

THE ROLE OF CULTURAL HERITAGE APPRECIATION AND HISTORICAL REVERENCE IN PROMOTING PRO-ENVIRONMENTAL BEHAVIOR AMONG TOURISTS: INSIGHTS FOR SUSTAINABLE HERITAGE TOURISM MANAGEMENT

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ABSTRACT

We explored the association between Cultural Heritage Appreciation (CHA) and Pro-Environmental Behavior (PEB) through the moderating impact of Cultural and Historical Reverence (CHR), along with the moderation-mediation impact of socio-demographic factors age and education. The data was collected from 468 tourists visiting Mohenjo-Daro, an ancient archaeological site in Pakistan. Study findings show the positive association between CHA and PEB, with the effect being stronger among younger and more-educated tourists. Additionally, the study reveals that CHR partially mediates the relationship between CHA and PEB, with older and less-educated tourists showing a stronger mediation effect. These findings highlight the importance of fostering cultural and historical engagement to promote sustainable tourism practices, offering valuable insights for policymakers and heritage site managers. The study contributes to the understanding of how socio-demographic factors influence pro-environmental behaviors in cultural heritage tourism and emphasizes the role of CHR as a mediator in this context.

Keywords: Cultural Heritage Appreciation, Pro-Environmental Behavior, Cultural and Historical Reverence, Sustainable Tourism, Mohenjo-Daro

1.INTRODUCTION

In recent years, the intersection of cultural heritage preservation and environmental sustainability has gained considerable attention, especially in the context of tourism. The appreciation of cultural heritage, particularly in UNESCO World Heritage Sites like Mohenjo-Daro in Pakistan, has the potential to influence tourists' pro-environmental behaviors (PEB). As the global tourism industry continues to grow, ensuring that it aligns with sustainable practices has become a priority. Increasingly, tourists' environmental behaviors, including waste management, recycling, and carbon footprint reduction, are being studied to understand the factors that drive more responsible tourism practices.

Central to this understanding is the concept of Cultural Heritage Appreciation (CHA), which

refers to how tourists value and emotionally connect with the history and preservation of cultural landmarks. Research has shown that a strong appreciation for a site's cultural significance can foster pro-environmental actions, leading to behaviors that support preserving these locations for future generations (Han, 2021; Khan, 2024). Socio-demographic factors may impact travelers' environmental activism. These include age and education. People's ideas on cultural heritage and their connection with it affect their attitudes toward environmental preservation. According to Loureiro et al. (2022), younger and better-educated visitors to historic places are more likely to be environmentally concerned and apply sustainable methods. Heritage tourism is rising; thus, it's necessary to research how various populations

respect the past to encourage ethics. This understanding is essential for legislators and historic site managers who are developing sustainable tourism strategies without sacrificing cultural relevance. Thus, our research seeks to understand how Cultural and Historical Reverence (CHR) mediates the relationship between Cultural Heritage Appreciation and Pro-Environmental Behavior, and how visitor age and education affect this relationship.

Different eco-tourism studies have examined why people travel and what they believe about sustainability. Ajibade and Boateng (2021) and Tasci et al. (2022) found that eco-conscious tourists recycle, dispose of rubbish, and give to conservation groups. Research by Mandić et al. (2024) and Fauzi et al. (2023) highlights the impact of socio-demographic characteristics like age and education on tourists' pro-environmental behaviors. These studies suggest that understanding how these aspects contribute to sustainable tourism is vital, particularly in cultural heritage contexts. Another critical factor is the cultural heritage appreciation (CHA) and pro-environmental behavior (PEB). Chen & Peng (2025) and Zhang et al. (2023) found that CHA improves visitors' sustainability. Cultural and historical reverence (CHR), which incorporates visitors' intellectual, emotional, and respectful connections to heritage sites, may mediate this encounter. Visitors revere historical sites like Mohenjo-Daro and may conserve those (Rasoolimanesh & Lu, 2024).

Sustainable tourism literature provides an excellent foundation for future study, but it doesn't examine how Cultural Heritage Appreciation (CHA) interacts with socio-demographic variables. Furthermore, the association between Cultural Heritage Appreciation (CHA) and socio-demographics in cultural heritage tourism is still not explored, despite past studies showing that both variables strongly affect PEB. The mediating influence of CHR on the Cultural Heritage Appreciation (CHA) –PEB relationship is not critically examined, particularly when adjusting for socio-demographic factors like education and age. Most research in this subject ignores the complex interaction between visitors' socio-demographic qualities and environmental behaviors, considering them as independent factors. This difference is highlighted at ancient sites like

Mohenjo-Daro, where cultural significance and environmental sustainability are intertwined.

Cultural heritage tourism's complex interactions, where visitors' intellectual and emotional links to the place may have a greater influence on their activities than in other tourist settings, have not been studied. The findings cannot be applied to real-world tourism management, where demographic factors shape policies and strategies for promoting sustainable practices, because there is no comprehensive framework that accounts for the moderating effects of age and education on the relationship between Cultural Heritage Appreciation (CHA), CHR, and Pro-Environmental Behavior (PEB). To address these literature gaps, we must first explore the interaction between Cultural Heritage Appreciation (CHA), Pro-Environmental Behavior (PEB), and CHR, including how education and age affect it. Policymakers, historic site managers, and tourist operators may benefit from studying how socio-demographic factors affect pro-environmental behavior in cultural heritage tourism. This information will help them tailor policies to encourage sustainable tourist behavior. Second, this study illuminates how cultural and historical respect might promote environmental sustainability. Mohenjo-Daro, a UNESCO World Heritage Site known for its historical importance, is the focus of our research on sustainable tourism and cultural heritage preservation.

Our study has practical applications as well as academic value. Policymakers and historic site managers may utilize the data to establish targeted initiatives to promote visitors' cultural participation, which supports heritage site preservation practices. Cultural and historical tales may enhance educational programs and tourism experiences. This would enable tourists to build deeper emotional and intellectual attachments to the area, promoting sustainable tourism. It's crucial to understand how age and education affect sustainable habits so that engagement strategies may be tailored to different visitor groups.

To address this gap, we analyzed Cultural Heritage Appreciation (CHA) and Pro-Environmental Behavior (PEB), adjusting for age and education as modifiers. We hypothesized that younger, more educated tourists would be more ecologically conscientious due to their greater cultural and historical commitment to the location. We examined the hypothesis that Cultural and

Historical Reverence (CHR) mediation function would help older and less educated tourists more. This advanced technique illuminates the various factors that affect sustainable tourism and suggests ways to attract different sorts of visitors. This study's findings provide politicians and tourism management with ways to promote sustainability at historic sites like Mohenjo-Daro to preserve their cultural and natural integrity for millennia.

Hypothesis Development

The objective of this research is to deepen the understanding of the relationship between Cultural Heritage Appreciation (CHA) and Pro-Environmental Behavior (PEB) among visitors to Mohenjo-Daro through age and education context. Furthermore, our study also examines the mediating role of Cultural and Historical Reverence (CHR) in this relationship while evaluating the influence of relevant socio-demographic factors (age and education). As tourism to Mohenjo-Daro grows, it is crucial to understand how visitors' appreciation for the site's cultural and historical significance influences their behaviors toward preserving the site's integrity and minimizing its environmental impact.

Sustainable tourism studies showed that environmental consciousness is an important indicator for tourist pro-environmental behavior (Han, 2021; Khan, 2024; Chen & Peng, 2025). Furthermore, environmental consciousness is focused on tourists' commitment to environmental challenges along with their positive attitude to engage in actions that lead towards the reduction of carbon footprint (Loureiro et al., 2022). Pro-Environmental Behavior refers to the sustainable practices that tourists take to protect the environment. This also includes waste disposal and other key guidelines that are defined by the authorities in that location (e.g., Lin et al., 2022). Although pro-environmental behavior has been widely studied variable along with socio-demographic factors (e.g., Ajibade & Boateng, 2021; Tasci et al., 2022; Mandić et al., 2024). We took Cultural Heritage Appreciation (CHA) and Pro-Environmental Behavior (PEB), along with two socio-demographic factors, age and education context of cultural and heritage tourism sites, to explore the importance of CHA in the promotion of sustainable tourism practices. We proposed our H1 as,

H1: Cultural Heritage Appreciation (CHA) positively influences tourists' Pro-Environmental Behavior (PEB) at Mohenjo-Daro.

It's commonly recognized that education shapes environmental perspectives and behaviors. Research shows that higher-educated people are more environmentally conscious and more inclined to act. Ajibade and Boateng (2021) found that people with greater education had a stronger environmental self-identity and stricter environmental sustainability criteria, which led to more eco-friendly activities. Loureiro et al. (2022) recommended increased education for eco-conscious tourists, particularly to historic places. Studies show that higher-educated individuals understand sustainability issues and the need to conserve historical monuments; therefore, they are more inclined to adopt pro-environmental steps in reaction to heritage sites' cultural worth. Ajzen (1991), who used TPB to environmental behavior, found that educational attitudes drive behavior. Higher-educated passengers may understand cultural preservation and tourism's environmental effect. That matches what Tasci et al. (2022) found: tourists who understand historical tourism's environmental impacts are more likely to include sustainable measures. Cultural Heritage Appreciation (CHA) may affect Pro-Environmental Behavior (PEB) more among educated tourists. Chen and Peng (2025) also note that education shows how sustainable tourism affects cultural assets. Environmental actions like waste management and resource conservation may be linked to a deeper concern for cultural heritage among educated people. Visitors who are educated appreciate the importance of preserving historic treasures. Therefore, we hypothesized,

H1a: For tourists with a higher level of education, the impact of Cultural Heritage Appreciation (CHA) on PEB is stronger than for those with a lower level of education.

Older tourists may see and interact with their environment differently. Studies reveal that younger generations are more environmentally conscious than older generations. Fauzi et al. (2023) found that younger ecotourists recycle and reduce their environmental impact. Mandić et al. (2024) found that Generation Z visitors prefer environmentally friendly tourism methods. Generational sustainability viewpoints may explain the difference in environmental preservation efforts between younger and older tourists.

Loureiro et al. (2022) found that environmental education enhances millennial and Gen Z knowledge of climate change and biodiversity loss. Younger, more environmentally conscious visitors to historical sites may consider these issues. Due to their environmental consciousness, younger visitors may be more affected by Cultural Heritage Appreciation (CHA).

Youth tourism protects historical and natural assets for future generations (Han, 2021). Respecting cultural riches may support historical tourism. Younger tourists may prioritize cultural site preservation owing to ethical and ecological considerations. Cultural Heritage Appreciation (CHA) may be more successful in encouraging younger tourists to be environmentally responsible than older visitors, who may prioritize historic places. Elderly tourists may choose comfort and pleasure above cultural or environmental preservation (Zhang et al., 2023). As individuals age, the Cultural Heritage Appreciation (CHA) - Pro-Environmental Behavior (PEB) relationship may lessen since younger visitors promote sustainability and understand the cultural significance of historic places.

H1b: For younger tourists, the impact of Cultural Heritage Appreciation (CHA) on PEB is stronger than for older tourists.

Different studies explored the tourists' behavior with historic sites to appreciate cultural heritage (CHA) (e.g., Kong, 2010; Chen et al., 2025). Environmental awareness, cultural reasons, and historical attraction have complicated heritage site motivation (Napitupulu et al., 2021; Carreira & al., 2022; Zhang and al., 2023). Based on Mohenjo-Daro's archeological and historical relevance, we proposed that CHR mediates the relationship between Cultural Heritage Appreciation (CHA) and PEB. Thus, we hypothesized,

H2: Cultural and Historical Reverence (CHR) mediates the relationship between Cultural Heritage Appreciation (CHA) and Pro-Environmental Behavior (PEB) at Mohenjo-Daro. Age and education as socio-demographic characteristics may also influence Cultural and

Historical Reverence (CHR). We want to know how visitors' age and education affect the mediation effect. Life experiences and emotional linkages to the past may help elderly tourists appreciate cultural heritage sites and Cultural and Historical Reverence (CHR). Because they value cultural preservation more emotionally and intellectually, older individuals are more inclined to practice sustainability (Rasoolimanesh & Lu, 2024). Older tourists with higher Cultural and Historical Reverence (CHR) moderate the CHA-PEB relationship in historical tourism. Timothy (2021) believes that 65-year-olds are more ecologically sensitive because they feel more connected to cultural areas.

H2a: The mediation effect of Cultural and Historical Reverence (CHR) within the relationship between Cultural Heritage Appreciation (CHA) and PEB is stronger for older compared to younger visitors.

Tourists with less education may have a deeper emotional connection to cultural landmarks, which might lead them to depend more on CHR to guide their conduct. Lower-educated people are more likely to participate in Pro-Environmental Behavior because they feel emotionally connected to historical locations (Chen & Peng, 2025). A community lacking the scientific understanding or education to comprehend tourism's environmental impacts may regard cultural assets more emotionally and historically. Less educated persons are more impacted by cultural and emotional variables in sustainable behaviors, according to Loureiro et al. (2022). CHR mediates between less-educated visitors and eco-friendly actions.

H2b: The mediation effect of Cultural and Historical Reverence (CHR) within the relationship between Cultural Heritage Appreciation (CHA) and PEB is stronger for less-educated visitors compared to more-educated ones.

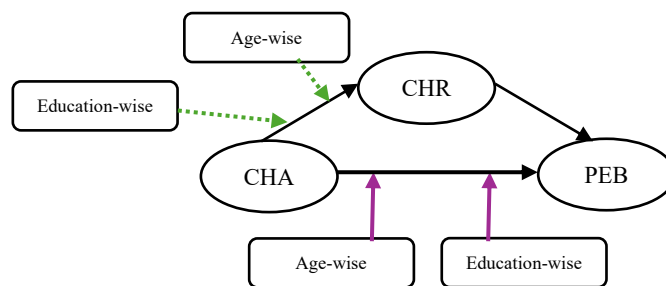


Figure 1: Conceptual Model

Methodology

Mohenjo-Daro, located in Sindh province of Pakistan, The site is recognized as a UNESCO World Heritage Site. It is the most significant archaeological sites of the Indus Valley Civilization. The location provides a unique environment for exploring sustainable tourism practices in the realm of cultural aspects, more specifically in cultural heritage preservation. We selected this location to understand the factors that motivate tourists to adopt pro-environmental behaviors. The population of the study was the visitors to the site of Mohenjo-Daro during 2024. We used a convenience sampling technique with a survey administered on-site. We collected data from 500 visitors, of whom we discarded 32 responses due to missing values or incomplete data. The response rate was 93.6%.

To measure the constructs of Cultural Heritage Appreciation (CHA), Cultural and Historical Reverence (CHR), and Pro-environmental Behavior (PEB), the study adapted items from existing literature. Cultural Heritage Appreciation (CHA) was measured using items from Goud & Lombardo (2022) and Innocente et al. (2023). Whereas, Cultural and Historical Reverence (CHR) was measured with items adapted from Rasoolimanesh, & Lu (2024); Kakonius (2024). Pro-environmental Behavior (PEB) was assessed using items from Carvajal-Trujillo et al. (2024); D'Arco et al. (2025). All items were measured using

a seven-point Likert (1-Strongly Disagree to 7-Strongly Agree).

The sample was divided into subgroups based on age and level of education. For age, visitors were categorized into two groups: younger visitors (aged 18–40, $n = 230$) and older visitors (aged 41 and above, $n = 238$). Regarding educational level, visitors were classified as more-educated (with at least a bachelor's degree, $n = 210$) and less-educated (with at most a high school diploma, $n = 258$). To test the hypotheses and assess the relationships between the constructs, a covariance-based Structural Equation Modeling (SEM) approach was used. The SEM analysis was performed using the lavaan package (Rosseel, 2012) in the R software. The Diagonally Weighted Least Squares (DWLS) method was selected to estimate model parameters, as it is suitable for non-normal data often encountered in survey-based research. The values of the standardized loadings, internal consistency, and discriminant validity of the constructs were evaluated. All constructs demonstrated acceptable levels of Cronbach's Alpha and Average Variance Extracted (AVE), indicating good reliability and validity. The incremental, exact, and absolute fit indices for the structural model were also assessed, and the results showed an adequate fit, with a Comparative Fit Index (CFI) of 0.93, Root Mean Square Error of Approximation (RMSEA) of 0.06, and Standardized Root Mean Square Residual (SRMR) of 0.05.



Figure 2: Mohenjo-Daro and Tourists

Results

Table 1. Measurement Model Results

Constructs/Items	YV (Younger Visitors)	OV (Older Visitors)	LEV (Less- Educated Visitors)	MEV (More- Educated Visitors)	CR	AVE	Alpha
Cultural Heritage Appreciation (CHA)							
Appreciation for Mohenjo-Daro's significance	0.846	0.843	0.850	0.851	0.912	0.776	0.889
Fascination with the site's history	0.913	0.910	0.915	0.919			
Intellectual engagement with the site's heritage	0.872	0.871	0.876	0.875			
Emotional connection to the site's cultural legacy	0.821	0.820	0.825	0.828			
Admiration for the site's historical preservation efforts	0.860	0.858	0.864	0.865			
Pro-Environmental Behavior (PEB)							
Engaging in sustainable tourism activities	0.835	0.832	0.838	0.840	0.897	0.742	0.880
Recycling and waste reduction behaviors	0.876	0.878	0.882	0.885			
Adhering to environmental site rules	0.812	0.810	0.815	0.818			
Reducing carbon footprint while traveling	0.823	0.820	0.828	0.830			

Promoting environmental conservation in local communities	0.869	0.868	0.873	0.875			
Cultural and Historical Reverence (CHR)							
Respect for the site's cultural significance	0.883	0.880	0.885	0.887	0.913	0.792	0.888
Emotional attachment to Mohenjo-Daro	0.891	0.890	0.894	0.895			
Intellectual respect for historical preservation	0.867	0.865	0.870	0.873			
Deep admiration for Mohenjo-Daro's cultural importance	0.879	0.877	0.880	0.883			
Dedication to preserving historical landmarks	0.849	0.847	0.851	0.853			

Table 1 depicts the measurement model results of the model, Cultural Heritage Appreciation (CHA), Pro-Environmental Behavior (PEB), and Cultural and Historical Reverence (CHR), across four visitor subgroups (Younger Visitors, Older Visitors, Less-Educated Visitors, and More-Educated Visitors). Furthermore, all constructs

show high Standardized Loadings, indicating strong relationships between items and constructs. Overall, the constructs demonstrate good reliability and validity, with strong engagement from visitors in both cultural and environmental aspects.

Table 2: Impact of Cultural Heritage Appreciation (CHA) on Pro-Environmental Behavior (PEB)

Hypothesis	Variables	Analysis Type	Test Description	Results	Results Interpretation	Notes
H1	CHA, PEB	Multiple Linear Regression	Testing the direct effect of CHA on PEB	$\beta = 0.45$, $p = 0.001$, $R^2 = 0.21$	CHA positively and significantly influences PEB. The relationship is strong, and CHA explains 21% of the variance in PEB.	This supports the idea that CHA is a positive influence on PEB.
H1a	CHA, PEB, Education Level	Moderated Regression Analysis	Interaction term between CHA and Education level to test moderation	β (CHA) = 0.40, $p = 0.004$, β (Interaction) = 0.22, $p = 0.02$	The relationship between CHA and PEB is stronger for tourists with higher education. The interaction	Higher education enhances the effect of CHA on PEB.

					term is significant, supporting the moderation hypothesis.	
H1b	CHA, PEB, Age	Moderated Regression Analysis	Interaction term between CHA and Age to test moderation	β (CHA) = 0.47, p = 0.001, β (Interaction) = -0.25, p = 0.03	The effect of CHA on PEB is stronger for younger tourists. The negative coefficient indicates that younger tourists benefit more from CHA in terms of PEB.	Younger tourists show a stronger response to CHA in shaping PEB.
H2	CHA, CHR, PEB	Mediation Analysis (PROCESS macro)	CHA $\rightarrow$ CHR $\rightarrow$ PEB; Testing if CHR mediates the relationship between CHA and PEB	Indirect Effect = 0.28, BootSE = 0.06, CI 95% = [0.17, 0.40]	CHR mediates the relationship between CHA and PEB. The indirect effect is statistically significant, supporting the mediation hypothesis.	CHR partially mediates the effect of CHA on PEB.
H2a	CHA, CHR, PEB, Age	Moderated Mediation Analysis	Testing if age moderates the mediation effect of CHR	Indirect Effect (Older) = 0.32, BootSE = 0.07, CI 95% = [0.20, 0.44]; Indirect Effect (Younger) = 0.22, BootSE = 0.05, CI 95% = [0.13, 0.31]	Older tourists experience a stronger mediation effect. The indirect effect is higher for older tourists, supporting the moderation by age in the mediation process.	Age moderates the mediation effect, with older tourists having a stronger indirect effect.
H2b	CHA, CHR, PEB, Education Level	Moderated Mediation Analysis	Testing if education moderates the mediation effect of CHR	Indirect Effect (Higher Education) = 0.24, BootSE = 0.05, CI 95% = [0.14, 0.34]; Indirect Effect (Lower	The mediation effect of CHR is stronger for less-educated tourists. The indirect effect is higher for lower-educated tourists, supporting the	Less-educated tourists experience a stronger mediation effect.

				Education) = 0.34, BootSE = 0.06, CI 95% = [0.22, 0.46]	moderation by education.	
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Table 2 depicts the hypothesis testing results among study variables. Cultural Heritage Appreciation (CHA) positively influences Pro-Environmental Behavior (PEB) (0.45), supporting H1. Moreover, we found significant moderation effects of education and age on the relationship between Cultural Heritage Appreciation (CHA) and Pro-Environmental Behavior (PEB) (β (CHA) = 0.40, $p = 0.004$, β (Interaction) = 0.22, $p = 0.02$; β (CHA) = 0.47, $p = 0.001$, β (Interaction) = -0.25, $p = 0.03$) this mean the relationship between CHA and PEB is stronger with higher education as education positively moderates the impact of CHA on PEB. Secondly, the relationship between CHA and PEB is stronger for younger tourists, as the negative interaction terms suggest that as age increases, the relationship is negatively impacted by age, thus supporting H1a and H1b. The results of the mediation analysis show partial support (Indirect Effect = 0.28, BootSE = 0.06, CI 95% = [0.17, 0.40]), which means in our model Cultural and Historical Reverence (CHR) partially supports H2. Lastly, H2a and H2b are supported as age and education moderate the mediation effect of CHR. This means the mediation effect is stronger for older tourists and for less-educated tourists.

Discussion

We explored the association between Cultural Heritage Appreciation (CHA) and Pro-Environmental Behavior (PEB) among tourists visiting Mohenjo-Daro. Furthermore, our study explores the mediating impact of Cultural and Historical Reverence (CHR) in the context of education and age. We collected data from a sample of 468 tourists visiting Mohenjo-Daro. Study findings reveal that Cultural Heritage Appreciation (CHA) positively impacts the Pro-Environmental Behavior (PEB), with a stronger impact on young and educated tourists. Moreover, results showed the partial mediation by Cultural and Historical Reverence (CHR) between Cultural Heritage Appreciation (CHA) and Pro-Environmental Behavior (PEB) among older and less-educated tourists. Study results show the importance of fostering cultural and historical

engagements in promoting sustainable tourism practices. The findings of the study are valuable for policymakers and site administrators who are particularly focused on sustainable tourism practices.

The strong positive connection between CHA and PEB is a main finding of this study. This study supports previous studies linking cultural appreciation to sustainable tourism. Chen and Peng (2025) and Han (2021) found that cultural participation may make tourists more ecologically concerned. This study shows that CHA affects PEB differently for visitors based on socio-demographic factors like education and age. The relationship between CHA and PEB is stronger among younger and more educated visitors. The study supports prior findings that age and education significantly influence environmental behaviors (Ajibade & Boateng, 2021; Mandić et al., 2024). However, showing how cultural appreciation and these elements affect ecotourism illuminates the problem. The study indicated that age and education mitigated the CHA-PEB connection, supporting the growing body of research on socio-demographic factors in pro-environmental behavior. Research by Mandić et al. (2024) and Fauzi et al. (2023) indicates that individuals with higher education and environmental awareness are more likely to engage in sustainable behaviors. This study indicated that tourists with higher education and younger ages were more inclined to appreciate cultural heritage and behave ecologically. This is consistent with Loureiro et al. (2022), who discovered that tourists with better education and younger ages are more inclined to accept sustainability messages and assist the environment. The research shows that CHR mediates CHA and PEB, expanding the theoretical framework. CHA and PEB have traditionally been studied separately in sustainable tourism, neglecting to account for tourists' sentiments, veneration, and intellectual interaction with cultural places on their environmental effect. This study fills a gap in the literature by adding CHR to the model and emphasizing the role of emotional and intellectual linkages to cultural heritage in pro-environmental

behavior. CHR somewhat mediates CHA-PEB links, with older and less educated visitors having a stronger mediation impact. A strong personal connection to the area and a deep appreciation for its history appear to encourage sustainable habits among visitors of all ages and education levels. Our conclusion contributes to the growing body of research on environmental awareness and sustainability, which often ignores the emotional and intellectual aspects of historic tourism.

The observation that age and education influenced PEB-CHA was important. This research is significant because it reveals how different groups respond to cultural heritage. Contrary to previous results, this study reveals how cultural heritage appreciation affects younger, better-educated tourists' pro-environmental behaviors. According to a study, younger, more educated tourists who respect cultural heritage are more inclined to embrace environmental sustainability. This supports Tasci et al. (2022) and Ajibade and Boateng (2021)'s arguments that socio-demographic variables shape environmental attitudes and behaviours. The study reveals that Cultural and Historical Reverence and demographics affect sustainable behavior. Younger and less educated visitors had a larger mediation effect of CHR, showing that their intellectual and emotional connection to the historic site influences their environmentally aware activities. This extensive investigation of age and education on the CHA-PEB link advances sustainable tourism research.

Study stresses CHR's moderating role in CHA-PEB relationship. Visitors with an emotional connection to a heritage site and a great appreciation for its history are more inclined to conduct eco-friendly behaviors. Cultural heritage site visitors who open their minds and hearts may become more environmentally conscientious due to intellectual and emotional connections. This conclusion builds on Timothy (2021) and Madandola and Boussaa (2023), who stressed the role of cultural heritage in promoting sustainable behavior without examining how tourists' intellectual and emotional connections to these places affect their environmental views. Sustainable tourism might benefit from this study's findings. This study contributes to cultural heritage appreciation and eco-conscious action literature by including socio-demographic characteristics like age and education level. Previous research has

neglected the cultural effect on sustainable behaviors and the intricate relationship between CHA and PEB. This study illuminates both. Cultural and Historical Reverence is used in this research to connect ecotourism to other professions. It presents a more comprehensive framework for understanding how cultural heritage tourism might help preserve the environment and argues that creating emotional and intellectual links with historic locations is crucial to promoting sustainable practices. In conclusion, this study expands our understanding of sustainable tourism and cultural heritage. This study examines the relationship between CHA and PEB, moderating variables like age and education, and mediating factors like CHR to better understand how cultural heritage may affect pro-environmental behaviors. The findings emphasize the importance of cultural involvement and personal links to historical sites for ecotourism. The study also gives legislators and historic site managers meaningful knowledge to encourage environmentally responsible behavior across populations. This study expands cultural heritage and sustainable tourism studies by revealing how CHA, age, education, and CHR affect sustainable behavior.

Theoretical Implications

From a theoretical standpoint, this study contributes to advancing the understanding of Pro-Environmental Behavior (PEB) in the context of cultural heritage appreciation (CHA) with Cultural and Historical Reverence (CHR) as moderator, with moderation mediation impact of age and education. Our study contributes to a deeper understanding of the factors influencing PEB in heritage and cultural tourism contexts, particularly the significance of cultural engagement and emotional connections with heritage sites. Moreover, by focusing on Cultural and Historical Reverence (CHR) expand the understanding of how non-spiritual factors, such as visitors' intellectual and emotional connections to history, may motivate visitors to adopt pro-environmental actions.

The study deepens our understanding that the positive role of cultural and historical appreciation can strengthen the pro-environmental behaviors among tourists. The unique contribution of the study focused on the CHR's mediating role and the moderating influence of age and education,

offering deeper insights into why cultural experiences lead to pro-environmental actions. This new insight yielded the critical role of socio-demographic factors (age and education) as a significant contributor in the model. It was found that younger tourists with low education are more influenced by their cultural and historical aspects towards pro-environmental behaviors. Previously, such variables were ignored in this context, which generated a gap in the literature and thus limited our understanding (e.g., Lin et al., 2022; Fauzi et al., 2023). Furthermore, cultural and historical reverence in tourism studies is generally explored as the main variable rather than its moderating impact (e.g., Timothy, 2021; Madandola & Boussaa, 2023)

Managerial Implications

Our study presents the practical implications for site managers, policymakers, along other stakeholders. Moreover, our study highlights the role of Cultural and Historical Reverence (CHR) in promoting sustainable practices among the visitors to the Mohenjo-Daro Site, thus positively contributing towards the long-term preservation. Additionally, the findings suggest that developing the emotional and intellectual bond between the visitors and the site's history and heritage aspect can serve as a powerful tool in promoting sustainable tourism. Thus, attracting more visitors to the site as well as enhancing the site's popularity as both an archaeological and sustainable tourism destination. Moreover, from a theoretical perspective, our study contributed towards sustainable tourism practices by offering a more nuanced understanding of the role that cultural engagement, emotional connection, and intellectual respect for the perspective of heritage sites play in motivating pro-environmental tourist behavior, while highlighting the importance of socio-demographic factors in this process.

Our study also highlighted the critical issue that authorities are facing from the tourists through their unfriendly practices, such as littering, spray-painted names, and the harmful practice of engraving names on ancient walls, which undermine the preservation efforts and cultural integrity of these historical treasures. Lastly, despite valuable contributions, the study has limitations that are driven by the study's focus on a single heritage site, with a cross-sectional approach. This limits the study findings' scope to be generalized to

other settings, such as cultural or archaeological destinations. Future researchers could explore the heritage or archaeological sites to explore the broader applicability of the findings. Additionally, by merging the socio-demographic factors such as age, education could help further explore the concept of sustainable practices in the context of heritage and cultural sites. The study conducted on the relationship between Cultural Heritage Appreciation (CHA) and Pro-Environmental Behavior (PEB) among tourists at Mohenjo-Daro provides valuable insights into how cultural and historical engagement influences sustainable tourism practices. However, like all research, it has its limitations, which need to be acknowledged to ensure a balanced understanding of the findings. Additionally, the study opens avenues for further research in this area, suggesting several future recommendations to expand upon its findings.

Study Limitations

Small sample size and restricted demographic focus are key critiques of the study. The survey included 468 Mohenjo-Daro tourists, although they were limited by culture and geography. Due to the study's small focus, its findings may not apply to other cultural or archeological sites, particularly those in other countries or with different demographics and socioeconomic situations. Due to Mohenjo-Daro's cultural significance, the results may not apply to the worldwide cultural tourist business. Increase the sample size to include visitors from different historic sites in diverse locales to improve generalizability. The study's cross-sectional design is another issue. Due to its snapshot nature, the data cannot track passengers' changing views or behaviors. Research investigating how visitors' attitudes and behaviors change before, during, and after their visit to historic places is needed to better understand the complex web of impacts on environmentally aware behavior. A longitudinal design may solve these issues. CHA and CHR's effects on PEB should be studied throughout time to ensure sustainable practices.

Convenience sampling may have introduced biases to the study. Despite the high response rate (93.6%), the sample may not represent all Mohenjo-Daro visitors. Since tourists who freely participated in the survey were more interested in cultural and environmental issues, the results may have been skewed. To achieve accurate findings,

employ random sampling to reduce bias and produce a more representative sample. The study examined Cultural Heritage Appreciation (CHA), Cultural and Historical Reverence (CHR), and Pro-Environmental Behavior (PEB) using self-reported data, which may include social desirability bias. People may have misled about their cultural or environmental involvement to seem better. Using objective measures or behavioral observation, future studies might better understand how tourists interact with their environment.

Future Research Recommendations

Future research should include a more diverse sample. This may include studying visitors from different countries, ethnicities, and socioeconomic backgrounds. A more diversified sample of tourists would help researchers understand how income, ethnicity, and tourist aspirations affect cultural heritage appreciation and ecologically responsible activities. Researchers may also examine how international tourists interact with historical sites and natural environments, taking into consideration regional cultural differences. Future studies may examine how CHA and CHR impact eco-friendly behavior. This study evaluated waste reduction, recycling, and environmental compliance as a generic PEB. Reducing one's carbon footprint, choosing sustainable transportation, and engaging in conservation initiatives may be studied. Understanding how CHA and CHR affect these behaviors might assist in maintaining cultural heritage tourism. External factors, including site management, tourism policies, and community engagement, should be studied. Example: how does historic site management's environmental regulatory enforcement or eco-friendly services affect visitors' PEB? It may be worth investigating if historic sites with sustainability initiatives amplify CHA and CHR on PEB. Research into site management, local communities, and tourists working collaboratively may lead to a more sustainable tourism strategy. Finally, future research may incorporate gender, personal environmental values, tourist motivations, age, and education levels in addition to these two elements' impacts on CHA and PEB. To understand ecotourism, it would be helpful to study how these factors and cultural respect impact ecologically aware behavior.

Conclusion

This study has shed light on how Mohenjo-Daro tourists might better appreciate cultural treasures and be ecologically conscientious. Cultural involvement matters, even when age and education mitigate the link between cultural participation and pro-environmental behaviors. The study admits that cross-sectional methodology, convenience sampling, and self-reported data dependency are flaws. To overcome these constraints, future research should use longitudinal and multi-method methods, include additional socio-demographic factors, and expand the study. Cultural and historical veneration has far-reaching implications, and future study should examine how its numerous forms influence eco-friendly activities. Future research that addresses these gaps may help historic site managers and lawmakers preserve cultural and environmental integrity by revealing how cultural heritage may promote sustainable tourism.

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