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Suggested Citation: Hendy, Nhung T.; Montargot, Nathalie (2025) : The role of intellectual humility in sustainable tourism development, Administrative Sciences, ISSN 2076-3387, MDPI, Basel, Vol. 15, Iss. 5, pp. 1-18,
<https://doi.org/10.3390/admsci15050185>

This Version is available at:

<https://hdl.handle.net/10419/321329>

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Article

The Role of Intellectual Humility in Sustainable Tourism Development

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Abstract: In this study, we examined the role of intellectual humility (IH) as an antecedent of individual attitude toward sustainable tourism viewed from the lens of personality trait theory, virtue ethics theory, and regenerative tourism principles within a stakeholder framework. Data were collected via Qualtrics in an online survey of 233 adults in the United States. A series of confirmatory factor analyses (CFA) were applied to the data to test the measurement model. In addition, a bifactor CFA was found to have acceptable fit and appropriate in controlling for common method variance. A series of covariance-based structural equations models (SEMs) was estimated to test the hypothesized model while controlling for common method variance in addition to individual age and gender. Using the chi-square difference test for nested model comparison, we found that intellectual humility was a significant antecedent of the negative ecological impact of tourism ($\beta = 0.14$, $p < 0.01$) while its relationships with economic and social impacts of travel became non-significant after controlling for common method variance. Pro-social tendency, operationalized as HEXACO Honesty–Humility, was also a significant antecedent of the negative ecological impact ($\beta = 0.17$) and positive economic impact ($\beta = -0.34$) of tourism, after controlling for common method variance. Despite its limitations due to its cross-sectional design and use of self-report data in the U.S., this study was novel in introducing intellectual humility as an important virtue to be cultivated at the individual level to achieve a holistic approach to sustainable tourism, especially in shaping destination choices. In addition, the study highlights the need to detect common method variance in self-report data via bifactor CFA to avoid erroneous reporting of significant findings, hampering our collective research efforts to address climate change and its impact.

Keywords: prosocial behavior; intellectual humility; common method variance; sustainable tourism; sustainability



Received: 15 February 2025

Revised: 4 May 2025

Accepted: 9 May 2025

Published: 19 May 2025

Citation: Hendy, N. T., & Montargot, N. (2025). The Role of Intellectual Humility in Sustainable Tourism Development. *Administrative Sciences*, 15(5), 185. <https://doi.org/10.3390/admsci15050185>

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1. Introduction

There has been an increasing interest in understanding individual characteristics that serve as antecedents of pro-environmental behavior and environmental sustainability within global climate change research. Most research in environmental sustainability has focused on the economic viability or impact at the macro level, while less research has studied individual characteristics (e.g., psychological, cognitive, affective, and behavioral tendencies) at the micro level as antecedents of environmentalism (e.g., Yu et al., 2011; Bichler & Lösch, 2019; Peeters et al., 2024). Defined as an ideology, environmentalism promotes human behavior that minimizes the negative impact on the environment (e.g.,

Wolf-Watz, 2014). Environmentalism has been studied in terms of pro-environmental attitudes and behaviors in prior research (e.g., Desrochers et al., 2019). Pro-environmental attitude is defined as one's tendency to exhibit a degree of favor toward the natural environment, whereas pro-environmental behavior refers to concrete action that positively affects the natural environment (Yu et al., 2011). Within the Big 5 personality traits, openness to experience was found to consistently exhibit a positive relation with pro-environmental attitude and behavior, whereas agreeableness was much less so, according to a meta-analysis (Soutter et al., 2020). In addition, Honesty–Humility, a personality dimension within the HEXACO framework, also known as pro-social tendency, was found to exhibit a positive relation with pro-environmental attitude and behavior according to one meta-analysis (Soutter et al., 2020). Honesty–Humility and pro-social tendency are used interchangeably throughout this paper.

Tourism development has been investigated in prior research as an interrelated, albeit paradoxical, component of environmentalism (e.g., Stoddart & Graham, 2018; Wolf-Watz, 2014). Specifically, nature-oriented tourism, a subset of which is ecotourism, built around promoting exposure to and connectedness with the wilderness in the natural environment, offers many economic (e.g., revenue to tourism operators and income to local residents), social (e.g., preservation of local culture), and ecological benefits (e.g., environmental conservation efforts in Hawaii, the U.S., and Costa Rica to name a few) as documented in prior research (e.g., Yee, 2018; Miller et al., 2023; Poudel et al., 2016; Wolf-Watz, 2014). However, tourism can also have a negative impact on the destination in economic (e.g., pricing out local residents), social (e.g., increased crime rate), and ecological (e.g., overcrowding) terms due to tourist loyalty and/or tourism hotspot destinations (e.g., Venice, Barcelona), which bring more harm than benefits to visitors and local residents alike (e.g., Papadopoulos et al., 2023). Sustainable tourism development has been proposed as a solution to provide economic benefits to residents and management authorities, while conserving the ecological environment and promoting social and cultural benefits of tourism development (Poudel et al., 2016). In this study, we adopted the definition of sustainable tourism proposed by the United Nations Environment Program and the World Tourism Organization in 2005. Specifically, sustainable tourism is defined as “Tourism that takes full account of its current and future economic, social, and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities” (UNEP & WTO, 2005).

Existing sustainable tourism frameworks have not sufficiently considered the moral virtues of individual stakeholders as determinants of attitudes toward sustainability. Whereas general humility refers to one's behavioral tendency as a golden mean between two extremes of arrogance and diffidence across situations, intellectual humility refers to one's behavioral tendency in intellectual discourse, which is especially important in promoting a healthy dialogue in the climate change debate. Notwithstanding the potential importance of intellectual humility in global climate change research, its role as an antecedent of sustainable tourism remains unaddressed. Conceptualized as a multi-dimensional construct, the definition of intellectual humility includes four dimensions: (a) one's tendency to recognize one's own intellectual limitations; (b) optimally calibrating one's intellectual limitations for epistemic truth, rather than appearing humble; (c) an appreciation for others' intellectual strengths; and (d) a low concern for one's own intellectual status and entitlement (Porter et al., 2022). In environmental research, it has been proposed that intellectual humility is needed to bridge the divide between climate change deniers or anti-environmentalism and climate change advocates or pro-environmentalism (e.g., Ferkany, 2015). Intellectual humility, as a virtue, seeks a balanced perspective between two extremes: denying climate change and its negative environmental impacts on one hand,

and overemphasizing its negative consequences on the other (e.g., P. T. Brown, 2023; P. T. Brown et al., 2023).

Despite decades of extensive tourism research fueled by rising concerns over tourism's emissions, a recent comprehensive review of 2573 journal articles on sustainable tourism reveals its limited impact (Peeters et al., 2024). One of the reasons for the limited impact of existing sustainable tourism research to mitigate climate change impact is the weak definition of sustainability (Peeters et al., 2024), coupled with an emphasis on systemic variables and processes. Shifting research attention from systems and their processes to individual attitudes and behavior to understand their role in tackling climate change is needed (Danner-Schröder et al., 2025). A holistic approach to sustainable tourism requires not only shared responsibility between government and business enterprises, but also the responsibility of individual citizens. Highlighting the significance of shaping destination choice, a study conducted in Sweden (Kamb et al., 2021) found it to be more effective at reducing carbon emissions compared to transport mode (e.g., train vs. car). Building upon the above discussion, the purpose of this study was threefold. First, we proposed a multi-level integrated framework of sustainable tourism in which intellectual humility is key in affecting tourism development attitude based on the theories of HEXACO personality (Ashton & Lee, 2007), virtue ethics (e.g., Jamal, 2004), and regenerative tourism principles (e.g., Dredge, 2022) within Freeman's (1984) and Freeman et al.'s (2010) stakeholder theory. Second, we extended prior research on examining personal characteristics and attitude linkage in tourism development. Third, this study added to extant research linking individual characteristics to the achievement of the United Nations' Sustainable Development Goals (SDGs). Specifically, SDG#13—"Take urgent action to combat climate change and its impact" (<https://sdgs.un.org/goals/goal13> accessed on 5 October 2024)—is relevant to this research addressing climate change.

This study contributes to the extant literature on pro-environmental attitude and sustainable tourism development in two ways. First, this study provides an opportunity to stimulate emerging research on intellectual humility as a necessary virtue in the global climate change debate and education. Second, this study was among the first to offer an opportunity for psychologists and sustainable tourism researchers to advance policies and practices aimed at achieving the United Nations Sustainable Development Goals (SDGs), specifically Goal 13.

1.1. A Multi-Level Integrated Framework of Sustainable Tourism

In this paper, we propose a multi-level framework of sustainable tourism development based on an interdisciplinary approach leveraging psychology, strategic management, and moral education research. As shown in Figure 1, our model includes three levels of analysis: individual, group, and national/international. While the focus of our study is at the individual level, we recognize the importance of the organizational and country-level influences on sustainable tourism in terms of policy and regulation standards. For example, policy and regulation standards serve as boundary conditions in motivating sustainable tourism behavior and deterring destructive tourism behavior (e.g., Chebli et al., 2024).

Intellectual humility (IH) is a unique predictor of sustainable tourism attitude and subsequent behavior. Bichler and Lösch (2019) showed that collaborative governance processes between stakeholder groups as crucial in building trust and transparency to promote sustainable tourism at the institutional level. However, unless stakeholders exhibit IH, such collaborative governance processes will fail. For example, despite mounting evidence, many climate activists were unwilling to accept the fact that the goal of the Paris Climate Agreement to limit the increase to 1.5 degrees Celsius or 2.7 degrees Fahrenheit was unrealistic (Hadden & Prakash, 2024).

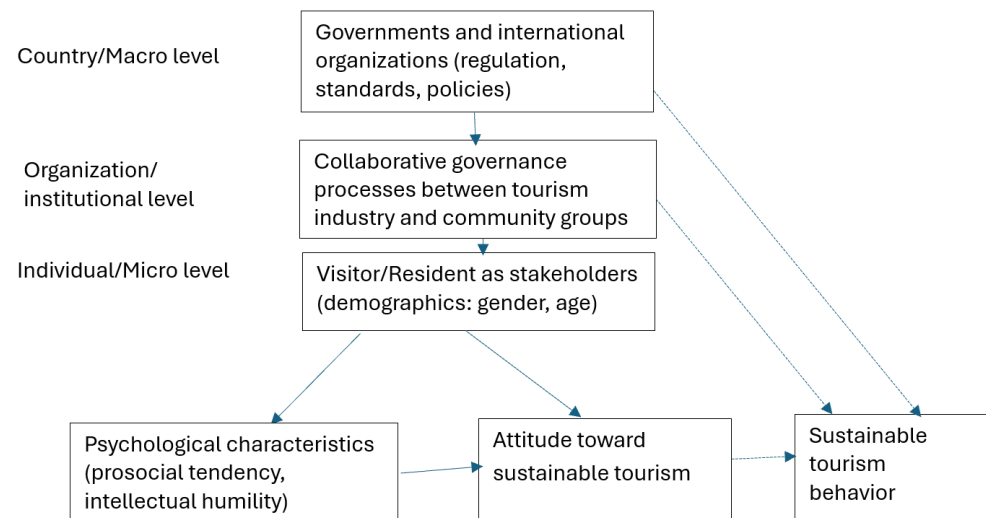


Figure 1. A multi-level integrated framework of sustainable tourism.

Intellectual humility (IH) goes beyond pro-environmental behavior (e.g., recycling, reducing energy consumption, choosing sustainable products) to include a growth mindset conducive to adaptive learning and management of the complexity and multi-faceted nature of sustainability (Ayers et al., 2023). In addition, intellectually humble individuals respect multiple perspectives of all stakeholders in fostering sustainable tourism attitudes and behavior. More importantly, IH's unique value is in mitigating personal bias (e.g., confirmation bias, short-term thinking) inherent in decision-making (e.g., Leary et al., 2017).

Freeman's (1984) stakeholder theory of strategic management was selected as a theoretical framework guiding our conceptual model for the following reasons. First, stakeholder theory is fundamentally an ethics theory (Freeman et al., 2010) because it promotes firms (e.g., tourism organizations) going beyond the minimum legal requirement to provide benefits to all stakeholder groups, including shareholders. According to the theory, tourism managers, in making decisions that impact their organization, should take into consideration the diverse needs and interests of all stakeholders, including local communities, visitors, businesses, and the environment, rather than prioritizing shareholders. Speaking differently, all parties having a stake in sustainable tourism should be given equal priority, and none should be treated as an instrument to achieve a goal (Freeman et al., 2010). Second, intellectual humility (IH) as a virtue can be developed through practice over time (e.g., Leary et al., 2017; Porter et al., 2022). As a virtue, IH is different from prosocial tendency, viewed as a personality trait (e.g., Duong & Pensini, 2023; Krumrei-Mancuso, 2017), such that intellectually humble individuals are aware of the limitations of their knowledge and are willing to update it. This reflects IH as a prerequisite to learning, which is unrelated to prosocial tendency as a personality trait of Honesty–Humility (Krumrei-Mancuso et al., 2019). The willingness to update one's knowledge is crucial in the ongoing global climate change debate.

IH, as a virtue, is needed to practice regenerative tourism principles (Dredge, 2022), which require a shift in mindset to generate collective action from individual actions. Ethics of care as a virtue has been adopted in teaching environmental ethics (e.g., Jamal, 2004; Tribe, 2002), consistent with several studies calling for a change in sustainability education and environmental research (e.g., K. E. Jordan, 2023; K. Jordan & Kristjánsson, 2017; Sadler-Smith, 2015). Third, stakeholder theory supports viewing competing demands, such as preserving nature and developing nature for tourism purposes, as dualities (i.e., both/and outcome), rather than dualism (i.e., either/or outcome). Viewed through the duality lens, both stakeholders and shareholders can benefit from sustainable tourism development. In

the paragraphs below, we present our hypotheses based on the proposed conceptual model shown in Figure 1.

1.2. Literature Review and Hypotheses Development

A literature review of research on intellectual humility (IH) shows that it has many benefits across analytical levels. At the individual level, IH has been documented to help people gain more accurate knowledge, make better decisions, live happier lives, and better cope with stress and anxiety (e.g., Krause et al., 2016; Leary, 2022). At the group level, IH has been shown to contribute to improved information sharing and reduced inter-group conflicts (Funck & Tomin, 2024). At the organizational level, IH has been proposed to improve an organization's culture of diversity, equity, and inclusion (e.g., Hendy, 2022). At the societal level, IH was found to temper conflicts or disagreements stemming from different political affiliations, religions, and lifestyles. For example, people scoring high on IH were found to be less likely to derogate those whom they disagreed with (e.g., Porter & Schumann, 2018), more likely to support COVID-19 vaccination, and less likely to be influenced by misinformation and health claims lacking scientific or evidentiary basis (e.g., Huynh & Senger, 2021).

As mentioned earlier, Honesty–Humility has been utilized in prior research as a pro-social tendency because Honesty–Humility reflects the tendency to be proactive, for example, initiating cooperation with others (active cooperation), which is essential in pro-social behavior (Hilbig et al., 2013). In contrast, agreeableness, one of the Big Five personality traits, was found to reflect the tendency to be reactive to cooperative initiative. People who are high on Honesty–Humility were also found to be fair to others by not exploiting them in establishing a fair distribution of outcomes in a laboratory setting (Hilbig et al., 2015). Extrapolated from the above findings, it is reasonable to expect that individuals high on Honesty–Humility will not exploit tourism development for their own benefits and view sustainable tourism fairly. Therefore, we hypothesize:

H1. *Pro-social tendency will be positively related to tourism development attitude with respect to economic, ecological, and social impact.*

Research showed that people holding moderate views tend to be higher on IH compared to those holding extreme views (e.g., Leary et al., 2017). In the context of sustainable tourism development, people high on IH are needed to reach a balancing act between two extremes: focusing only on the positive impact or the negative impact of tourism. The golden mean, in our opinion, represents reducing the negative impact caused by humans on the ecological, social, and economic environment while simultaneously considering technological and societal changes over time that promote sustainable tourism. This duality of conservation and environmental development, inherent in the seemingly opposing forces between protecting natural environments and pursuing environmental development for economic growth, has been documented in prior research. For example, although nature-minded tourists are aware of their carbon footprint impact on the ecological environment, they still seek to travel to remote areas, rather than being deterred by it (e.g., Wolf-Watz, 2014; Eriksson & Balslev Clausen, 2024). Intellectually humble visitors may be more willing to adopt sustainable practices promoted by tourism operators who adhere to stakeholder principles. They may be more receptive to information about responsible waste disposal, water conservation, and respecting local customs. Tourism operators who actively engage with diverse stakeholders and communicate the reasons behind their sustainable practices can foster IH in visitors by exposing them to different viewpoints and the complexities of sustainable tourism.

Therefore, we hypothesize:

H2. *Intellectual humility will be positively related to tourism development attitude with respect to economic, ecological, and social impact.*

2. Methods

2.1. Sample and Procedure

We used G*Power version 3.1.9.7 (Faul et al., 2009) to determine the adequate sample size for this research. A multiple regression model in which two control variables of age and gender, plus two predictor variables of pro-social tendency and intellectual humility, was used to calculate the required sample size. A small effect size was used, i.e., f^2 -squared equal to 0.05, with two predictors being correlated at 0.2. A sample size of 192 was needed to achieve a power of 0.7, and a sample size of 233 was needed to achieve a power of 0.8. We proceeded with data collection knowing that we would need a sample varying from 192 to 233 individuals, depending on the statistical power level. Data were collected entirely online and anonymously using Qualtrics during Fall 2020 and Spring 2021. Participation in the study was voluntary, and participants did not receive any monetary compensation in exchange for their participation. The study protocol was approved by the first author's Institutional Review Board. A total of 233 working adults participated in the study. Using a snowball sampling technique, participants were recruited via email using the authors' personal and social networks. A survey link was embedded in the invitation email asking participants to complete the survey for research purposes. Clicking the link took participants to a page where they were introduced to the study and given the choice to provide consent or not at the end of the page. To be eligible for participation in the survey, participants must be at least 18 years of age and reside in the U.S. at the time of the survey completion. Participants were told that by clicking "I consent to participate in the study", they would not be able to withdraw their consent after that, i.e., in the middle of the survey, which allowed for partial survey response analyses. However, they were informed that they had the right to discontinue completing the survey at any point in time if they felt uncomfortable answering any of the survey questions. The survey questions were presented in the following order: intellectual humility (IH), prosocial tendency, attitude toward tourism development, and demographic variables. The average time to complete the survey was 7 min, ranging from 4 to 12 min.

Participants were diverse in terms of age ($M = 27.34$, $SD = 12.18$), ranging from 18 to 84 years old, of whom 111 were male and 110 were female. In terms of ethnicity, the majority was reported as "White" with 60.8%, while Blacks, Hispanics, and Asians accounted for 17.1%, 5.4%, and 9.5%, respectively. A total of 7.2% described themselves as "Other". Missing data were imputed using the regression approach in SPSS version 28 because it leverages the relationships between variables in the dataset to provide more accurate estimates compared to other methods, such as mean or median imputation based on prior research recommendations of missing data using Likert scales (Wu et al., 2015).

2.2. Measures

Pro-social tendency. We used Lee and Ashton's (2018) 16-item measure of the Honesty–Humility dimension of the HEXACO personality inventory. Sample items include "If I want something from a person I dislike, I will act very nicely toward that person to get it"; "I'd be tempted to use counterfeit money if I were sure I could get away with it"; and "I would like to be seen driving around in a very expensive car". Scale anchors ranged from 1 "strongly disagree" to 5 "strongly agree". Cronbach's alpha for this measure was 0.77.

Intellectual humility. We used Leary et al.'s (2017) 6-item scale to measure participants' general intellectual humility. Anchors of the items ranged from 1 "strongly disagree" to 5 "strongly agree". Sample items include "I question my own opinions, positions, and

viewpoints because they could be wrong” and “I reconsider my opinions when presented with new evidence”. Cronbach’s alpha of this measure was 0.80.

Attitude toward Tourism development. Poudel et al.’s (2016) 45-item measure of tourism impact was used. This scale measures the perceived impact of tourism development in three areas: social, economic, and ecological environments, each with positive and negative impacts. Sample items for ecological impact include “Tourism destroys the natural environment”; “Tourism provides incentive for conservation of natural areas”; social impact “Tourism enhances knowledge of other cultures”; “Tourism development increases crime rates”; economic impact “Tourism development increases property taxes”; and “Tourism increases income and improves living standards of local communities”. Anchors ranged from 1 “strongly disagree” to 7 “strongly agree”. Cronbach’s alphas for the subscales were 0.88, 0.85, 0.80, 0.90, 0.88, and 0.84, respectively.

All internal consistency estimates of variables used in the study were above the recommended cutoff of 0.7 (Nunnally, 1978).

Control variables. We controlled for participant biological sex and age in the statistical analyses based on previous research reporting these two variables as significant correlates of pro-environmentalism (e.g., Desrochers et al., 2019).

Statistical analysis. SPSS version 28 was used to conduct data screening, scoring, and imputation. MPlus version 8.1 (Muthén & Muthén, 1998–2017) was used to run the confirmatory factor analyses to validate the measurement and structural models.

3. Results

Assumption testing. We conducted various analyses prior to validating the conceptual model to make sure all statistical assumptions concerning multivariate normality were met. Specifically, we first ran a series of descriptive analyses in SPSS for all variables at the item level to determine if they met the normality assumptions to be reflective indicators of latent variables in confirmatory factor analysis (CFA) based on Kline’s (2005) recommendations. All items had small skewness values (between -2 and $+2$) with kurtosis values between -3 and $+3$. Given the recommended acceptable levels of skewness (between -3 and $+3$) and kurtosis (-10 to $+10$) for covariance-based structural equations modeling (SEM) that we used to validate our conceptual model (T. A. Brown, 2006), we deemed our variables as having met the assumption of normality. Second, we looked at the probability-probability (P-P) plot of all variables to determine multivariate normality. Most variables are closely clustered along the diagonal line with small deviation from normality due to the curves from the Q-Q plot for Honesty–Humility and intellectual humility, respectively. In addition, we ran a series of regression analyses in which we regressed the subscales of travel impact onto pro-social tendency and intellectual humility (IH) to get an estimate of multicollinearity among the two predictors of prosocial tendency and IH. The results showed the VIF values to be 1.05, which is a very small departure from 1, indicating almost no correlation between predictors. We noted that covariance-based SEM is robust to small deviations from normality and multicollinearity between or among predictors, and therefore we proceeded with our subsequent model testing based on T. A. Brown’s (2006) recommendations.

Table 1 shows the descriptive statistics and zero-order intercorrelations of observed variables included in the study. An examination of Table 1 reveals the following. First, the correlation between sex and pro-social tendency was significant ($r = 0.15$, $p < 0.05$), favoring female participants. This finding was consistent with previous research (e.g., Lee & Ashton, 2020). In addition, the chronological age was significantly related to pro-social tendency, favoring older participants ($r = 0.33$, $p < 0.01$). This finding was also consistent

with previous research (e.g., Ashton & Lee, 2016). Taken together, these findings justified treating sex and age as control variables in subsequent analyses.

Table 1. Descriptive statistics and zero-order correlations of variables in the study.

Variables	Mean	Std	1	2	3	4	5	6	7	8	9	10
1. Age	27.37	12.20	-									
2. Gender (1 = Male, 2 = Female)	1.49	0.50	−0.19	-								
3. Prosocial behavior (HH)	3.51	0.58	0.33	0.15	0.77							
4. Intellectual humility	4.05	0.64	0.15	0.07	0.23	0.80						
5. Negative ecological impact	4.87	1.15	0.21	0.11	0.18	0.19	0.88					
6. Positive ecological impact	3.88	1.11	0.07	−0.14	0.08	−0.01	−0.41	0.85				
7. Negative economic impact	5.22	0.92	0.07	0.05	0.03	0.19	0.26	−0.01	0.80			
8. Positive economic impact	5.12	0.83	−0.06	−0.01	−0.21	0.14	−0.22	0.30	0.31	0.90		
9. Negative social impact	4.49	0.90	0.09	0.06	−0.01	0.04	0.51	−0.33	0.33	−0.17	0.88	
10. Positive social impact	5.30	0.87	−0.02	0.21	0.00	0.18	−0.01	0.12	0.20	0.47	−0.08	0.84

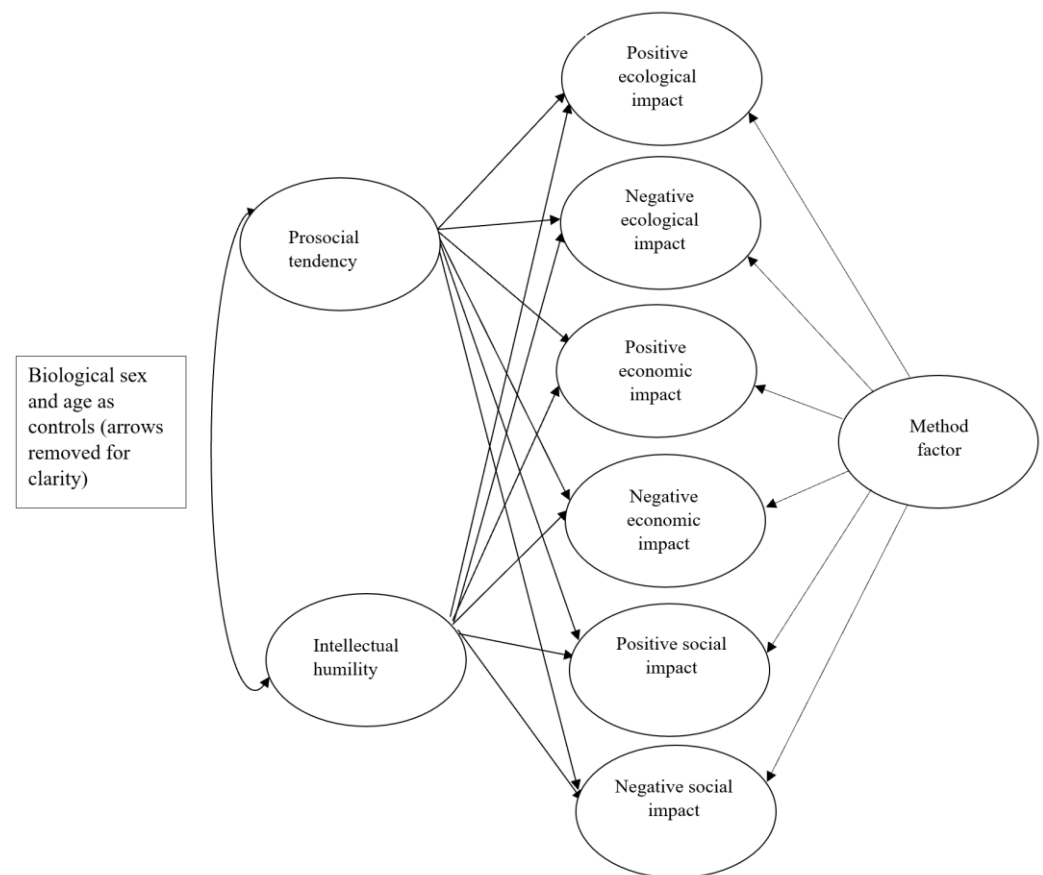
Note: Correlations ≥ 0.13 are significant at $p < 0.05$; Correlations ≥ 0.18 are significant at $p < 0.01$. Cronbach's alphas were shown along the diagonal.

Statistical models. Because of the self-report nature of the study data, common method variance was addressed via a latent model approach (i.e., confirmatory factor analysis), estimating an unmeasured method factor following Podsakoff et al. (2003) recommendations. This approach is also known as a bifactor CFA approach (e.g., Biderman et al., 2011). The bifactor CFA approach has been found to be more effective at detecting common method variance than Harman's single-factor test, commonly used in management research (Howard et al., 2024).

A series of confirmatory factor analyses (CFA) was applied to individual item responses using Mplus version 8.1 (Muthén & Muthén, 1998–2017). Based on previous research (e.g., Biderman et al., 2011) showing that adding a bifactor general factor improves model fit over a CFA model without such a factor, we also ran a bifactor CFA to address common method variance per Podsakoff et al.'s (2003) and Li and Savalei's (2025) recommendations. The following cutoff values were used to determine model fit. For the Comparative Fit Index (CFI), a value of close to 0.95 was considered a good fit. For Root Mean Square Error of Approximation (RMSEA), a value close to 0.06 was considered a good fit (Hu & Bentler, 1999). Table 1 shows the descriptive statistics and zero-order correlations of all variables in the study using summed scores. Table 2 shows the CFA and bifactor CFA model fit statistics. Model fit comparison was conducted using the chi-square difference test. As shown in Table 2, Model 4, which includes eight substantive factors (intellectual humility, Honesty–Humility, and six factors comprising the tourism impact attitude) plus a general factor, was considered the best fitting model with goodness-of-fit statistics of $\chi^2 = 3940.33$ ($df = 2058$), CFI = 0.73, RMSEA = 0.06. The fit statistics of Model 3, which does not contain the general factor, were worse off, with $\chi^2 = 4256.76$ ($df = 2124$), CFI = 0.70, RMSEA = 0.07. Model 4 provided a better fit to the data than Model 3 [$(\Delta\chi^2 = 316.43$ ($\Delta df = 66$), $p < 0.001$)], suggesting the existence of common method variance. This model was retained to confirm the structural model shown in Figure 2.

Table 2. Bifactor Confirmatory Factor Analysis of measurement model ($N = 233$).

Model	Chi-Square	Degree of Freedom	$\Delta\chi^2/\Delta df$	p	CFI	TLI	RMSEA
Model 1—1 factor (all 8 factors combined)	7548.13	2144	-	0.00	0.24	0.22	0.10
Model 2—2 factors (IH-HH as one factor and tourism impact attitude as the second factor)	7213.64	2145	334/1	0.00	0.28	0.25	0.10
Model 3—8 factors (IH, HH, and 6 tourism impact attitude factors)	4256.76	2124	306/1	0.00	0.70	0.68	0.07
Model 4—Add method factor to 8 substantive factors	3940.33	2058	316/66	0.00	0.73	0.71	0.06

**Figure 2.** A covariance-based structural equation model with a latent common method factor (items as indicators are not shown for clarity).

We noted that the CFI value was less than the recommended cutoff, but this was likely because the latent variables were reflected by individual items, rather than parcels of items, as shown in prior research, which has led to a smaller ratio of parameters to sample size. Although item parceling would improve model fit indices, we chose to include individual items to avoid any measurement confounds resultant from item parceling based on previous research (e.g., [Nasser & Wisenbaker, 2003](#)). In addition, the low CFI value does not affect the reliability of SEM models based on factor determinacy, a measure of how reliably the observed variables reflect the latent construct. We also calculated various composite reliability estimates (Omega values) and explained common value (ECV) following recent recommendations in evaluating bifactor CFA models ([Li & Savalei, 2025](#)). These statistics are shown in Table 3. More details on the calculations of these statistics using Excel ([Dueber, 2017](#)) can be found in the Supplemental Materials. As shown in Table 3, the factor

determinacy values for all latent constructs were above 0.9, except for IH, where it was 0.89, suggesting a high level of latent construct reliability. An examination of Table 3 further reveals that the ECV and Omega values were exceeding the recommended cutoff. Overall, based on both overall model fit indices and latent variable multidimensionality reliability coefficients, the bifactor CFA model was retained for a full structural model testing.

Table 3. Composite Reliability Estimates of latent variables in the study.

	Latent Variable	Explained Common Variance	Omega Subscale	Factor Determinacy
1	General method factor	0.19	0.93	0.93
2	Prosocial tendency	0.89	0.85	0.93
3	Intellectual Humility	0.57	0.91	0.89
4	Positive ecological impact	0.93	0.88	0.94
5	Negative ecological impact	0.86	0.89	0.94
6	Positive economic impact	0.84	0.94	0.96
7	Negative economic impact	0.65	0.85	0.88
8	Positive social impact	0.81	0.88	0.94
9	Negative social impact	0.84	0.91	0.95

To test the hypotheses, we conducted a series of covariance-based structural equation models with competing model comparison. A covariance-based approach is deemed appropriate when the model includes reflective indicators, as is the case in this study. Further, a covariance-based approach is more appropriate than a Partial Least Square (PLS) approach to latent model testing when the goal is to seek a more accurate estimation of the relationships between latent constructs by estimating their respective measurement error (Ringle et al., 2020). Specifically, we first fitted a bifactor SEM model with age and gender as control variables, but the paths from age and gender to IH and pro-social tendency were both fixed to zero, and the other model with those paths freely estimated. Table 4 shows the fit statistics of the model comparison. As shown in Table 4, the model with both age and gender serving as control variables had a slightly better fit based on the chi-square difference test. We therefore retained this structural model for subsequent hypothesis testing. Table 5 shows the latent path coefficients of the model. As shown in the Table, pro-social tendency was a significant antecedent of two (negative ecological and positive economic impact) of out six dimensions of tourism impact attitude. Specifically, pro-social tendency was positively related to negative ecological impact ($\beta = 0.17, p < 0.01$) while negatively related to positive economic impact ($\beta = -0.34, p < 0.01$). Hypothesis 1 was therefore partially supported. Next, as shown in Table 5, intellectual humility was significantly related to only one dimension (negative ecological impact) out of six dimensions of tourism impact ($\beta = 0.14, p < 0.05$). Hypothesis 2 was also partially supported. Overall, our conceptual model received partial support based on the sample data.

Table 4. Structural equations modeling results ($N = 233$).

Model	Chi-Square	Degree of Freedom	$\Delta\chi^2/\Delta df$	p	CFI	TLI	RMSEA
Model 4 (8 substantive factors plus a method factor and age, gender as controls)	4244.20	2080	-	0.00	0.713	0.71	0.06
Model 5 (Model 4 with age and gender as controls fixed at zero)	4248.90	2181	4.7/1	0.00	0.711	0.69	0.06

Table 5. Structural path coefficients (controlling for common method factor, age, and gender).

	Positive Ecological Impact	Negative Ecological Impact	Positive Economic Impact	Negative Economic Impact	Positive Social Impact	Negative Social Impact
Prosocial tendency	0.12	0.17 *	−0.34 **	−0.10	−0.00	−0.04
Intellectual humility	0.00	0.14 *	0.05	−0.03	−0.03	0.03

Note: * = significant at $p < 0.05$ level; ** = significant at $p < 0.01$ level.

4. Discussion

In this study, we examined the role of intellectual humility (IH) in sustainable tourism development attitude. Controlling for common method variance and demographic factors of age and gender via structural equations modeling, we found that intellectual humility was a significant antecedent of negative ecological impact from tourism development. This finding was important for at least two reasons. First, although IH was correlated with pro-social tendency as shown in Table 1, it shared additional variance with a negative ecological impact attitude toward tourism development. Second, the negative ecological impact from tourism development might be more visible to intellectually humble stakeholders, such as visitors, compared to economic and social impacts. The linkage between IH and the social impact of tourism may be moderated by other systemic factors, such as institutional governance, as shown in Figure 1, in terms of government policy and regulation of sustainable tourism.

As mentioned earlier, reducing the negative impact caused by human activities on the ecological system via making conscious destination choices is consistent with environmentalism and sustainable tourism behavior (Wolf-Watz, 2014; Kamb et al., 2021; Dredge, 2022). There are several reasons we did not find any significant relationships between IH and social as well as economic impacts of travel. First, it is likely that common method variance is biasing the zero-order correlation between IH and positive social impact upward, as shown in Table 1. Similarly, both correlations between IH and positive economic impact ($r = 0.19$, $p < 0.01$) and IH with negative economic impact ($r = 0.14$, $p < 0.05$) became non-significant after controlling for common method variance via structural equation modeling, as shown in Table 5. Second, the IH measure used in this study is a general IH measure. A more domain-specific measure of IH might have yielded significant results.

We found that those scoring high on pro-social tendency and intellectual humility both viewed the negative ecological impact of tourism development to be more pronounced than those scoring low on the above two variables. This suggests the perceived ecological harm from tourism might be a motivator for sustainable tourist action, consistent with prospect theory's (Tversky & Kahneman, 1981) emphasis on loss aversion in decision making, where the pain of loss outweighs the pleasure of equivalent gain. Therefore, we anticipate stronger stakeholder engagement in sustainable tourism and policies for reducing this recognized ecological damage. We replicated prior research showing that pro-social tendency was a significant predictor of environmentalism (e.g., Soutter et al., 2020), such that prosocial individuals were more likely to view the positive economic impact of tourism (e.g., income generation) in a negative light. Prosocial individuals are often concerned with fairness and equitable distribution of benefits, reflected by two facets of greed avoidance and fairness in HEXACO's Honesty–Humility used in this study. They might perceive that a disproportionate share of the income generated by tourism is going to large corporations, foreign investors, or a small elite within the destination. This can lead

them to view the overall positive economic impact as potentially masking or exacerbating existing income inequalities.

Contrary to our expectation, intellectual humility correlates with social and economic impacts of tourism were non-significant after controlling for common method variance as well as two demographic variables of age and gender. One possible reason for the non-significant findings is the lack of specific destinations for tourism used in this study. Prior research showed that residents' place image was a significant predictor of tourism development support and lack thereof (Papadopoulou et al., 2023; Styliadis et al., 2014). It is our conjecture that the lack of a significant relationship between IH and tourism's positive ecological impact attitude may be due to this lack of a destination as well. Environmentalists did travel as evidenced in prior research, although they selected destinations differently, based on activities offered by the destination that foster a sense of nature connectedness (e.g., Wolf-Watz, 2014). This paradoxical relationship between environmentalism and sustainable tourism behavior might shape the destination choices of intellectually humble visitors. For example, we think that IH is more crucial for understanding sustainability in nature tourism, where the ecological impacts are more visible and/or direct, compared to urban tourism, where this linkage is less obvious.

The economic impacts of tourism are driven mainly by individual tourist spending, which is related to IH. However, other drivers of the economic impacts of tourism not examined in this study (e.g., business development, job creation, and infrastructure development) might explain why IH was not significantly related to the economic impacts of tourism.

We provided initial support to the potential bias due to common method variance or response distortion, inflating the zero-order correlations of all variables in the study, evidenced in this study by several IH correlates with dimensions of tourism development attitudes reduced to being non-significant after controlling for common method variance in the structural equations model. People high in IH, in searching for epistemic truth rather than looking humble (Porter & Schumann, 2018), may need to have the courage to do something risky or unpopular when called for by their moral integrity (e.g., Ferkany, 2015). Tourism, when connected to nature in order to preserve it, represents a positive ecological impact, whereas doing nothing to appear humble to others would perpetuate the status quo and/or lead to environmental degradation, such as biodiversity loss (e.g., Wolf-Watz, 2014; Šergo et al., 2022). We extended prior research showing that pro-social tendency, operationalized as Honesty–Humility, was positively correlated with environmentalism by revealing its positive linkage to negative ecological impact and negative linkage to positive economic impact attitude toward tourism development.

Contributions to theories and future research directions. Several contributions to the theories of this study should be noted. First, this study bridges the gap between pro-environmental attitude and sustainability policy. It is important to note the potential refinement to existing models of sustainable tourism by including intellectual humility (IH) as a unique predictor of travel impact attitude. IH promotes a bottom-up approach rather than a top-down approach to sustainable tourism, focusing on the role of individual visitors and/or residents. IH enables us to fulfil our dual roles as researchers and citizens (Danner-Schröder et al., 2025) to embrace diverse perspectives in our quest for epistemic truth in the debate on climate change. Including IH in sustainable tourism models may help foster continuous learning, as cultivating IH is an iterative process through which we build trust and transparency to seek a long-term solution to mitigate climate change impact, consistent with SDG 13. Policymakers who are perceived as intellectually humble are willing to learn and admit their mistakes when they are wrong. This intellectual virtue contributes to the broader discourse in sustainability decision-making such that IH will

help reduce the risk of overconfidence in setting unrealistic goals (e.g., [Hadden & Prakash, 2024](#)). Including IH in sustainable tourism models may serve as an antidote to political acrimony and affective polarization (e.g., [Porter et al., 2022](#)) in shaping sustainable tourism destination choices.

Second, we incorporated virtue ethics (e.g., [Jamal, 2004](#)) and collaborative governance to engage stakeholders in tourism together with regenerative tourism principles in our proposed multi-level framework of sustainable tourism. Although our study addresses the individual level of sustainable tourism, future research is needed to replicate our study using an experimental design and/or longitudinal design to strengthen the findings' internal validity and causality. In addition, our study serves as a stimulus for future multi-level research investigating the potential cross-level impact of IH on sustainable tourism attitude and behavior.

Our study was among the first to document the existence of common method variance in self-reported data measuring individual attitudes toward sustainable tourism, as well as a measure of intellectual humility, the [Leary et al. \(2017\)](#) measure. Future research should routinely check for common method variance to address the potential response distortion when measuring psychological and behavioral tendencies using self-report data. Third, although prosocial tendency—as measured by the Honesty–Humility scale within the HEXACO framework—was positively correlated with intellectual humility, the two constructs are distinct from each other, as evidenced by the low correlation coefficient. This suggests the incremental variance in tourism development attitude is attributable to intellectual humility.

Practical implications. Several practical implications for policymaking are worth mentioning based on the study findings. First, as shown in prior research, intellectual humility was a prerequisite to learning ([Meagher et al., 2019](#)), decision-makers in travel destination management might want to foster intellectual humility among residents so that they will be more ready to accept the positive impact of tourism while reducing its negative impact on the ecological environment. For example, in tourism marketing, it is important to emphasize learning and respectful engagement with visitors to highlight the limits of knowledge when showcasing historical sites to acknowledge multiple perspectives.

Second, intellectual humility as a virtue is important in promoting sustainable tourism development because of its positive relation with pro-social tendency and negative ecological impact from tourism development. As an example, the city of Venice recently passed a policy in which tourist groups would be limited to no more than 25 to manage the negative social impact of tourism on its residents while promoting its economic impact ([Hernandez, 2024](#)). Integrating insights from intellectual humility can significantly enhance the development and implementation of effective, sustainable tourism strategies by various stakeholders. At the local government level, collaborative governance can be established to promote adaptive management as well as build trust and transparency ([Bichler & Lösch, 2019](#)). Intellectual humility can be viewed as a foundation of many success stories in sustainable tourism policies in which visitor attitudes played a crucial role. For example, visitors' positive attitude toward sustainable tourism development in small island developing states was found to be related to their willingness to pay for sustainable tourism development in a choice experimental study ([Grilli et al., 2021](#)).

Third, emerging evidence shows that there was no relation between political orientation and an objective measure of intellectual humility (e.g., [Hendy, 2020](#)). As a virtue, intellectual humility can be developed and improved over time with training and practice. Several methods to foster intellectual humility (IH) at the individual level and collective level have been identified ([Porter et al., 2022](#); [Krumrei-Mancuso et al., 2025](#)). For example, to cultivate IH at the individual level, metacognitive interventions found to be effective

in developing IH in community development and higher education (e.g., [Meagher et al., 2019](#); [Porter & Schumann, 2018](#)) can be incorporated in tourism management training (e.g., self-reflection on one's own knowledge, reflecting on past mistakes and learning, perspective-taking exercise, and constructive dialogue). To foster an intellectually humble environment, policymakers and tourism managers are recommended to adopt methods for scaffolding collective IH, such as anonymous balloting and deliberative polling, to promote broad participation and generate productive discussions on politically polarizing topics such as sustainable tourism to mitigate climate change and its impact. Norms and systems of accountability should be established to hold participants accountable for their contributions and for collective outcomes. This system of accountability has been recently proposed to facilitate greater reflection in individuals and constructive criticism between individual stakeholders ([Krumrei-Mancuso et al., 2025](#)).

Fourth, previous research has documented several causes of tourist dysfunctional behavior, including lack of knowledge and egocentricity ([Chebli et al., 2024](#)), which are two indicators of a lack of intellectual humility. In addition, destination choice was found to have more potential in reducing emissions compared to transport mode choice based on at least one study ([Kamb et al., 2021](#)). This explains why some European countries have instituted policies to promote domestic travel destinations over intercontinental destinations to reduce emissions from air travel. Our findings suggest that fostering intellectual humility as a moral virtue within and among visitors will be key for successful adaptive management ([Walters & Holling, 1990](#)), whose central tenet is learning by doing, in sustainable tourism to minimize ecological damage.

Limitations. Several limitations of this study should be noted. First, the snowball sampling method via personal and social networks of the authors may have resulted in an under-represented sample in terms of cultural and occupational groups, which, coupled with the cross-sectional design of this study design limits the extent to which causality and generalizability of the findings can be inferred. Second, the small sample size limits the extent to which fit indices such as CFI and TLI can reach the conventional thresholds of 0.9 using item-level bifactor CFA modeling as shown in previous research (e.g., [Biderman et al., 2011](#); [Hendy & Biderman, 2019](#)). Third, the lack of a behavioral measure of sustainable tourism prevented us from drawing any conclusions about the positive linkage between sustainable tourism development attitude and actual tourism-supportive behavior.

5. Conclusions

Notwithstanding the above limitations, this study was among the first to examine the role of intellectual humility in sustainable tourism development. Intellectually humble and prosocial individuals' heightened perception of travel's negative ecological impact suggests perceived harm drives stronger support for climate-mitigating policies and destination choices than perceived benefit based on the loss aversion principle. The observed reduction in the significance of IH correlates with tourism development attitudes after controlling for common method variance underscores the potential for spurious relationships in studies relying on single-source data. We caution researchers that seemingly significant associations between the variables under study might be inflated by methodological biases. Therefore, future research seeking to identify reliable psychological predictors of support for climate-mitigating tourism policies and behaviors under SDG 13 must rigorously address common method variance to ensure that observed relationships are robust and not artifacts of data collection methods. This methodological rigor is crucial for building a reliable evidence base to inform effective strategies for achieving climate action in tourism.

Although our study raises more questions than answers, we hope to stimulate researchers to replicate our results and expand the scope of our study to include not only

attitudes towards tourism development but also the supporting behaviors related to sustainable tourism policies. We are optimistic that this study is an important step toward building a foundation for future inquiries at the intersection of environmental factors and individual characteristics, ultimately contributing to the broader United Nations Sustainable Development Goals. Specifically, by highlighting the importance of cultivating intellectual humility among and between tourism stakeholders, our study directly addresses SDG 13: Climate Action. Recognizing that combating climate change and its impacts requires collective effort, our research offers a preliminary insight into how fostering intellectual humility can shape more sustainable destination choices, paving the way for a transition from individual awareness to individual and collective action aimed at reducing tourism-related emissions and mitigating their impact on the global climate.

Supplementary Materials: The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/admsci15050185/s1>, Table S1. Bifactor Indices Calculation.

Author Contributions: Conceptualization, N.T.H. and N.M.; methodology, N.T.H.; software, N.T.H.; validation, N.T.H.; formal analysis, N.T.H.; investigation, N.T.H. and N.M.; resources, N.T.H. and N.M.; data curation, N.T.H.; writing—original draft preparation, N.T.H.; writing—review and editing, N.T.H. and N.M.; visualization, N.T.H.; supervision, N.T.H. and N.M.; project administration, N.T.H. All authors have read and agreed to the published version of the manuscript.

Funding: The authors received no external funding for this research.

Institutional Review Board Statement: This study was approved by the Institutional Review Board at Towson University, Maryland, U.S.A. on 21 July 2020, protocol #1196.

Informed Consent Statement: Voluntary informed consent was obtained from all participants in this study.

Data Availability Statement: Data for this study are available on Open Science Framework via this link: <https://osf.io/5sdvf/>.

Conflicts of Interest: The authors declare no conflicts of interest.

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