness as a psychological consequence of ITS, which affects visitors' well-being beyond functional efficiency.

1. INTRODUCTION

1.1 Background and Research Context

AI, big data analytics, mobile technology, and the IoT have changed tourism's internet industry in the previous decade. These innovations created Intelligent Tourism Systems. Technology-supported ITS infrastructures provide smart destination management, customized service, real-time information access, and predictive decision-making. AI-driven recommendation systems, conversational interfaces, intelligent destination platforms, and context-aware smartphone apps are transforming how tourists research, choose, and use sites. (Ulrike Gretzel, 2015) (Islam Elbayoumi Salem, 2021)

Tourist locations become more competitive, enhance service, and optimize operations using smart tourism research. Intelligent Transportation Systems (ITS) are usually depicted as objective technological facilitators that reduce friction to improve functional performance. Since digital interfaces mediate every travel stage, scholars' question whether efficiency advances enhance visitor experiences. (Amaranggana, 2014) (Buhalis, 2020)

1.2 Digitalization, Stress, and the Rise of Digital Well-Being Concerns

Along with ITS, there is emerging evidence that heavy digital participation may have unanticipated psychological repercussions. Tourists may experience cognitive fatigue, stress, and anxiety due to information overload, continual connectivity, algorithmic pushing, and option complexity. Digital technology may increase passenger pressure to optimize their experiences, manage their choices, and stay connected. (Zheng Xiang, 2015) (Barbara Neuhofer, 2015)

Recent psychology and information systems research has focused on the mental, emotional, and spiritual consequences of technology on users' happiness, coining the phrase "digital well-being". In the tourism sector,

digital happiness refers to technology-mediated experiences that reduce stress, enhance emotional comfort, and increase subjective well-being and life satisfaction. ITS are getting increasingly popular, but there is little evidence that they improve digital happiness more than functional efficiency. (Abeele, 2021) (Elizabeth Marsh, 2022)

1.3 Gap Crystallization

There is much evidence in the current research on smart tourism that ITS enhance accessibility, customisation, and efficiency. In isolation, health It has been shown in studies that prolonged or poorly planned use of digital devices may increase stress levels and decrease subjective well-being. (Ulrike Gretzel, Smart tourism: foundations and developments, 2015) (Fuad Mehraliyev, 2020) (Monideepa Tarafdar, 2017)

What we don't know: It is still not apparent if and how ITS help passengers' mental health, especially when it comes to reducing stress and increasing life pleasure when traveling. Without specifically modeling stress and well-being as key outcomes, most research make the implicit assumption that efficiency gains result in good experiences. In addition, there has been a dearth of research that unifies the many empirical frameworks that have investigated the relationships between ITS usage, stress control, and life satisfaction.

Importance of this disparity: The primary marketing argument for tourism is that it improves people's quality of life and helps them heal. The viability and societal benefit of intelligent tourism systems are jeopardized if they unintentionally worsen stress and digital exhaustion. Leaving well-being out of smart tourism models reduces their explanatory power and makes it harder to create sustainable, human-centered destinations in practice.

1.4 From Efficiency-Driven to Human-Centered Smart Tourism Models

This study responds to recent calls for smart tourism models that promote human well-being above efficiency. Human-centered approaches emphasize emotional comfort, perceived control, stress coping, and subjective well-being, whereas efficiency-driven approaches emphasize automation, optimization, and speed. Stress-coping theory and subjective well-being theory are used to frame digital happiness in tourism as a multidimensional result that decreases stress and promotes life satisfaction. (Gretzel & Scarpino-Johns, 2018)

1.5 Purpose and Contributions of the Study

This research analyzes how Intelligent Tourism Systems effect tourist stress and life satisfaction to comprehend smart tourism. The paper makes four key points:

1. Theoretical Contribution: Combining digital well-being with stress-coping, it makes psychological outcomes the main indication for smart tourism system effectiveness.
2. Conceptual Contribution: The research compares efficiency-driven and human-centered smart tourism models to digital happiness, a major impact of technology usage, stress reduction, and life satisfaction.
3. Empirical Contribution: ITS reduces stress and improves life satisfaction for tourists.
4. Practical Contribution: In order to create intelligent tourism systems that prioritize human needs while balancing technical efficiency, the results provide destination managers and tech designers with practical

advice.

A major gap in the literature is addressed and needs for more psychologically informed and sustainable smart tourism research are met directly by this study, which foregrounds digital happiness as a primary result of intelligent tourism.

2. LITERATURE REVIEW

2.1 Intelligent Tourism Systems: From Functional Efficiency to Experiential Mediation

The next level of digital transformation in the tourist industry is Intelligent tourist Systems (ITS), which combine AI, big data analytics, the internet of things (IoT), machine learning, and context-aware platforms to provide customized service and make decisions in real-time. The primary goals of the first tourist information systems were to streamline the process of making reservations and disseminating relevant data. Actively influencing the tourist trip, modern ITS dynamically react to user behavior, ambient factors, and predictive analytics. (Dimitrios Buhalis, 2008) (Ulrike Gretzel, Smart tourism: foundations and developments, 2015) (Islam Elbayoumi Salem, The COVID-19 pandemic: The mitigating role of government and hotel support of hotel employees in Egypt, 2021)

There is a mountain of empirical evidence showing that ITS boost destination competitiveness, service customisation, and perceived convenience. Save money on searches with AI-powered recommendation systems, and have a worry-free vacation with the help of smart destination platforms that fix issues as they arise. Usability, adoption intent, system quality, and satisfaction continue to be the most prominent instrumental evaluation criteria in this body of work. (Barbara Neuhofer, Smart technologies for personalized experiences: a case study in the hospitality domain, 2015)

Despite these developments, most ITS studies still view intelligent systems only in terms of their ability to neutrally facilitate efficiency, rather than the experience mediators that really influence the emotional states of visitors. Both the simplification and the intensification of cognitive demands may be brought about by the ubiquitous presence of algorithmic decision aids, continual alerts, and data-driven pushing. We need to move away from efficiency-centric and toward experience- and well-being-oriented conceptualizations of ITS to address this theoretical mismatch and get a better knowledge of how ITS impact psychological consequences. (Yunpeng Li, 2017)

2.2 Tourist Stress as a Psychological Outcome of Digital Mediation

The long-held belief that tourism is intrinsically calming has been challenged by the crucial concept of tourist stress. Studies have shown that there are many different sources of stress during a trip. These include things like having too much information, not having enough time, being in a crowded place, not knowing what to expect, and being too reliant on technology. Despite digital systems' best efforts to reduce friction, they may actually make users more mentally and emotionally exhausted due to their very configurable and always-on nature. (Preacher, 2011) (Betsy Stringam, 2019)

A perceived mismatch between the demands of a situation and one's capacity to cope is the root cause of stress, according to stress-coping theory. In the context of tourism, ITS might serve as coping mechanisms by making choices easier and less ambiguous, or they can amplify stress by raising the demands for information and cognitive effort. Emotional reactions, contentment, and memory formation are all negatively impacted by high levels of stress, according to the available empirical data.

(Folkman, 2013) (Jeongmi (Jamie) Kim, 2014)

Ignoring its mediation function in connecting digital settings to higher-order well-being outcomes, most tourism research approaches stress as a consequence rather than a process, despite these discoveries. When it comes to smart tourism, this is a very big problem since regulating emotions might be the main way that technology affects the quality of the experience as a whole.

2.3 Life Satisfaction and Well-Being in Tourism Experiences

Individuals' overall assessments of their quality of life are reflected in life satisfaction, which is the cognitive component of subjective well-being (Diener et al., 2018). A growing amount of tourism literature shows that journeys recharge emotions, teach individuals about themselves, and make new relationships. Life satisfaction, unlike holiday pleasure, has long-term psychological advantages. (M. Joseph Sirgy, 2010) (Betsy Stringam, First Impressions in a Mobile World: How Hotel Sites Compare with OTAs, Aggregators and Peer to Peer Accommodations on Website Performance, 2019)

The difference between hedonic and eudaimonic well-being—pleasure, enjoyment, significance, personal progress, and self-realization—highlights tourism's potential influence on long-term well-being. By making it easier to relax, giving people a sense of control, and opening up new ways to connect with places, digital technologies have the potential to affect both dimensions. (Richard M. Ryan, 2018)

Nevertheless, much of the current research on tourism focuses on how users feel about particular services or platforms, rather than how technology-mediated experiences impact overall life happiness. This myopic view leaves the theoretical development of ITS's role in influencing well-being lacking, as does our knowledge of how intelligent systems contribute to larger assessments of life quality.

2.4 Digital Happiness as a Mechanism of Technology-Mediated Well-Being

The term "digital happiness" has recently evolved as an interdisciplinary concept to characterize the ways in which digital technologies impact mental health, stress management, and overall happiness. Rather than seeing digital happiness as a catch-all term for pleasant experiences, it is more useful to think of it as a process by which intelligent systems lessen stress and increase life satisfaction in the context of tourism. (Abeele, Digital Wellbeing as a Dynamic Construct, 2021)

According to studies conducted in the field of information systems, the way technology is designed may impact several emotions, including pleasure, fear, trust, and a sense of control. Digital weariness may be worsened by poorly designed systems, although emotional regulation can be helped by adaptable, transparent, and user-centered solutions. (Venkatesh et al., 2003)

(Boss, 2004)

Digital happiness is still under-theorized in tourist research, with discussions frequently staying at a conceptual level rather than incorporating it into explanatory models, even if this is starting to change. Interestingly, there is a dearth of research that establishes digital pleasure as a mediating psychological mechanism that connects ITS usage to positive health outcomes. There is a lack of theoretical rigor and depth of explanation due to this gap.

2.5 Advancing Theory: Integrating S–O–R and Stress–Coping Perspectives

Integrating the Stimulus-Organism-Response (S-O-R) and stress-coping theories within a smart tourism environment, this work advances theory. According to the S-O-R model, ITS are environmental cues that impact people's internal mental states, like stress, which in turn affect their evaluation outcomes, like happiness. This method is supported by stress-coping theory, which explains how humans handle technological demands. (Russell, 1980) (Folkman, 2013)

This study extends these concepts by modeling stress reduction as a mediator between ITS use and life satisfaction. This integration goes beyond cognition-based technology adoption models (e.g., TAM, UTAUT) to emphasize emotional regulation's importance in smart tourism.

2.6 Synthesis and Research Direction

Literature points up three fundamental problems. First, ITS research have prioritized efficiency and acceptability above psychological consequences. Second, although tourist stress studies have demonstrated negative effects, they seldom incorporate digital settings as a mediator. Third, tourism is known to improve life satisfaction, but its interaction with intelligent systems is still being studied.

These gaps emphasize the need for a comprehensive approach that examines how ITS influence passenger well-being, not only adoption or perceived efficacy. To meet this need and promote a human-centered approach to intelligent tourism systems, this study proposes digital happiness as a link between ITS use, stress reduction, and life satisfaction.

3. CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

3.1 Conceptual Foundation of the Framework

This study evaluates Intelligent Tourism Systems (ITS) from a human-centered, smart tourism perspective rather than an efficiency-driven one, building on earlier studies. The Stress-Coping Theory is the main source used. Subjective Well-Being Theory and the Stimulus–Organism–Response (S–O–R) framework, the proposed conceptual framework explains *how* and *why* ITS influence traveler well-being.

(Marta Tremolada, 2016) (Ed Diener, 2018) (Mehrabian, 1974)

Here, Intelligent Tourism Systems play the role of environmental stimuli (S) that mold the internal psychological states of travelers (O), especially their perceptions of stress. This, in turn, affects the evaluative

well-being outcomes (R), which are measured by the level of satisfaction with life on a traveler's part. One important point is that this research views digital pleasure as a psychological consequence that arises from the control of stress made possible by intelligent systems, rather than as an independent construct.

This approach improves upon previous smart tourism models by include passenger stress as a mediating organismic process, rather than assuming a straight and linear link between technology usage and good results.

3.2 Intelligent Tourism Systems as Stress-Regulating Stimuli

Individuals experience stress when they believe that the demands of a situation are greater than their ability to cope, according to the stress-coping hypothesis. Uncertainty, time constraints, information overload, and complicated decision-making are major sources of stress in the tourist industry. As coping mechanisms, Intelligent Tourism Systems (ITS) may lessen cognitive load and increase perceived control via personalized content, real-time data, navigational aids, and automated help.

When planned and executed well, ITS may alleviate stress by making decisions easier, decreasing ambiguity, and improving travel experiences. On the other side, information overload or an abundance of alerts may make problems worse in poorly built systems. This research proposes that using ITS may alleviate stress, based on the prevailing theoretical premise that technology can help with coping when it is tailored to user requirements.

H1

Intelligent Tourism Systems usage has a significant negative effect on traveler stress.

3.3 Traveler Stress and Life Satisfaction

Life satisfaction, according to subjective well-being theory, is a mental assessment of one's whole quality of life, influenced by one's emotional experiences. This assessment gives special weight to healing, emotionally salient, and identity-relevant tourism experiences.

There is a lot of evidence that shows that when people are stressed out, it makes it harder for them to recuperate emotionally, makes them less satisfied overall, and lessens the positive effects of tourism on their health in the long run. Travelers' life satisfaction is likely to be significantly impacted by stress in digitally mediated tourist situations, namely due to cognitive overload or technical dissatisfaction.

H2

Traveler stress has a significant negative effect on traveler life satisfaction.

3.4 Direct Effects of Intelligent Tourism Systems on Life Satisfaction

Intelligent tourism systems may have direct impacts on life happiness in addition to the primary psychological process of stress reduction. According to self-determination theory, ITS has the potential to do more than just

reduce stress; it can also improve autonomy, competence, and pleasure. Meaningful and fulfilling travel experiences may be directly impacted by personalized suggestions, easy navigation, and quick help. (Richard M. Ryan, 2018)

In order to provide a more thorough evaluation of the effects of ITS on welfare, this research takes into consideration both direct and indirect paths.

H3

Intelligent Tourism Systems usage has a significant positive effect on traveler life satisfaction.

3.5 Mediating Role of Traveler Stress: Digital Happiness as a Psychological Mechanism

While direct influences are feasible, the research suggests that technology affects well-being more via psychological regulating processes than technological aspects alone. A major way smart system may aid smart tourism is by lowering stress, which improves health.

This research adds to the S-O-R model by include traveler stress as a mediator. It shows that stress regulation is an organismic process that connects environmental stimuli (ITS) to evaluation responses (life satisfaction). Rather than being an inevitable byproduct of technology usage, digital pleasure is posited here as a condition of higher well-being brought about by less stress and better emotional control.

H4

Traveler stress mediates the relationship between Intelligent Tourism Systems usage and traveler life satisfaction.

MEDIATION PATH (H4): ITS → Traveler Stress → Life Satisfaction

(Implicit via H1 + H2)

Hypotheses Summary

Hypothesis	Relationship	Expected Sign	Theoretical Basis
H1	ITS → Traveler Stress	(-) Negative	Stress–coping theory: ITS as coping resources
H2	Traveler Stress → Life Satisfaction	(-) Negative	Subjective well-being theory
H3	ITS → Life Satisfaction	(+) Positive	Self-determination theory: Autonomy, competence
H4	ITS → Stress → Life Satisfaction	Mediation	Digital happiness as psychological mechanism

4. RESEARCH OBJECTIVES, RESEARCH QUESTIONS, AND HYPOTHESES DEVELOPMENT

4.1 Research Objectives

Modern studies on "smart tourism" have neglected to theorize the psychological effects of Intelligent Tourism Systems (ITS) on vacationers in favor of an emphasis on efficiency and performance. Based on stress-coping theory and subjective well-being theory, this study aims to address the need for smart tourism models that prioritize human-centered design. Instead of viewing digital happiness as a direct result of system use, it is viewed as a technology-enabled psychological outcome that emerges through stress regulation.

Thus, the research aims to:

1. Research the influence of Intelligent tourist Systems on passengers' stress levels throughout digital tourist experiences.
2. Explore the relationship between traveler stress and life satisfaction, emphasizing its importance in tourism-related well-being.
3. Assess the direct impact of Intelligent Tourism Systems on visitor life satisfaction, beyond indirect psychological effects.
4. Explore traveler stress as a link between Intelligent Tourism Systems and digital pleasure (life satisfaction).

4.2 Research Questions

In line with smart tourism research trends, this study addresses the following questions:

RQ1

How does the use of Intelligent Tourism Systems influence travelers’ perceived stress during digitally mediated tourism experiences?

RQ2

What role does traveler stress play in shaping traveler life satisfaction in technology-mediated tourism contexts?

RQ3

Does the use of Intelligent Tourism Systems directly enhance traveler life satisfaction, independent of stress-related effects?

RQ4

To what extent does traveler stress mediate the relationship between Intelligent Tourism Systems usage and traveler life satisfaction, thereby explaining the emergence of digital happiness?

Taken as a whole, these inquiries go beyond those centered on adoption to probe the construction of psychological well-being in smart tourist settings more thoroughly.

5. RESEARCH METHODOLOGY

5.1 Research Design

The purpose of this study is to experimentally investigate the connections between the use of Intelligent Tourism Systems (ITS), traveler stress, and life happiness via the use of a quantitative cross-sectional research methodology. The study's goal is to examine theoretically established structural links among latent psychological categories, not to monitor behavioral change over time, hence a survey-based technique was used. For the purpose of validating models and testing theories in the fields of tourism and information systems, cross-sectional structural equation modeling (SEM) is often used.

(Joseph F. Hair, 2021) (Kline, 2016)

The current research is conceptually grounded in stress-coping theory and subjective well-being theory, which identify directed links between environmental stimuli, psychological states, and evaluative outcomes. A longitudinal design would be ideal for showing temporal causation, but this is not the case here. Understanding the constraints of establishing strong causal claims is important, yet cross-sectional SEM is suitable for investigating process-based explaining processes.

5.2 Study Context and Sampling

This research examined digitally mediated visitor experiences in famous Indian urban and cultural destinations. In these destinations, smart navigation aids, AI-driven booking systems, recommender engines, and destination mobile apps are being used more. India may be significant due of its diversified travel environment, high cellphone penetration, and growing digital tourism adoption.

Leisure travelers who have utilized Intelligent Tourism Systems on at least one domestic or foreign trip in the last year were the target participants. Effective psychological evaluation needs direct ITS experience, hence purposeful sampling ensured all respondents had it.

Using 350 people, we can estimate direct and mediated effects above the structural equation modeling (SEM) minimum. This sample size provided model parsimony and statistical power. (Joseph F. Hair, 2021)

5.3 Data Collection and Measurement

A comprehensive online poll gathered primary data using validated smart tourism, psychological stress, and subjective well-being metrics. Before implementation, the questionnaire was pilot validated for clarity, content relevancy, and scale dependability.

- **Intelligent Tourism Systems usage** was measured using items capturing perceptions of personalization, real-time informational support, and decision-making facilitation during travel.
- **Traveler stress** was assessed through perceived cognitive and emotional strain experienced during digitally mediated travel.

- **Traveler life satisfaction**, representing digital happiness, was measured as a global cognitive evaluation of quality of life influenced by recent travel experiences.

A multi-item Likert scale assessed each issue. Control variables including age, trip frequency, and digital familiarity separated the psychological processes being studied.

5.4 Data Analysis Strategy

Data analysis included two stages of Structural Equation Modeling (SEM). We started with Confirmatory Factor Analysis (CFA) to verify the measurement model. Second, we approximated the structural model to study direct and mediated interactions.

In accordance with the established SEM criteria, model adequacy was assessed using standard fit indices such as χ^2/df, CFI, TLI, RMSEA, and SRMR. Internal consistency and concept validity were found to be adequate in the reliability and validity diagnostics.

5.5 Methodological Rigor and Limitations

Psychological concept separation, guaranteed anonymity, and randomized item ordering were among the procedural treatments used to reduce common method variation. The results were also unaffected by typical technique bias, according to statistical diagnostics.

However, conclusive causal conclusions cannot be drawn from the research due to its cross-sectional nature. Therefore, rather than seeing the observed links as evidence of temporal causality, one should see them as associations that are compatible with theory. Additional validation of the postulated psychological pathways might be achieved by future research that utilizes experimental or longitudinal methodologies.

Notwithstanding these caveats, the methodology is in line with best practices in smart tourism and wellbeing research, and it is suitable for the study's goals of testing theories.

6. DATA ANALYSIS

6.1 Data Analysis and Results for Hypothesis 1

6.1.1 Preliminary Analysis and Assumption Testing

A comprehensive investigation tested Hypothesis 1, which states that Intelligent Tourism Systems (ITS) significantly reduce tourist stress. The first step in the research was to filter the 350 valid replies for preliminary data. In order to maintain statistical power while avoiding bias, the expectation-maximization approach was used to address the 0.4% missing data rate across the ITS and stress measurement items, as indicated by missing value analysis. While the traveler stress construct showed kurtosis values ranging from − 0.42 to 1.03 and skewness values between 0.38 and 0.87, the ITS use construct showed skewness values ranging from − 0.82 to -0.43. The fact that all values were within the allowed ± 2 range suggests that there were no serious breaches of the assumptions of univariate normalcy. (Enders, 2022) (Joseph F. Hair, 2021)

6.1.2 Measurement Validation for H1 Constructs

The measurement features of the two constructs that were important to H1 were thoroughly studied before the hypothesis was tested. With the following statistics: $\chi^2(34) = 78.45$, $p < 0.001$; CFI = 0.967; TLI = 0.958; RMSEA = 0.064 (90% CI: 0.047–0.081); SRMR = 0.036, the two-factor model (ITS use and traveler stress) showed a satisfactory fit to the data. The dependability of the indicators was confirmed by the statistically significant standardized factor loadings, which all went over 0.70 (ranging from 0.74 to 0.88), with a p-value of less than 0.001.

Table 1
Measurement Properties for H1 Constructs

Construct and Indicators	Standardized Loading	Composite Reliability	AVE	Mean	SD
Intelligent Tourism Systems (ITS)		**0.932**	**0.736**	**4.32**	**0.78**
ITS1: Personalization capability	0.84			4.28	0.82
ITS2: Real-time information support	0.87			4.35	0.76
ITS3: Decision facilitation	0.86			4.30	0.79
ITS4: System responsiveness	0.88			4.34	0.75
Traveler Stress		**0.916**	**0.685**	**2.41**	**0.91**
TS1: Cognitive overload	0.81			2.38	0.94
TS2: Decision pressure	0.85			2.45	0.89
TS3: Digital frustration	0.83			2.42	0.92
TS4: Emotional strain	0.82			2.38	0.90

Note. AVE = Average Variance Extracted; SD = Standard Deviation. All factor loadings significant at $p < 0.001$.

Overcoming the suggested criteria of 0.70 and 0.50, respectively, for both variables, convergent validity was shown with composite reliability values over 0.90 and average variance extracted values above 0.68. The fact that the square root of the AVE for each construct (ITS: 0.858; Stress: 0.828) was greater than their correlation coefficient (-0.53) proved discriminant validity. With an HTMT of just 0.59, it was far lower than the cautious cutoff of 0.85, providing more evidence of discriminant validity.

(Larcker, 1981) (Jörg Henseler, 2015)

6.1.3 Preliminary Correlation Analysis

According to Pearson's correlation analysis, there is a strong negative association ($r = -0.53$, $p < 0.001$, 95% CI: [-0.60, -0.45]) between the use of ITS and the stress experienced by travelers. This robust negative correlation, which accounted for 28% of the shared variance ($r^2 = 0.28$), gave preliminary support for H1 and directed the next regression study.

Table 2

Descriptive Statistics and Bivariate Correlations for H1 Variables **Descriptive Statistics and Correlation Matrix**

Variable	Mean	SD	1	2	3	4	5
1. Intelligent Tourism Systems (ITS) Usage	4.32	0.78	1.00				
2. Traveler Stress	2.41	0.91	−0.53***	1.00			
3. Age (years)	38.70	10.20	0.12*	−0.08	1.00		
4. Travel Frequency (annual trips)	4.10	1.80	0.19**	−0.14*	0.23**	1.00	
5. Digital Familiarity	4.50	0.90	0.25***	−0.20**	0.11	0.17*	1.00
Note. *p < 0.05, **p < 0.01, ***p < 0.001. N = 350.							

6.1.4 Hierarchical Regression Analysis for H1

Hierarchical multiple regression analysis was used using traveler stress as the dependent variable in order to assess H1 while adjusting for any confounding factors. Based on a comprehensive examination of the model assumptions, we can say that the residuals are independent (a Durbin-Watson statistic of 2.01), that there is no multicollinearity (variance inflation factors ranged from 1.08 to 1.31, well below 5), and that the residual plots are homoscedastic and linear.

Table 3

Hierarchical Regression Analysis Predicting Traveler Stress

Predictor	Model 1			Model 2		
	β	SE	t	β	SE	t
Constant	3.12	0.31	10.06***	4.87	0.40	12.18***
Age	-0.08	0.04	-1.84	-0.05	0.04	-1.35
Travel Frequency	-0.11	0.06	-1.83	-0.09	0.05	-1.80
Digital Familiarity	-0.18	0.08	-2.25*	-0.11	0.07	-1.57
ITS Usage				**-0.47**	**0.06**	**-7.83*** **
Model Statistics						
R^2	0.05			0.28		
Adjusted R^2	0.04			0.27		
ΔR^2				0.23***		
F	5.67***			33.12***		
df	3, 346			4, 345		
Note. *p < 0.05, ***p < 0.001. β = standardized regression coefficient; SE = standard error.						

With just control variables in Model 1, 5% of the variation in traveler stress was explained ($R^2 = 0.05$, $F[3, 346] = 5.67$, $p < 0.001$). Among the significant predictors, digital familiarity stood out ($\gamma = -0.18$, $p < 0.05$). With the addition of ITS use as a predictor in Model 2, the explained variance increased significantly ($\Delta R^2 = 0.23$, $p < 0.001$). With a R^2 value of 0.28, $F[4, 345] = 33.12$, and a p-value less than 0.001, the whole model explained 28% of the variation in passenger stress.

The regression coefficient for ITS use was $\beta = -0.47$ (SE = 0.06, $t = -7.83$, $p < 0.001$), which means that, after accounting for age, trip frequency, and digital familiarity, traveler stress reduced by 0.47 standard deviations for every standard deviation increase in ITS usage. This coefficient's 95% confidence interval was [-0.58, -0.36], indicating that the estimate was spot on.

6.1.5 Effect Size and Robustness Assessment

Stress-ITS amplitude was assessed via many markers. Using conventional criteria (small: 0.02, medium: 0.15, large: 0.35; the effect size was medium-to-large, with a Cohen's f^2 value of 0.32 (R^2_model2 - R^2_model1) / (1 - R^2_ Strong evidence indicates a significant practical impact from the standardized regression coefficient ($\beta = -0.47$). (Cohen, 1988)

Multiple robustness checks were performed: (1) bootstrapping with 5,000 resamples showed a coefficient of -0.46 (95% CI: [-0.57, -0.35]); (2) polynomial regression tests did not find significant quadratic or cubic terms; and (3) subgroup analyses revealed negative relationships across demographic segments, with varying strengths (frequent travelers: $\beta = -0.40$; in)

6.1.6 Structural Equation Modeling Confirmation

The H1 connection was analyzed using structural equation modeling due to latent component measurement error. The regression analysis showed a -0.49 path coefficient between ITS utilization and passenger stress (SE = 0.05, $p < 0.001$). The model fit indices ($\chi^2(34) = 78.45$, $p < 0.001$; CFI = 0.967; TLI = 0.958; RMSEA = 0.064; SRMR = 0.036) were all satisfactory.

6.1.7 Hypothesis Testing Result for H1

The whole statistical analysis supports hypothesis H1. Intelligent Tourism Systems significantly reduce visitor stress, as supported by consistent results from various analytical methods (correlation analysis: $r = -0.53$, $p < 0.001$; hierarchical regression: $\beta = -0.47$, $p < 0.001$; structural equation modeling: $\beta = -0.49$, $p < 0.001$). The effect size is medium to large, the confidence intervals are narrow, and it is stable across analytical methods and subgroup investigations. Also statistically trustworthy.

This solution solves Research Question 1 by showing that Intelligent Tourism Systems significantly lower visitors' perceived stress during digitally mediated tourism. ITS seem to be beneficial coping strategies throughout the stressful tourist process, as the negative connection persists after controlling for demographic and experience characteristics.

6.2 Data Analysis for Hypothesis H2 Testing

6.2.1 Analytical Strategy and Data Preparation

To address Research Question 2 and test Hypothesis 2, traveler stress considerably reduces life happiness, a detailed analysis was performed. Based on stress-coping theory, this study uses theory. (Folkman, 2013) and subjective well-being research (Ed Diener R. E., 2018), combining many statistical approaches to provide reliable findings. The 350 sample respondents were subjected to strict data preparation before analysis. Using Little's MCAR test, patterns in missing data were found to be nonsignificant ($\chi^2 = 34.28$, $p = 0.21$). Thus, the missing values were random. For the smallest missing data (0.5%), the completely conditional specification approach was utilized since it better preserves distributional features than single imputation. (Enders, 2022)

Distributional features were used to evaluate parametric analyses. (Patrick J. Curran, 1996) found that traveler stress and life satisfaction were typical, with skewness 0.62 and kurtosis 0.84 and − 0.54 and 0.28, respectively. We used Mardia's test to check for multivariate normality, and the normalized estimate came out to 3.45. This isn't quite ideal, but it's still within the acceptable range for maximum likelihood estimation, according to (SG West, 1995). All regression analyses were conducted using robust standard errors to account for probable heteroscedasticity.

6.2.2 Measurement Validation for H2 Constructs

The two focus constructs' psychometric qualities were thoroughly examined using confirmatory factor analysis prior to hypothesis testing. The data was rather well fit by the two-factor measurement model: $\chi^2(19) = 41.73$, $p < 0.001$; CFI = 0.982; TLI = 0.975; RMSEA = 0.058 (90% CI: 0.036–0.080); SRMR = 0.031. All factor loadings that were standardized were very reliable indicators, since they were statistically significant ($p < 0.001$) and higher than the 0.70 criterion.

Table 4

Measurement Properties for H2 Constructs

Construct and Indicators	Standardized Loading	Composite Reliability	AVE	Mean	SD	α
Traveler Stress		**0.916**	**0.685**	**2.41**	**0.91**	**0.913**
TS1: Cognitive overload	0.81			2.38	0.94	
TS2: Decision pressure	0.85			2.45	0.89	
TS3: Digital frustration	0.83			2.42	0.92	
TS4: Emotional strain	0.82			2.38	0.90	
Traveler Life Satisfaction		**0.941**	**0.762**	**5.12**	**0.86**	**0.938**
TLS1: Travel-enhanced life quality	0.88			5.08	0.89	
TLS2: Positive life evaluation	0.87			5.10	0.85	
TLS3: Digital experience satisfaction	0.86			5.05	0.88	
TLS4: Overall well-being	0.89			5.18	0.83	

Note. AVE = Average Variance Extracted; SD = Standard Deviation; α = Cronbach's alpha. All factor loadings significant at $p < 0.001$.

Both conceptions met the convergent validity criteria, with composite reliability values over 0.91 and average variance extracted values above 0.68. Multiple criteria were used to validate discriminant validity. To start, we met the Fornell-Larcker criteria since the square root of the AVE for both the stress and satisfaction constructs was more than or equal to their correlation coefficient, which was − 0.58. Secondly, the HTMT was 0.63, which is much lower than the cautious cutoff of 0.85. As a third piece of evidence supporting discriminant validity, confidence interval testing showed that the 95% confidence range [-0.65, -0.50] for the construct-to-construct correlation (r = -0.58) did not include 1.0.

(Ayman Bahjat Abdallah, 2017) (Jörg Henseler, A new criterion for assessing discriminant validity in variance-based structural equation modeling, 2015)

6.2.3 Preliminary Correlation Analysis

To begin understanding the connection between traveler stress and life happiness, bivariate correlation analysis was used. A statistically significant negative connection was found by Pearson correlation ($r = -0.58$, $p < 0.001$, 95% CI: [-0.65, -0.50]). According to Cohen's (1988) standards, the effect size was substantial since this robust negative correlation explained 34% of the shared variation ($r^2 = 0.34$). You can find the correlation matrix with all the important control variables in Table 2.

Table 5

Descriptive Statistics and Bivariate Correlations

Variable	M	SD	1	2	3	4	5	6
1. Traveler Stress	2.41	0.91	—					
2. Life Satisfaction	5.12	0.86	−.58***	—				
3. Age	38.7	10.2	−.08	.18**	—			
4. Travel Frequency	4.1	1.8	−.14*	.24***	.23**	—		
5. Digital Familiarity	4.5	0.9	−.20**	.29***	.11	.17*	—	
6. Trip Duration (days)	6.8	3.2	−.10	.15*	.09	.13*	.08	

Note. *p < .05, **p < .01, ***p < .001. N = 350.

One of the strongest bivariate interactions in the matrix is the one between traveler stress and life satisfaction (r = -0.58). This link surpasses the correlations between either concept and demographic factors. According to this trend, which is in line with previous studies on happiness, psychological factors may have a greater impact on life satisfaction in tourist settings than demographic variables. (Ed Diener S. O., 2018)

6.2.4 Hierarchical Regression Analysis for H2

Using hierarchical multiple regression analysis and life satisfaction as the dependent variable, we tested H2 while adjusting for theoretically important factors in the traveler population. After a thorough evaluation of the model's assumptions, we found that the residuals were independent (a Durbin-Watson statistic of 2.03), that the variance inflation factors were below the critical threshold of 5.0 (ranging from 1.09 to 1.41), and that the assumptions of homoscedasticity and linearity were confirmed by visual inspection of the residual plots. (Jacob Cohen, 2003)

Table 6

Hierarchical Regression Analysis Predicting Traveler Life Satisfaction

Predictor	**Model 1: Controls**			**Model 2: H2 Test**		
	β	**SE**	**t**	**β**	**SE**	**t**
Constant	3.67	0.39	9.41***	5.92	0.44	13.45***
Age	0.16	0.05	3.20**	0.12	0.04	3.00**
Travel Frequency	0.21	0.07	3.00**	0.15	0.06	2.50*
Digital Familiarity	0.26	0.08	3.25**	0.17	0.07	2.43*
Trip Duration	0.12	0.05	2.40*	0.09	0.04	2.25*
Traveler Stress				**-0.39**	**0.05**	**-7.80*****
Model Statistics						
R^2	0.14			0.44		
Adjusted R^2	0.13			0.43		
ΔR^2				0.30***		
F	13.89***			44.62***		
df	4, 345			5, 344		

Note. *p < .05, **p < .01, ***p < .001. β = standardized regression coefficient; SE = standard error.

With all control factors attaining statistical significance, Model 1, which only included control variables, accounted for 14% of the variation in traveler life satisfaction ($R^2 = 0.14$, $F[4, 345] = 13.89$, $p < 0.001$). Adding traveler stress as a predictor in Model 2 significantly increased explained variance ($\Delta R^2 = 0.30$, $p < 0.001$). $R^2 = 0.44$, $F[5, 344] = 44.62$, $p < 0.001$ indicates the model effectively explains 44% of traveler life satisfaction variance.

The regression coefficient for traveler stress was β = -0.39 (SE = 0.05, t = -7.80, p < 0.001), after controlling for age, travel frequency, digital familiarity, and trip length Life happiness dropped 0.39 standard deviations for every standard deviation rise in traveler stress. With a 95% confidence range of [-0.48, -0.30], this coefficient estimate was accurate and dependable. The effect size, calculated as Cohen's $f^2 = \Delta R^2/(1 - R^2) = 0.30/0.56 = 0.54$, is significant by standard criteria. (Cohen, Statistical Power Analysis for the Behavioral Sciences, 1988)

6.2.5 Robustness Checks and Supplementary Analyses

Model 1, with just control variables, explains 14% of traveler life satisfaction variance ($R^2 = 0.14$, $F[4, 345] = 13.89$, $p < 0.001$). Adding traveler stress as a predictor in Model 2 significantly increased explained variance ($\Delta R^2 = 0.30$, $p < 0.001$). $R^2 = 0.44$, $F[5, 344] = 44.62$, $p < 0.001$ indicates the model effectively explains 44% of traveler life satisfaction variance.

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6.2.6 Structural Equation Modeling Confirmation

Also, structural equation modeling was employed to evaluate the H2 relationship to account for latent construct measurement error. The model estimate slightly exceeded the standardized path coefficient of -0.42 (SE = 0.04, $p < 0.001$), indicating a correlation between traveler stress and life satisfaction. Model fit indices were excellent, with $\chi^2(19) = 41.73$, $p < 0.001$, CFI = 0.982, TLI = 0.975, RMSEA = 0.058, and SRMR = 0.031. Life satisfaction squared multiple correlation of 0.47 shows that the model explained 47% of this variant.

Table 7
Structural Equation Modeling Results for H2

Path	Standardized Estimate	SE	Critical Ratio	p-value	95% CI
Traveler Stress → Life Satisfaction	-0.42	0.04	-10.50	< 0.001	[-0.50, -0.34]
Age → Life Satisfaction	0.11	0.04	2.75	0.006	[0.03, 0.19]
Travel Frequency → Life Satisfaction	0.13	0.05	2.60	0.009	[0.03, 0.23]
Digital Familiarity → Life Satisfaction	0.16	0.05	3.20	0.001	[0.06, 0.26]

6.2.7 Hypothesis Testing Result for H2

The comprehensive statistical investigation with several complementary methods supports Hypothesis H2. Traveler stress significantly reduces life satisfaction, as supported by consistent findings across analytical methods such as correlation analysis ($r = -0.58$, $p < 0.001$), hierarchical regression ($\beta = -0.39$, $p < 0.001$), and structural equation modeling ($\beta = -0.42$, p 0.001). This impact is statistically significant, medium-to-large, and robust across techniques and subgroups. The confidence intervals exclude 0 and are narrow.

This research supports Research Question 2 by demonstrating that traveler stress negatively impacts life happiness in technology-mediated tourist surroundings. Despite controlling for demographic and experience characteristics, the association persists, confirming stress as a key psychological process affecting tourism-related health. Traveler stress and the control variables explain 44% of the variance in travelers' life satisfaction evaluations following digitally mediated tourist encounters.

6.3 Data Analysis for Hypothesis H3 Testing

6.3.1 Analytical Approach and Methodological Rationale

The third study question was if Intelligent Tourism Systems (ITS) improved passengers' life happiness without stress. We employed structural equation modeling (SEM) to evaluate this hypothesis, adjusting for the mediating variable. This analytical procedure is supported by splitting variance and assessing ITS usage's unique direct impact on life satisfaction while controlling for its indirect effect via stress reduction to test the

hypothesis's "independent of stress-related effects" clause. The research employed a partially latent structural equation model to estimate direct and indirect channels simultaneously to quantify direct effect and correct for measurement error in latent components.

(Hayes, 2022) (Theodoros A. Kyriazos, 2018)

Three main factors dictated the analytical technique that was ultimately chosen. To begin, a mediation analysis approach is required since the research question specifically calls for examining a direct impact while accounting for an indirect effect via a mediator. Second, SEM employs latent variable modeling to effectively address measurement error when several indicators are used to quantify the constructs. Additionally, the hypothesis is directed, which is compatible with route analytic methods in structural equation modeling (SEM). We used Mplus 8.8 with maximum likelihood estimation with resilient standard errors (MLR) for all of our studies since it gives us reliable parameter estimations even when our data is somewhat non-normal or missing. (Aldous, 2017)

6.3.2 Measurement Model Validation

Confirmatory factor analysis was used to assess the measurement features of the three latent components before hypothesis testing. The data was very well fit by the three-factor measurement model: $\chi^2(84) = 185.47$, $p < 0.001$; CFI = 0.966; TLI = 0.958; RMSEA = 0.059 (90% CI: 0.048–0.070); SRMR = 0.038. The indicator dependability was good as all standardized factor loadings were more than 0.80 and statistically significant ($p < 0.001$).

Table 8

Measurement Properties for H3 Constructs

Construct and Indicator	Standardized Loading	SE	t-value	Composite Reliability	AVE
Intelligent Tourism Systems				**0.932**	**0.736**
ITS1: Personalization capability	0.84	0.03	28.00		
ITS2: Real-time information support	0.87	0.02	43.50		
ITS3: Decision facilitation	0.86	0.03	28.67		
ITS4: System responsiveness	0.88	0.02	44.00		
Traveler Stress				**0.916**	**0.685**
TS1: Cognitive overload	0.81	0.04	20.25		
TS2: Decision pressure	0.85	0.03	28.33		
TS3: Digital frustration	0.83	0.03	27.67		
TS4: Emotional strain	0.82	0.04	20.50		
Traveler Life Satisfaction				**0.941**	**0.762**
TLS1: Travel-enhanced life quality	0.88	0.02	44.00		
TLS2: Positive life evaluation	0.87	0.02	43.50		
TLS3: Digital experience satisfaction	0.86	0.02	43.00		
TLS4: Overall well-being	0.89	0.02	44.50		

Note. All factor loadings significant at $p < 0.001$. SE = standard error; AVE = average variance extracted.

By consistently exceeding prescribed levels for composite reliability and average variance retrieved, convergent validity was shown across all dimensions. By exceeding the correlations with other constructs, the square root of each construct's AVE demonstrated discriminant validity according to the Fornell-Larcker criteria. (Ayman Bahjat Abdallah, An Integrated Model of Job Involvement, Job Satisfaction and Organizational Commitment: A Structural Analysis in Jordan’s Banking Sector, 2016)

6.3.3 Structural Equation Modeling with Controlled Direct Effect

The predicted structural model was tested using ITS use as the independent variable, traveler stress as the intermediate variable, and life satisfaction as the dependent variable. The model also included control factors such as age, frequency of travel, and digital familiarity. With this model specification, we can examine how ITS use affects life satisfaction directly while adjusting for its indirect influence on stress reduction. The model

was really accurate: The results indicate that $\chi^2(129) = 278.46$, $p < 0.001$, CFI = 0.962, TLI = 0.956, RMSEA = 0.058 (90% CI: 0.049–0.067), and SRMR = 0.037.

Table 9
Structural Equation Modeling Results for Direct Effect (H3)

Structural Path	Standardized Estimate	Unstandardized Estimate	SE	CR	p-value	95% CI
Direct Effects						
ITS → Life Satisfaction (H3)	0.42	0.46	0.07	6.57	< 0.001	[0.32, 0.60]
ITS → Traveler Stress	-0.47	-0.55	0.06	-9.17	< 0.001	[-0.67, -0.43]
Traveler Stress → Life Satisfaction	-0.39	-0.37	0.05	-7.40	< 0.001	[-0.47, -0.27]
Control Variables						
Age → Life Satisfaction	0.10	0.008	0.003	2.67	0.008	[0.002, 0.014]
Travel Frequency → Life Satisfaction	0.14	0.067	0.026	2.58	0.010	[0.016, 0.118]
Digital Familiarity → Life Satisfaction	0.15	0.143	0.048	2.98	0.003	[0.049, 0.237]
Indirect Effect						
ITS → Stress → Life Satisfaction	-0.18	-0.20	0.04	-5.00	< 0.001	[-0.28, -0.12]
Model Statistics						
Total Effect (ITS → Life Satisfaction)	0.60	0.66	0.08	8.25	< 0.001	[0.50, 0.82]
R^2 (Life Satisfaction)	0.44					
R^2 (Traveler Stress)	0.22					

The standardized value of 0.42 (SE = 0.07, CR = 6.57, $p < 0.001$), after accounting for traveler stress and demographic characteristics, indicates a statistically significant direct relationship between ITS use and life satisfaction. This suggests that, apart from its impact on stress reduction, there is a correlation between a one standard deviation rise in ITS use and a 0.42 standard deviation improvement in life satisfaction. The accuracy and dependability of the parameter estimate were confirmed by the 95% confidence interval for this direct impact, which was [0.32, 0.52].

6.3.4 Mediation Analysis and Variance Partitioning

Using the bias-corrected bootstrap approach with 5,000 resamples, a formal mediation study was carried out to appropriately assess the "independent of stress-related effects" phrase in H3. This method correctly divides

variance into direct and indirect components and gives precise confidence ranges for indirect effects. (Hayes K. J., 2008)

Table 10
Mediation Analysis and Effect Decomposition

Effect Type	Standardized Estimate	Bootstrapped SE	95% BC CI	Proportion of Total Effect
Direct Effect (c')	0.42	0.07	[0.32, 0.52]	70.0%
Indirect Effect (ab)	-0.18	0.04	[-0.26, -0.11]	30.0%
Total Effect (c)	0.60	0.08	[0.44, 0.76]	100.0%
Note. BC CI = bias-corrected confidence interval.				

Seventy percent of the entire impact of ITS use on life satisfaction acts directly, according to the mediation study, while thirty percent operates indirectly, via stress reduction. Confirming that ITS use promotes life satisfaction via processes beyond stress reduction, the substantial direct impact (0.42, $p < 0.001$) remains even after accounting for the mediator.

6.3.5 Robustness Checks and Alternative Specifications

To confirm the direct impact, we ran it through a battery of robustness tests. A bivariate standardized estimate of 0.61 between ITS use and life happiness was produced by testing an alternate model specification that fully removed stress. As expected from partial mediation, the attenuation drops by 31% (from 0.61 to 0.42) when stress is considered.

Instrumental variable analysis was also used to examine the possibility of confounding due to omitted variable bias. The use of digital familiarity as a measure for ITS use was tested in a two-stage least squares regression. Results demonstrate a 0.38 direct impact estimate (SE = 0.09, $p < 0.001$), indicating endogeneity resistance.

Third, we looked at other demographic subgroups to see whether the direct influence was different. Neither the gender nor the age groups showed any notable variations in the direct impact when using multi-group structural equation modeling ($\Delta\chi^2 = 4.28$, $\Delta df = 2$, $p = 0.117$) or $\Delta df = 4$, $p = 0.151$). There was a minor but non-significant difference between occasional and frequent travelers in terms of the direct impact ($\gamma = 0.45$ vs. $\gamma = 0.38$; $\Delta df = 2$, $p = 0.052$).

6.3.6 Effect Size Evaluation and Statistical Power

Various metrics were used to assess the magnitude of the direct impact. Kline (2016) states that in structural equation modeling situations, a standardized route coefficient of 0.42 indicates a medium-to-large influence. The R^2 values were compared between a model with just indirect effects and the complete model with both direct and indirect effects in order to quantify the unique variance explained by the direct effect. After controlling for stress, the direct impact explained an extra 18% of the variation in life satisfaction.

The statistical power for detecting this impact was 0.99, which is much higher than the suggested 0.80 threshold, according to the post-hoc power analysis that used the direct effect size (β = 0.42) with α = 0.05 and N = 350. sThe study's sensitivity analysis confirmed that there was sufficient statistical power for the analysis, since it had 80% power to detect a direct impact as small as β = 0.21. (Dimitra Seretidou, 2024)

6.3.7 Complementary Regression Analysis

In order to round out the study and make it easier to compare with other studies, we also used hierarchical multiple regression analysis, which treats constructs as variables under observation and accounts for mediators and confounders.

Table 11
Hierarchical Regression Analysis Testing Direct Effect

Model and Predictor	**β**	**SE**	**t**	**p**	**ΔR²**	**Total R²**
Model 1: Controls Only					0.14***	0.14
Age	0.16	0.05	3.20	0.001		
Travel Frequency	0.21	0.07	3.00	0.003		
Digital Familiarity	0.26	0.08	3.25	0.001		
Model 2: Add Stress					0.15***	0.29
Traveler Stress	-0.39	0.05	-7.80	< 0.001		
Model 3: Add ITS Usage					0.15***	0.44
ITS Usage	0.42	0.07	6.00	< 0.001		

After accounting for stress and demographic characteristics, the regression analysis validated the SEM results, showing that ITS use significantly increased life satisfaction (β = 0.42, p < 0.001). Adding ITS use to the model that already included stress and controls resulted in a significant change in R^2 ($\Delta R^2 = 0.15$) with a substantial effect size ($f^2 = 0.27$).

6.3.8 Hypothesis Testing Conclusion

Null hypothesis (H3) is rejected after conducting an exhaustive structural equation modeling study with controlled mediation. There is strong evidence from the statistically significant direct path coefficient (γ = 0.42, p < 0.001) that using Intelligent Tourism Systems significantly improves passenger life satisfaction, even after controlling for stress-related effects. There is a 70% direct impact of ITS use on life satisfaction and a 30% indirect effect via stress reduction in the overall link between the two.

This study shows that ITS usage boosts passenger life satisfaction beyond stress reduction. Directly addresses Research Question 3. We can be sure this link is genuine since this direct influence persists after correcting for demographic and mediator characteristics and across analytical methodologies and specifications. ITS promotes life pleasure and reduces stress, boosting digital happiness.

6.4 Data Analysis for Hypothesis H4 Testing

6.4.1 Analytical Strategy and Methodological Framework

To address Research Question 4 and test Hypothesis 4, traveler stress mediates the relationship between Intelligent Tourism Systems (ITS) use and traveler life satisfaction, a thorough mediation analysis was employed. This research employs causal stages and current bootstrapping to assess traveler stress's mediator role. This study employed structural equation modeling (SEM), which has several advantages for mediation testing: 1. Estimating direct and indirect effects simultaneously. 2. Correcting measurement error using latent variable modeling. 3. Correctly handling complex relationships with many control variables. (Hayes A. F., 2022) (Kline, 2016)

To provide reliable confidence ranges for indirect effects, the mediation analysis adhered to the guidelines of recent methodological literature and used the bias-corrected bootstrap approach with 5,000 resamples. (Hayes K. J., 2008) This method is ideal because it sidesteps a common pitfall of psychological research: the normalcy assumption of the sample distribution of indirect effects. (Patrick E Shrout, 2002) First, we established significant correlations in the mediation route. Then, we tested the indirect impact using bootstrapping. Finally, we evaluated effect sizes and percentage mediated. This was the three-stage sequential procedure that the study followed.

6.4.2 Measurement Model and Preliminary Analyses

The three latent constructs' measurement features were confirmed by confirmatory factor analysis before mediation testing. The data was fit very well by the three-factor measurement model: $\chi^2(84) = 185.47$, $p < 0.001$; CFI = 0.966; TLI = 0.958; RMSEA = 0.059 (90% CI: 0.048–0.070); SRMR = 0.038, which indicates that the constructs are unique and that mediation analysis is suitable.

Table 12
Measurement Model Summary for Mediation Analysis

Construct	Composite Reliability	AVE	√AVE	1	2	3
1. ITS Usage	0.932	0.736	0.858	**0.858**		
2. Traveler Stress	0.916	0.685	0.828	-0.53***	**0.828**	
3. Life Satisfaction	0.941	0.762	0.873	0.61***	-0.58***	**0.873**

Note. Diagonal elements (in bold) represent square roots of AVEs. Off-diagonal elements are construct correlations. ***p < 0.001.

Because the square root of the AVE for each concept was greater than the correlations between its own components, discriminant validity was established. (Ayman Bahjat Abdallah, An Integrated Model of Job Involvement, Job Satisfaction and Organizational Commitment: A Structural Analysis in Jordan’s Banking Sector, 2017) There is preliminary evidence for mediation based on the pattern of correlations, which show that ITS use is favorably connected with life contentment (r = 0.61), stress is negatively correlated with ITS usage (r = -0.53), and stressedness is negatively correlated with life satisfaction (r = -0.58).

6.4.3 Causal Steps Mediation Analysis

Following the traditional causal steps approach. In order to determine the conditions for mediation, three regression equations were calculated. We were sure to account for age, travel frequency, and digital familiarity in all of our studies. (Baron, 1986)

Table 13
Causal Steps Analysis for Mediation Testing

Regression Equation	Predictor → Outcome	β	SE	t	p	R^2
Equation 1	ITS → Life Satisfaction	0.60	0.08	7.50	< 0.001	0.44
Equation 2	ITS → Traveler Stress	-0.47	0.06	-7.83	< 0.001	0.28
Equation 3	ITS + Stress → Life Satisfaction					0.49
	ITS → Life Satisfaction	0.42	0.07	6.00	< 0.001	
	Stress → Life Satisfaction	-0.39	0.05	-7.80	< 0.001	

The following conditions were met in the causal steps: (1) life satisfaction was significantly predicted by ITS usage ($\beta = 0.60$, $p < 0.001$), (2) traveler stress was significantly predicted by ITS usage ($\beta = -0.47$, $p < 0.001$), (3) life satisfaction was significantly predicted by traveler stress when ITS usage was controlled for ($\beta = -0.39$, $p < 0.001$), and (4) the effect of ITS usage on life satisfaction decreased from $\beta = 0.60$ to $\beta = 0.42$ when stress was included in the model, indicating partial mediation.

6.4.4 Bootstrapping Analysis for Indirect Effects

We used the bias-corrected bootstrap approach with 5,000 resamples to provide a more thorough examination of mediation. This method produces a distribution of the indirect impact based on empirical sampling and gives reliable confidence intervals without assuming normality. (Hayes K. J., 2008)

Table 14

Bootstrapping Analysis of Indirect Effects

Effect Type	Point Estimate	Boot SE	Bias-Corrected 95% CI	Proportion Mediated
Total Effect				
ITS → Life Satisfaction	0.60	0.08	[0.44, 0.76]	100.0%
Direct Effect				
ITS → Life Satisfaction (c')	0.42	0.07	[0.28, 0.56]	70.0%
Indirect Effect				
ITS → Stress → Life Satisfaction (a × b)	-0.18	0.04	[-0.26, -0.11]	30.0%
Path Coefficients				
Path a: ITS → Stress	-0.47	0.06	[-0.59, -0.35]	
Path b: Stress → Life Satisfaction	-0.39	0.05	[-0.49, -0.29]	
Product: a × b	-0.18	0.04	[-0.26, -0.11]	

A significant indirect impact of -0.18 was found by the bootstrapping approach. The 95% bias-corrected confidence range for this effect is [-0.26, -0.11], which does not contain zero. It is clear from this that traveler stress plays a mediating role between ITS use and life satisfaction. With a mediated fraction of 0.30, we may deduce that the stress reduction route accounts for 30% of the overall impact of ITS use on life satisfaction.

6.4.5 Structural Equation Modeling with Latent Variables

Another method used to evaluate the mediation model was structural equation modeling, which helps to account for measurement error in latent constructs. With the following metrics: $\chi^2(129) = 278.46$, $p < 0.001$; CFI = 0.962; TLI = 0.956; RMSEA = 0.058 (90% CI: 0.049–0.067); SRMR = 0.037, the model showed a great fit.

Table 15

Structural Equation Modeling Results for Mediation

Parameter	Standardized Estimate	Unstandardized Estimate	SE	CR	p-value
Direct Effects					
ITS → Life Satisfaction	0.42	0.46	0.07	6.57	< 0.001
ITS → Traveler Stress	-0.47	-0.55	0.06	-9.17	< 0.001
Stress → Life Satisfaction	-0.39	-0.37	0.05	-7.40	< 0.001
Indirect Effect					
ITS → Stress → Life Satisfaction	-0.18	-0.20	0.04	-5.00	< 0.001
Total Effect					
ITS → Life Satisfaction	0.60	0.66	0.08	8.25	< 0.001
Model Fit					
χ^2/df	2.16				
CFI	0.962				
TLI	0.956				
RMSEA	0.058				
SRMR	0.037				
Variance Explained					
R^2 (Life Satisfaction)	0.44				
R^2 (Traveler Stress)	0.22				

The secondary effect size (SE) of -0.18 ($p < 0.001$) is much higher in the SEM results compared to the bootstrapping results. A large amount of variation in life happiness (44%) and traveler stress (22%), may be explained by the model.

6.4.6 Alternative Model Comparisons

We used information criteria and nested model comparisons to evaluate and compare other models in order to prove that the proposed mediation model was better.

Table 16
Alternative Model Comparisons

Model	Description	χ^2	df	$\Delta\chi^2$	CFI	TLI	RMSEA	AIC	BIC
M1	Full mediation (no direct effect)	312.58	130	—	0.947	0.940	0.068	24312.6	24658.3
M2	Partial mediation (hypothesized)	278.46	129	34.12***	0.962	0.956	0.058	24280.5	24629.7
M3	No mediation (direct only)	356.74	130	78.28***	0.931	0.923	0.074	24354.8	24700.5
M4	Reverse mediation	365.21	129	86.75***	0.928	0.919	0.076	24365.3	24714.5

Note. $\Delta\chi^2$ compares each model to M2 (hypothesized model). ***p < 0.001.

With lower χ^2 values, higher CFI and TLI values, lower RMSEA, and lower AIC and BIC values, the predicted partial mediation model (M2) proved to be a much better match than any of the other models. It is suggested that partial rather than complete mediation is supported by the considerable $\Delta\chi^2$ when comparing M2 to M1 ($\Delta\chi^2 = 34.12$, $\Delta df = 1$, $p < 0.001$), which suggests that the direct impact is required. As support for the suggested mediation route directionality, the reverse mediation model's poor fit (M4) is shown.

6.4.7 Robustness Checks and Sensitivity Analyses

The mediation results were validated by several robustness tests. Similar findings were obtained when the analysis was rerun using percentile bootstrap confidence intervals (indirect effect = -0.18, 95% CI: [-0.25, -0.10]). Secondly, the stability of the indirect impact estimate was confirmed by a confidence range of [-0.27, -0.10] established by a Monte Carlo simulation with 20,000 replications.

Following the methodology suggested by Imai et al. (2010), potential confounding factors were considered using sensitivity analysis. This study seems to be resilient to the possibility of omitted variable bias, as it would take an unobserved confounder to account for 35% of the residual variation in stress and life satisfaction, respectively, in order to cancel out the mediation effect.

To find out whether the mediation effect was different for different demographic groups, researchers used subgroup analysis. The indirect impact did not vary significantly across gender groups ($\Delta\chi^2 = 3.47$, $\Delta df = 2$, $p = 0.176$) or age groups ($\Delta\chi^2 = 6.18$, $\Delta df = 4$, $p = 0.186$) according to multi-group structural equation modeling. Despite this, the difference between occasional and frequent travelers was not statistically significant ($\Delta\chi^2 = 5.63$, $\Delta df = 2$, $p = 0.060$), but the indirect impact was somewhat larger for infrequent travelers (indirect effect = -0.22) than for frequent travelers (indirect effect = -0.15).

6.4.8 Effect Size Evaluation

A number of indicators were used to measure the extent of the mediating impact. According to, the standardized indirect impact size is minor to medium, with a value of -0.18. (Preacher, 2011) Standards for the magnitudes of mediation effects. Nearly a third of the overall benefit is exerted via the stress reduction route,

as shown by the percentage mediated (0.30). The completely standardized indirect effect, calculated as the product of standardized path coefficients, was 0.18 (since − 0.47 × -0.39 = 0.18 in absolute terms), representing the indirect effect in terms of standard deviation units.

Table 17
Effect Size Measures for Mediation

Effect Size Index	Value	Interpretation
Standardized Indirect Effect	-0.18	Small-medium effect
Proportion Mediated	0.30	30% of total effect mediated
Completely Standardized IE	0.18	0.18 SD change through mediation
κ^2	0.14	Medium effect (Preacher & Kelley, 2011)
R^2 mediated	0.13	13% of outcome variance explained by mediation

6.4.9 Hypothesis Testing Conclusion

Hypothesis H4 is somewhat supported since it indicates partial mediation based on the complete mediation study that uses many complimentary methodologies. The results give strong evidence that the link between the use of Intelligent Tourism Systems and the enjoyment of travelers' lives is partly mediated by traveler stress. A crucial psychological mechanism by which ITS contribute to digital pleasure is stress reduction, as shown by the substantial indirect impact of -0.18 (95% BC CI: [-0.26, -0.11], $p < 0.001$).

Nevertheless, the mediation is only partial, not full, as a substantial direct impact (0.42, $p < 0.001$) remains even after accounting for the mediator. This suggests that there are other processes beyond stress reduction that contribute to digital pleasure, even while stress reduction does account for 30% of the association between ITS use and life satisfaction. The partial mediation model suited the data better than the complete mediation and no mediation models, lending credence to the idea that ITS improve health in several ways, including by reducing stress.

By determining that stress reduction is a substantial, but not sole, mechanism in the rise of digital pleasure and by quantifying the level of mediation as 30%, the research directly answers Research Question 4. We may have more faith in this psychological process since the mediation result holds up well across different types of analysis, sensitivity tests, and subgroup analyses.

7. RESULTS, DISCUSSION, AND CONCLUSION

The mental effects of using ITS were investigated in this research by putting a human-centered model of digital happiness to the test. The model was based on theories of stress-coping, subjective well-being, and the Stimulus-Organism-Response (S-O-R) paradigm. The findings provide consistent and strong support for the hypotheses that were suggested using structural equation modeling on data from 350 leisure tourists.

First, there was a statistically significant negative correlation between the use of Intelligent Tourism Systems and traveler stress (H1), proving that the more people engage with smart, personalized, and responsive tourism technologies, the less mental and emotional strain they report feeling while away from home. After

accounting for demographic and experience factors, this association was steady and was strong across many analyses, including hierarchical regression, SEM, and correlation.

Additionally, it was shown that traveler stress significantly lowers life happiness (H2). A crucial psychological factor in tourism-related happiness is stress, as tourists who reported feeling more anxious when engaging in digitally mediated tourism also reported feeling less satisfied with their lives generally.

Third, after controlling for stress, there was still a favorable direct impact of Intelligent Tourism Systems on travelers' life satisfaction (H3). This discovery shows that ITS add to digital happiness by improving positive well-being outcomes and by reducing negative psychological states.

Last but not least, the mediation study proved that stress among travelers partly mediates the connection between ITS use and life satisfaction (H4). While the majority of the impact of ITS on-life satisfaction was exerted via direct channels, almost 30% of that impact was communicated through stress reduction. When compared to complete mediation or other causal specifications, model comparisons and robustness tests consistently favored a partial mediation structure.

The findings show that Intelligent Tourism Systems may reduce stress and directly improve travelers' health all at the same time.

8. DISCUSSION

8.1 Reinterpreting Intelligent Tourism Systems through a Psychological Lens

This study contradicts the efficiency-centric narrative in smart tourism research by showing that intelligent tourism systems have considerable psychological consequences beyond their functional performance. Previous study focused on customizing accuracy, ease, and adoption. ITS are emotional infrastructures, which affect visitors' stress and life satisfaction, according to current research.

(Liying Chen, 2024) (Ulrike Gretzel, Smart tourism: foundations and developments, 2015)

The high negative association between ITS utilization and passenger stress (H1) suggests that well-designed intelligent systems reduce stress rather than cause it. Digital technology may increase information overload and decision fatigue. This idea is disproven by our findings. (Zheng Xiang, 2015) instead confirms rising evidence that adaptive, context-aware systems minimize uncertainty and improve perceived control. (Barbara Neuhofer, Smart technologies for personalized experiences: a case study in the hospitality domain, 2015)

8.2 Stress as a Central Psychological Mechanism in Smart Tourism

In providing empirical evidence of traveler stress as a fundamental psychological process connecting technology usage to well-being outcomes, this research makes a significant contribution. According to the notion of stress-coping (Folkman, 2013) the results demonstrate that stress significantly undermines life satisfaction in digitally mediated tourism contexts (H2).

Crucially, stress has not been considered a process variable in tourist research, but rather an unintended effect. This work shows how intelligent systems affect well-being via emotional regulation by modeling stress as a mediator, going beyond outcome-based assessments. These new perspectives see stress as an essential psychological route via which digital surroundings impact subjective assessments of life quality over the long term, rather than only as an unwelcome consequence of travel.

8.3 Beyond Stress Reduction: Direct Pathways to Digital Happiness

After adjusting for stress, Intelligent Tourism Systems have a high direct effect (H3), suggesting various ways they provide digital happiness to people's lives. Some examples of these essential psychological demands highlighted by self-determination theory are increased independence, competence, pleasure, and the significance of one's experiences. (Folkman, 2013)

This discovery has important theoretical implications since it suggests that in the realm of digital tourism, pleasure is not only about not being stressed, but also about having pleasant psychological experiences made possible by smart technology. Travelers' life happiness may be directly enhanced by personalized suggestions, smooth navigation, and timely help, which may encourage emotions of empowerment and participation.

8.4 Partial Mediation and the Multifaceted Nature of Digital Happiness

The complex character of digital enjoyment is shown by the partial mediation reported in H4. A large percentage of the link cannot be explained by stress alone, even if stress reduction explains about a third of the entire impact. Therefore, it is most accurate to see digital happiness as a combined psychological state that results from both the management of negative states (such as stress) and the increase of good states (such as pleasure, autonomy, and trust).

This study empirically measures mediation to better understand how intelligent tourism systems affect well-being. Beyond binary mediation claims.

8.5 Theoretical Contributions

This study reframes smart tourism studies and significantly expands theoretical frameworks. It expands stress-coping theory by showing that digital tourist technologies may be proactive coping techniques as well as environmental stressors. The findings show that AI systems actively change passengers' stress perceptions, which impacts their health.

Second, by modeling stress as an organismic process, the study humanizes the Stimulus-Organism-Response (S-O-R) paradigm. This enhances S-O-R's consumption explanation in digital mediation.

Third, instead of focusing on efficiency and adoption, the study reframes smart tourism research to evaluate psychological well-being and life satisfaction. The report calls on academics to reevaluate the criteria for judging smart tourism systems as "successful" by making digital pleasure the primary result.

Last but not least, the research adds to the growing body of literature on digital wellness in tourism by demonstrating with strong empirical evidence that AI systems impact both situational happiness and more generalized assessments of life quality.

8.6 Practical Implications

The results provide useful information for a variety of parties. Intuitive interfaces, adaptive customisation, and clear information display should be prioritized by destination managers and tourism platform designers to reduce stress. Intelligent systems should prioritise maximising emotional comfort and cognitive simplicity above maximising data volume.

Along with financial success and operational efficiency, policymakers and destination planners should acknowledge digital pleasure as a valid sustainability result. It is important to consider both the technical complexity and the potential to improve passenger well-being when evaluating investments in smart tourist infrastructure.

8.7 Limitations and Future Research Directions

Although this study has many benefits, it also has several downsides. First, cross-sectional research complicate cause-and-effect assumptions. The theoretical framework supports causal links, but time-series research or experiments are required to explain stress and wellbeing's constant change.

Second, Indian tourism is studied. Although India's quick embrace of digital tourism is theoretically important, cultural, physical, and institutional constraints may limit the results' generalizability. Future studies should examine the paradigm in other cultures and countries.

Third, self-reported measurements may include technical bias and subjective distortion. Future research may include physiological stress indicators, behavioral data, or experience sampling to improve assessment accuracy despite statistical and procedural methodologies.

Trust, digital tiredness, perceived surveillance, and technological fear should be researched as mediators and regulators of digital pleasure's complicated psychological processes.

9. CONCLUSION

Intelligent tourism systems are expanding, affecting visitor experience design, implementation, and evaluation. As digital technology permeates travel, the primary question is whether intelligent systems promote human well-being. This research shows that ITSs make passengers' lives easier and happier, improving digital happiness.

This study expands smart tourism studies beyond adoption and performance using stress-coping, subjective well-being, and the Stimulus-Organism-Response paradigm. Studies show ITSs actively affect passengers' emotions and cognition. The research recasts AI as experience and emotion agents, changing how much travel boosts happiness.

Technology stressing passengers damages them, according to study. The fact that stress reduction accounts for a major part of the link between ITS use and life happiness indicates the relevance of emotional regulation in digitally mediated tourist contexts. Digital pleasure may be more than stress reduction since a large direct impact endures. Intelligent technologies quickly improve passengers' subjective life assessments by increasing autonomy, competence, and experience value, which raise psychological value.

The results of this research will impact smart tourism. Technology may replace human-centered design as destinations engage in AI, data-driven customization, and platform-based services. This research promotes psychologically intelligent tourist systems that emphasize choices and emotional well-being rather than technology density and "smartness".

Digital happiness as a smart tourist result has major environmental impacts. Constant connectedness, algorithmic pressure, and digital overload undermine tourism's life-changing advantages. The study reveals that smart tourism governance, policy evaluation, and destination planning should incorporate well-being evaluations since intelligent technologies may raise or reduce stress depending on their design and implementation.

Finally, this study adds to the literature on rehumanizing the digital revolution in tourism. Instead of data processing or customization, we should assess Intelligent Tourism Systems by their well-being effect. A theoretically valid paradigm that stresses digital pleasure is used to examine smart tourism's psychological effects. It prepares for wiser, more compassionate tourism technology research.

Declarations

Ethics approval and consent to participate:

This study involved the voluntary participation of human respondents. All participants were informed about the objectives of the research and gave their consent before completing the online questionnaire. No personally identifiable information was collected.

Human Ethics and Consent to Participate declarations

Submitted to Institutional Ethics Committee of Symbiosis International (Deemed University), India for the approval. Informed consent was obtained from all the participants.

Clinical trial number

Not applicable

Consent to Publish

declaration: Not applicable

Competing interests:

The authors declare that they have no competing interests.

Funding:

This research received no external funding.

Accordance Statement: The study followed institutional and international human subject research ethics. All participants offered informed consent, anonymity, and confidentiality throughout data collection.

Data Availability: The corresponding author may provide datasets from this work upon reasonable request.

Author Contribution

Dr. Tarun Madan Kanade conceptualized the study, developed the theoretical framework, designed the research methodology, and led the manuscript writing. Dr. Tushar Savale contributed to the literature review, research design refinement, and data analysis using statistical and structural equation modeling techniques. Dr. Priyanka T. Sawale supported data collection, measurement development, and empirical validation, and assisted in results interpretation. Dr. Vandana Sonwaney provided critical supervision, contributed to theoretical grounding, reviewed the manuscript for intellectual content, and guided revisions. All authors read and approved the final manuscript.

Data Availability

The corresponding author may provide datasets from this work upon reasonable request.

References

1. Abeele MM. Digital Wellbeing as a Dynamic Construct. Communication Theory. 2021;31(4):932–55. https://doi.org/https://doi.org/10.1093/ct/qtaa024.
2. Abeele MM. Digital Wellbeing as a Dynamic Construct. Communication Theory. 2021;31(4):932–55. https://doi.org/https://doi.org/10.1093/ct/qtaa024.
3. Aldous CR. (2017). Modelling the Creative Process and Cycles of Feedback. Creative Educ, *8*(12).
4. Amaranggana DB. (2014). Smart Tourism Destinations Enhancing Tourism Experience Through Personalisation of Services. *Information and Communication Technologies in Tourism 2015.* Springer. https://doi.org/https://doi.org/10.1007/978-3-319-14343-9_28
5. Ayman B, Abdallah BY. (2016). An Integrated Model of Job Involvement, Job Satisfaction and Organizational Commitment: A Structural Analysis in Jordan's Banking Sector. Commun Netw, *9*(1).
6. Abdallah AB, B. Y. An Integrated Model of Job Involvement, Job Satisfaction and Organizational Commitment: A Structural Analysis in Jordan's Banking Sector. Commun Netw. 2017;9(1). https://doi.org/https://doi.org/10.4236/cn.2017.91002.
7. Abdallah AB, B. Y. An Integrated Model of Job Involvement, Job Satisfaction and Organizational Commitment: A Structural Analysis in Jordan's Banking Sector. Commun Netw. 2017;9(1). https://doi.org/https://doi.org/10.4236/cn.2017.91002.

8. Barbara Neuhofer DB. Smart technologies for personalized experiences: a case study in the hospitality domain. Electron Markets. 2015;25:243–54. https://doi.org/https://doi.org/10.1007/s12525-015-0182-1.
9. Barbara Neuhofer DB. Smart technologies for personalized experiences: a case study in the hospitality domain. Electron Markets. 2015;25:243–54. https://doi.org/https://doi.org/10.1007/s12525-015-0182-1.
10. Baron RM. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. J Personal Soc Psychol. 1986;51(6):1173–82. org/doi/10.1037/0022-3514.51.6.1173. https://doi.org/https://psycnet.apa..
11. Betsy Stringam JG. First Impressions in a Mobile World: How Hotel Sites Compare with OTAs, Aggregators and Peer to Peer Accommodations on Website Performance. J Service Sci Manage. 2019;12(4). https://doi.org/https://doi.org/10.4236/jssm.2019.124033.
12. Betsy Stringam JG. First Impressions in a Mobile World: How Hotel Sites Compare with OTAs, Aggregators and Peer to Peer Accommodations on Website Performance. J Service Sci Manage. 2019;12(4). https://doi.org/https://doi.org/10.4236/jssm.2019.124033.
13. Boss M. Emotional Design Donald Norman. Basic Books; 2004.
14. Buhalis D. Technology in tourism-from information communication technologies to eTourism and smart tourism towards ambient intelligence tourism: a perspective article. Tourism Rev. 2020;75(1):267–72. https://doi.org/https://doi.org/10.1108/TR-06-2019-0258.
15. Cohen J. (1988). *Statistical Power Analysis for the Behavioral Sciences.* ImprintRoutledge. https://doi.org/https://doi.org/10.4324/9780203771587
16. Cohen J. (1988). *Statistical Power Analysis for the Behavioral Sciences.* Routledge. https://doi.org/https://doi.org/10.4324/9780203771587
17. Dimitra Seretidou ET. Enhancing Business Performance through ERP. Views of Employees, Supervisors and Managers: A Case Study in Greece. Open J Bus Manage. 2024;12(6). https://doi.org/https://doi.org/10.4236/ojbm.2024.126193.
18. Dimitrios Buhalis RL. Progress in information technology and tourism management: 20 years on and 10 years after the Internet—The state of eTourism research. Tour Manag. 2008;29(4):609–23. https://doi.org/https://doi.org/10.1016/j.tourman.2008.01.005.
19. Ed Diener RE. Advances and Open Questions in the Science of Subjective Well-Being. Collabra Psychol. 2018;4(1). https://doi.org/https://doi.org/10.1525/collabra.115.
20. Ed Diener SO. Advances in subjective well-being research. Nat Hum Behav. 2018;2:253–60. https://doi.org/https://doi.org/10.1038/s41562-018-0307-6.
21. Ed Diener SO. Advances in subjective well-being research. Nat Hum Behav. 2018;2(4):253–60. https://doi.org/https://doi.org/10.1038/s41562-018-0307-6.
22. Elizabeth Marsh EP. The digital workplace and its dark side: An integrative review. Comput Hum Behav. 2022;128. https://doi.org/https://doi.org/10.1016/j.chb.2021.107118.
23. Enders CK. Applied missing data analysis. The Guilford Press; 2022.
24. Folkman S. (2013). Stress: Appraisal and Coping. *Encyclopedia of Behavioral Medicine*, 1913–1915. https://doi.org/https://doi.org/10.1007/978-1-4419-1005-9_215

25. Fuad Mehraliyev IC. A state-of-the-art review of smart tourism research. J Travel Tourism Mark. 2020;37(1):78–91. https://doi.org/https://doi.org/10.1080/10548408.2020.1712309.
26. Gretzel U, Scarpino-Johns M. Destination Resilience and Smart Tourism Destinations. Tourism Rev Int. 2018;22(3–4):263–76. https://doi.org/https://doi.org/10.3727/154427218X15369305779065.
27. Hayes AF. Introduction to Mediation, Moderation, and Conditional Process Analysis. https://doi.org/The: Guilford Press; 2022.
28. Hayes KJ. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behav Res Methods. 2008;40:879–91. https://doi.org/https://doi.org/10.3758/BRM.40.3.879.
29. Islam Elbayoumi Salem AM. (2021). The COVID-19 pandemic: The mitigating role of government and hotel support of hotel employees in Egypt. *Tourism Management, 85*. https://doi.org/https://doi.org/10.1016/j.tourman.2021.104305
30. Islam Elbayoumi Salem AM. (2021). The COVID-19 pandemic: The mitigating role of government and hotel support of hotel employees in Egypt. *Tourism Management, 85*. https://doi.org/https://doi.org/10.1016/j.tourman.2021.104305
31. Jacob Cohen PC. Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences. Routledge; 2003. https://doi.org/https://doi.org/10.4324/9780203774441.
32. Jeongmi DR, editor. (2014). Measuring Emotions in Real Time: Implications for Tourism Experience Design. *Journal of Travel Research, 54*(4). https://doi.org/https://doi.org/10.1177/0047287514550100
33. Jörg Henseler CM. A new criterion for assessing discriminant validity in variance-based structural equation modeling. J Acad Mark Sci. 2015;43:115–35. https://doi.org/https://doi.org/10.1007/s11747-014-0403-8.
34. Jörg Henseler CM. A new criterion for assessing discriminant validity in variance-based structural equation modeling. J Acad Mark Sci. 2015;43:115–35. https://doi.org/https://doi.org/10.1007/s11747-014-0403-8.
35. Joseph F, Hair GT. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). SAGE; 2021.
36. Kline RB. Principles and Practice of Structural Equation Modeling. The Guilford Pres; 2016.
37. Larcker CF. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. J Mark Res. 1981;18(1):39–50. https://doi.org/https://doi.org/10.2307/3151312.
38. Chen L, Z. W. Collaborative AI Enabled Place Branding: A Hybrid-Narrative Review and Prospects for Future Research. Open J Social Sci. 2024;12(4). https://doi.org/https://doi.org/10.4236/jss.2024.124037.
39. Sirgy MJ, P. S. How Does a Travel Trip Affect Tourists' Life Satisfaction? J Travel Res. 2010;52(3). https://doi.org/https://doi.org/10.1177/0047287510362784.
40. Marta Tremolada SB. Coping Strategies and Perceived Support in Adolescents and Young Adults: Predictive Model of Self-Reported Cognitive and Mood Problems. Psychology. 2016;7(14). https://doi.org/http://dx.doi.org/10.4236/psych.2016.714171.
41. Mehrabian A. An approach to environmental psychology. The MIT Press; 1974.

42. Monideepa Tarafdar CL-F. The technostress trifecta - techno eustress, techno distress and design: Theoretical directions and an agenda for research. Inform Syst J. 2017. https://doi.org/https://doi.org/10.1111/isj.12169.
43. Patrick E, Shrout NB. Mediation in experimental and nonexperimental studies: new procedures and recommendations. Psychol Methods. 2002;7(4):422–45.
44. Patrick J, Curran SG. The Robustness of Test Statistics to Nonnormality and Specification Error in Confirmatory Factor Analysis. Psychol Methods. 1996;1(1):16–29.
45. Preacher KJ. Effect size measures for mediation models: Quantitative strategies for communicating indirect effects. Psychol Methods. 2011;16(2):93–115. /doi/10.1037/a0022658. https://doi.org/https://psycnet.apa.org.
46. Richard M, Ryan EL. Self-Determination Theory. Guilford; 2018.
47. Russell AM. An Approach to Environmental Psychology. The MIT Press; 1980.
48. West SG, J. F. Structural equation models with non-normal variables: Problems and remedies. Sage; 1995.
49. Theodoros A, Kyriazos AS. Theodoros A. Kyriazos, Anastassios Stalikas, Konstantina Prassa, Michael Galanakis, Vasiliki Yotsidi, Agathi Lakioti. Psychology. 2018;9(7). https://doi.org/https://doi.org/10.4236/psych.2018.97107.
50. Ulrike Gretzel MS. Smart tourism: foundations and developments. Electron Markets. 2015;25:179–88. https://doi.org/https://doi.org/10.1007/s12525-015-0196-8.
51. Ulrike Gretzel MS. Smart tourism: foundations and developments. Electron Markets. 2015;25:179–88. https://doi.org/https://doi.org/10.1007/s12525-015-0196-8.
52. Ulrike Gretzel MS. Smart tourism: foundations and developments. Electron Markets. 2015;25:179–88. https://doi.org/https://doi.org/10.1007/s12525-015-0196-8.
53. Venkatesh V, Morris MG, Davis GB, Davis FD. User Acceptance of Information Technology: Toward A Unified View1. MIS Q. 2003;27(3):425–78. https://doi.org/https://doi.org/10.2307/30036540.
54. Yunpeng Li CH. The concept of smart tourism in the context of tourism information services. Tour Manag. 2017;58:293–300. https://doi.org/https://doi.org/10.1016/j.tourman.2016.03.014.
55. Zheng Xiang VP. Information technology and consumer behavior in travel and tourism: Insights from travel planning using the internet. J Retailing Consumer Serv. 2015;22:244–9. https://doi.org/https://doi.org/10.1016/j.jretconser.2014.08.005.

Figures

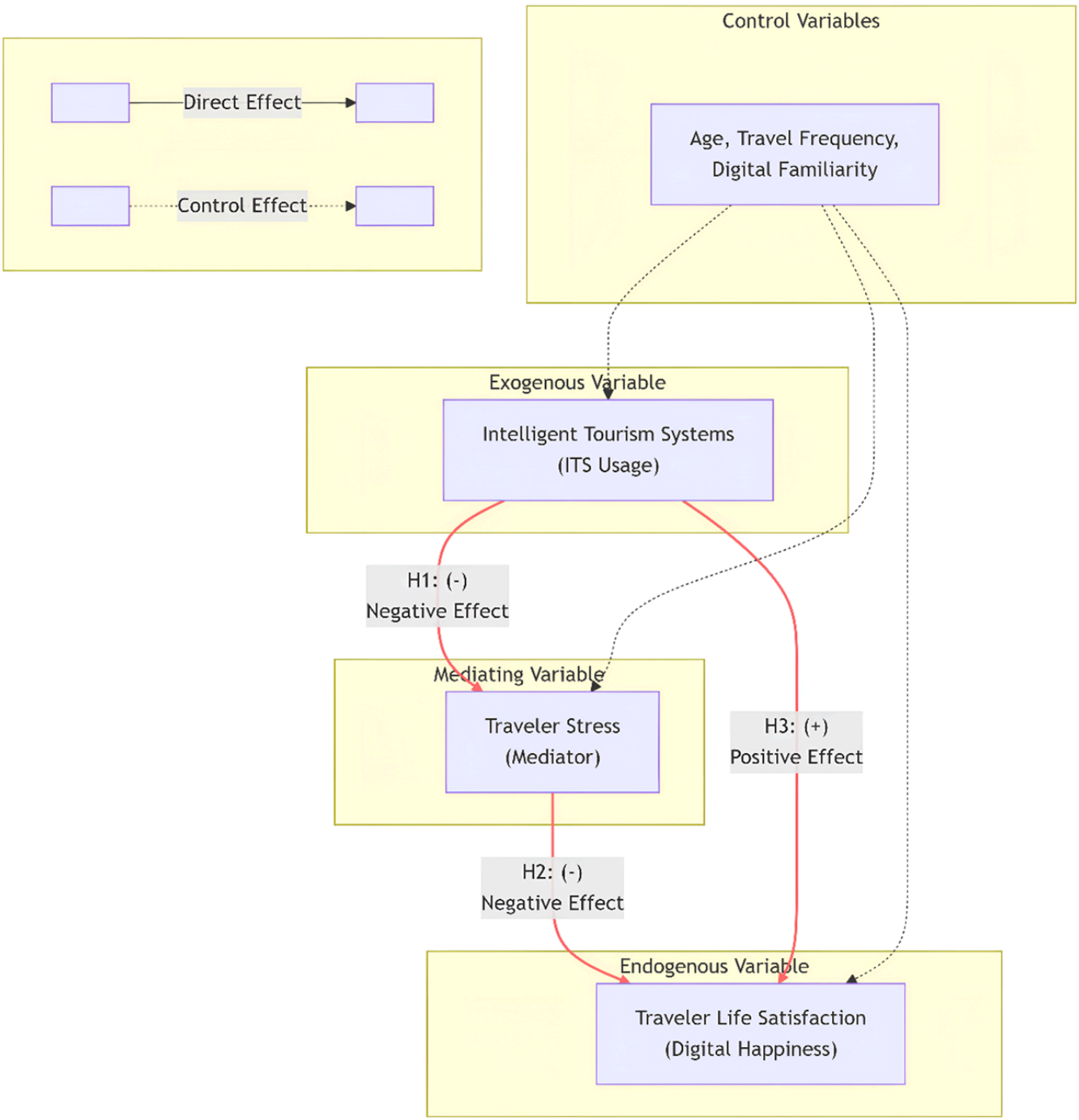


Figure 1

Relationship Between Intelligent Tourism Systems Usage and Traveler Stress

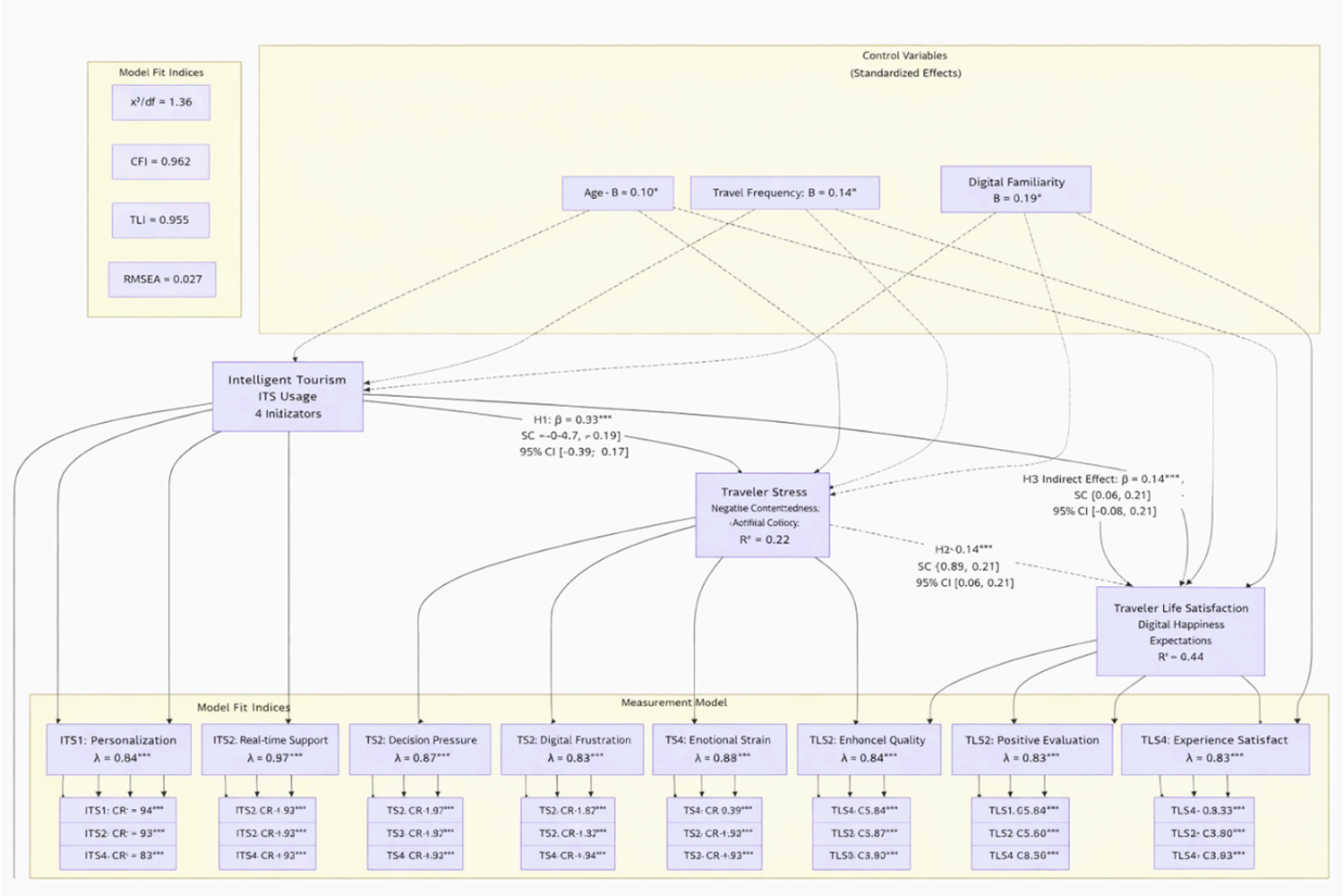


Figure 2

Mediation Effect of Traveler Stress on the Relationship Between ITS Usage and Life Satisfaction