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Values system as Driver of Urban Forests Conservation: A Multidimensional Model of Pro-Environmental Behavior in a Megacity

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Article

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Abstract

Urban forests are key components of urban areas, providing critical ecosystem services that support climate resilience, biodiversity conservation, and human well-being. Their long-term sustainability, however, depends not only on planning and management but also on citizens' pro-environmental behavior within urban forest settings. While existing urban forestry research has examined cognitive and attitudinal drivers of such behavior, the role of deeply rooted cultural and religious value systems remains insufficiently explored, particularly in non-Western megacities. This study develops and empirically tests a multidimensional value-based model to explain pro-environmental behavior among urban forest visitors in Tehran, Iran. Using survey data from 389 respondents and Partial Least Squares Structural Equation Modeling (PLS-SEM), the study examines how cultural and religious values shape biospheric, altruistic, egoistic, spiritual, aesthetic, and hedonic value orientations, and how these values jointly influence conservation-oriented behavior. The proposed model explains 84% of the variance in pro-environmental behavior, indicating strong explanatory power. The results show that religious and cultural values function as foundational drivers of urban forest stewardship, exerting both direct effects on behavior and indirect effects through biospheric, altruistic, and egoistic values. Biospheric and altruistic values positively influenced pro-environmental behavior, whereas egoistic values had a negative effect. In addition, spiritual connection, aesthetic appreciation, and hedonic enjoyment of urban forests significantly promoted environmentally responsible actions, highlighting the importance of experiential and affective motivations. These findings contribute to urban forestry and urban greening scholarship by demonstrating that urban forest stewardship is embedded within broader sociocultural and moral value systems. For policy and practice, the results suggest that effective urban forest governance should integrate value-based and culturally sensitive strategies alongside conventional management approaches.

1. Introduction

Urban forests are critical ecological assets that which are considered to play a significant role in mitigating climate change while offering environmental, social, and cultural benefits (Bassett et al., 2026). Their conservation, however, is closely tied to the environmentally responsible behaviors of visitors (Erfanian et al., 2024). While policy measures and technological innovations have played significant roles in environmental conservation (Ahsan Iqbal et al., 2025), the contribution of individual behavior remains indispensable. Pro-Environmental Behavior (PEB), defined as voluntary actions that benefit or minimize harm to the natural environment, has emerged as a focal point in environmental research (Erfanian et al., 2024; Rampedi and Ifegbesan, 2022). To effectively promote and strengthen such behaviors, it is essential to analyze and identify the factors that influence them. Gaining insight into these determinants can support the development of targeted educational and outreach initiatives aimed at fostering PEB and ensuring the sustainable management of urban forests.

Various studies have utilized different behavioral models to identify the factors influencing PEB. These models have demonstrated that certain personal factors, such as attitudes and perceived behavioral control (López-Mosquera et al., 2014; Xie et al., 2024), cognitive factors, such as understanding the behavior of others (Erfanian et al., 2024), and emotional factors, such as place attachment (Maleknia and Pakravan-Charvadeh, 2025; Zhou et al., 2024), can serve as significant determinants of visitors' pro-environmental and conservation behaviors in urban forests. Along with these variables, values are also considered as the influential factors shaping individual behavior, and they have received considerable attention in environmental studies. In essence, values function as a set of variables that, through a mechanism or chain of interconnected factors, can influence human behavior (Joffe-Nelson et al., 2024a; Rafferty, 2025). Although the role of values in shaping PEB among urban forest visitors

has not been extensively explored, numerous studies in other domains such as tourism (Kim et al., 2025; Siyavooshi et al., 2019), energy consumption (Duong, 2023), water resource conservation (Karakaş, 2023; Yang and Sato, 2025), green consumerism (Ang, 2023; Hussain and Huang, 2022), and forest conservation (Wu et al., 2024) have confirmed their significance. Values themselves encompass a wide range of types, including cultural, religious, egoistic, altruistic, and ecological values (Marie et al., 2024; Stern et al., 1999). Their influence can vary depending on the social or individual context, particularly in relation to the dominant cultural orientation toward individualism or collectivism (Rafferty, 2025). Human values, as enduring beliefs that guide attitudes and behaviors, serve as a fundamental foundation for shaping environmental actions (Al Mamun et al., 2022; Su et al., 2022). The interplay between individual values and environmental decision-making has been extensively explored in environmental psychology, with growing recognition that values influence not only attitudes but also behavioral intentions and practices (Bruzzese et al., 2025).

Nevertheless, there remains a research gap regarding influence of chain of values on citizens' PEB in urban forests. Despite extensive research on PEB, several important gaps remain. First, existing studies tend to examine value dimensions in isolation rather than integrating multiple value domains into a comprehensive analytical framework. This fragmentation limits our understanding of how diverse moral, cultural, spiritual, aesthetic, and hedonic values jointly shape pro-environmental behavior. Second, dominant theoretical approaches often treat values as distal or background factors, offering limited insight into the mechanisms through which deep-rooted cultural and religious values translate into behavioral outcomes via specific value orientations. Third, empirical evidence from urban forest settings, particularly in non-Western contexts where cultural and religious values are highly salient, remains scarce. Addressing these gaps, the present study develops and tests an integrated, multidimensional value-based model to explain PEB in urban forests, thereby providing a more nuanced and context-sensitive understanding of value-driven environmental action.

Specifically, it seeks to (1) examine the direct and indirect effects of cultural and religious values on PEB, (2) investigate how biospheric, altruistic, and egoistic values are shaped by cultural and religious contexts, and how they subsequently influence behavior, (3) explore the contributions of aesthetic, hedonic, and spiritual values in motivating environmentally responsible actions. Accordingly, the main research questions were (1) How do cultural and religious values directly and indirectly influence pro-environmental behavior in urban forests? (2) What mediating roles do biospheric, altruistic, and egoistic values play in this relationship? And do spiritual, aesthetic, and hedonic values provide additional explanatory power for pro-environmental behavior?

Understanding the multidimensional pathways through which values influence PEB offers valuable insights for both theory and practice. Theoretically, this research can contribute to literature by integrating cultural and religious dimensions into value-behavior models, offering a more holistic view of environmental motivation. Practically, the findings can inform the design of more culturally sensitive and value-driven environmental education programs, policy campaigns, and interventions aimed at encouraging sustainable behavior in context of urban forests. By bridging psychological, cultural, and spiritual perspectives, this study underscores the necessity of looking beyond individual attitudes and toward the deeper value systems that guide everyday environmental choices.

2. Conceptual framework

To explain how urban forests visitors decide to adopt PEB, this study proposes an integrated conceptual framework (Fig. 1) that bridges cultural, psychological, and spiritual values of human motivation. At its core, the

model conceptualizes values as central drivers that shape and guide conservation-related actions. The framework begins with cultural and religious values as foundational influences that reflect societal and moral norms, especially in traditional religious societies. These broad values shape more specific, individual-level orientations such as biospheric, altruistic, and egoistic values which represent varying degrees of self-transcendence or self-enhancement. In addition, the model incorporates spiritual, aesthetic, hedonic values and to account for emotional and experiential. By integrating these components, the framework offers a multidimensional view of environmental action, one that acknowledges the deep cultural, ethical, and affective roots of sustainable behavior in urban forest contexts.

Religious values encompass the moral principles and beliefs derived from spiritual traditions, scriptures, and institutionalized doctrines (Saleem, 2019). These values often serve as a moral compass that guides behavior, shapes social norms, and influences personal identity (Aglozo and Cohen, 2025; de Boer and Aiking, 2026). In the context of environmental behavior, religious teachings may offer both explicit and implicit guidance on the relationship between humans and the natural world. Many religious traditions emphasize stewardship, compassion, humility, and respect for creation principles that align closely with biospheric and altruistic values (Das et al., 2025; Ghazali et al., 2018). In religious societies, religious values represent powerful moral foundations that shape PEB (Das et al., 2025; Filimonau et al., 2023). Rooted in scriptural teachings and spiritual obligations, these values often frame nature as divine creation and humans as entrusted stewards. Beyond personal belief, religion operates as a collective norm system, where ecological actions may be perceived as both spiritual duties and socially rewarded practices (Kala and Chaubey, 2024). Thus, religious values might directly guide PEB and indirectly shape other value orientations, making them indispensable drivers of sustainability. Directly, individuals who perceive environmental stewardship as a religious duty may feel morally obligated to engage in sustainable practices (Maleknia et al., 2024b). Indirectly, religious values help shape biospheric, altruistic, and egoistic values by instilling a sense of moral responsibility toward others, nature, or divine authority.

H1. Religious values have a positive effect on biospheric values.

H2. Religious values have a positive effect on altruistic values.

H3. Religious values have a negative effect on egoistic values.

H4

Religious values have a positive effect on PEB.

Cultural values represent shared beliefs, norms, and practices that define what is acceptable and desirable within a society (Calza et al., 2020). They form the sociocultural backdrop against which individuals interpret their relationships with others and the environment. In the context of environmental behavior, cultural values influence individuals' worldviews, including how they perceive nature, sustainability, and communal responsibility (Davari et al., 2024; Ghasemi and Bruskotter, 2026). Research findings have shown that this variable can influence PEB such as climate change mitigation, plastic consumption reduction, and biodiversity conservation by shaping individuals' underlying value systems (Tam, 2025; Yang et al., 2024). Directly, they can prescribe environmentally responsible behaviors (Wang and Li, 2025); indirectly, they shape individual-level values biospheric, altruistic, and egoistic values by framing what is considered virtuous or acceptable. A culture that promotes self-restraint, harmony, and sustainability may strengthen biospheric and altruistic values while suppressing egoistic tendencies (Kang et al., 2024; Nguyen and Dekhili, 2024). Conversely, a culture centered on consumerism and individualism may elevate

egoistic orientations, undermining ecological concern (Jebarajakirthy et al., 2024; Riaz et al., 2023). Thus, cultural values function as foundational antecedents, exerting influence across the value spectrum and informing the construction of environmental identity. In collectivist cultural systems such as Tehran, environmental responsibility is often tied to social harmony, respect for shared resources, and concern for future generations (Chevrier et al., 2025). By guiding both collective responsibilities and personal aspirations, cultural values serve as foundational antecedents that shape environmental identity and significantly affect PEB. Therefore, the framework posits cultural values as both direct drivers and formative influences within the value-behavior pathway.

H5. Cultural values have a positive effect on biospheric values.

H6. Cultural values have a positive effect on altruistic values.

H7. Cultural values have a negative effect on egoistic values.

H8

Cultural values have a positive effect on PEB.

Biospheric values refer to individuals' concern for the biosphere and non-human nature, emphasizing the intrinsic worth of the natural environment independent of human utility (Stern et al., 1993). These values are central to environmental ethics and reflect a worldview in which protecting ecosystems, preserving biodiversity, and minimizing environmental harm are seen as moral imperatives (Sampene et al., 2024). Biospheric values are strongly aligned with the concept of ecocentrism, which positions nature not merely as a resource but as a system deserving respect and protection (Sockhill et al., 2022). Individuals with strong biospheric orientations are more likely to engage in behaviors such as conserving energy, reducing waste, supporting conservation policies, and making environmentally responsible consumer choices (Kala and Chaubey, 2024). In the proposed model, biospheric values function as mediators between foundational (cultural and religious) values and PEB and director determiner of PEB.

H9. Biospheric values have a positive effect on PEB.

Altruistic values are characterized by concern for the welfare of other human beings and the broader society (Stern et al., 1999). These values emphasize compassion, empathy, social justice, and moral responsibility toward others, particularly in relation to future generations and vulnerable populations (Druica et al., 2023). In the context of environmental behavior, altruistic values manifest as a motivation to protect the environment not necessarily for personal gain or even for nature itself, but to ensure the well-being of others who are or will be affected by environmental degradation (Alghamdi and Agag, 2024). This includes concern for the health, safety, and livelihoods of people affected by climate change, pollution, deforestation, or resource scarcity. In the proposed framework, altruistic values play a central mediating role, linking broader cultural and religious contexts to PEB. Cultural traditions and religious teachings that promote community welfare, collective responsibility, or intergenerational solidarity are likely to foster altruistic orientations.

H10. Altruistic values have a positive effect on PEB.

Egoistic values reflect a self-centered orientation where individual interests, personal gain, power, and control are prioritized over collective or ecological concerns (Stern et al., 1995). In the context of environmental behavior, individuals driven by egoistic values typically evaluate environmental actions based on how they affect their

personal outcomes (Nguyen and Dekhili, 2024). Egoistic values can therefore either inhibit or, in some strategic contexts, promote PEB (Druica et al., 2023; Gansser and Reich, 2023). For example, someone may reduce energy consumption to save money or adopt a green lifestyle to enhance social status, rather than out of concern for the planet or future generations. In the proposed model, egoistic values are conceptualized as individual-level constructs shaped by cultural and religious values (Das et al., 2025; Kang et al., 2024). Certain cultural systems that emphasize individualism, materialism, or competitive achievement may nurture stronger egoistic orientations (Kokash et al., 2025). Likewise, religious interpretations that prioritize human dominion or prosperity may inadvertently support egoistic worldviews (Wnuk, 2025). Therefore, in this study, this construct was considered both as a dependent variable influenced by cultural and religious values and as an independent factor affecting behavior.

H11. Egoistic values have a negative effect on PEB.

Spiritual values refer to beliefs and experiences that emphasize connection with a higher purpose, universal unity, or the sacredness of life and nature (Dehaghi et al., 2012; Raza et al., 2024). These values are distinct from institutional values in that they may be expressed both within and outside of organized societies, often encompassing a deep sense of interconnection between humans and the natural world (Wnuk, 2025). This sense of unity with the environment often leads to increased ecological concern, moral responsibility, and behaviors aimed at preserving natural harmony (Afsar et al., 2016; Shakeri et al., 2021). Individuals who feel spiritually connected to nature are more likely to perceive themselves as part of the ecological system, a self-concept that reinforces sustainable choices. Empirical research has shown that people with higher levels of spiritual awareness or transcendental belief are more likely to engage in conservation, eco-friendly consumption, and environmental activism (Gull et al., 2024; Plieninger et al., 2020). Research findings also have shown that forests and urban green spaces can generate spiritual values for visitors (Ormsby, 2021; Roux et al., 2022). spiritual values though related but are conceptually distinct from religious values. Religious values reflect socially reinforced norms and obligations rooted in organized faith, whereas spiritual values reflect an individual’s personal sense of transcendence and connection to nature. Therefore, within the proposed framework, spiritual values are theorized to influence the environmental behavior of urban forest visitors.

H12. Spiritual values have a positive effect on PEB.

Aesthetic values refer to an individual's appreciation of beauty, harmony, and the visual or experiential qualities of the natural environment (Kubala, 2025; Nadal and Skov, 2024). These values are grounded in emotional and sensory responses to nature such as awe at a landscape, peace from a forest walk, or admiration for biodiversity and can profoundly influence environmental attitudes and behavior (Martens et al., 2011; Xie et al., 2023). Unlike more cognitively grounded values like biospheric or altruistic values, aesthetic values are often experiential and affective, based on personal encounters with nature’s beauty and serenity (Chen et al., 2023). They foster a non-utilitarian view of the environment, where nature is valued not for what it can provide materially, but for how it enriches human experience. The impact of aesthetic values on PEB is linked to the way sensory experiences and emotional attachments enhance environmental awareness and concern (Jayakody et al., 2024). When individuals highly value the aesthetic aspects of nature, they are more likely to engage in behaviors that conserve natural beauty, such as supporting protected areas, participating in habitat restoration, or advocating against pollution and environmental degradation (Baumeister et al., 2020). Thus, aesthetic values probably play a crucial role in motivating environmentally responsible behavior by appealing to the emotional and experiential dimensions of human-nature relationships.

H13. Aesthetic values have a positive effect on PEB.

Hedonic values center on the pursuit of pleasure, comfort, and personal enjoyment (Kang et al., 2024). They reflect a motivational orientation where individuals prioritize experiences that bring immediate gratification, reduce discomfort, or enhance emotional well-being (Bouman et al., 2020). In environmental contexts, hedonic values can play an ambivalent role. On one hand, they may discourage PEB when such actions are perceived as inconvenient, costly, or limiting such as reducing air travel, cutting meat consumption, or buying more expensive eco-products (Wensing et al., 2025). On the other hand, when PEB are framed or experienced as enjoyable or fulfilling, hedonic values can become supportive of sustainability (Lou et al., 2025). In the theoretical framework presented here, hedonic values are modeled as a direct influence. This reflects the idea that, under certain conditions, individuals may choose sustainable actions because they provide immediate emotional or experiential rewards, such as relaxation, aesthetic pleasure, or social bonding (Maleknia and Pakravan-Charvadeh, 2025). Unlike biospheric or altruistic values, which are self-transcendent, hedonic values (Yang et al., 2024) are self-enhancing and inherently egocentric. However, this does not preclude them from playing a constructive role in sustainability, especially when behaviors can be designed to align with enjoyment. Thus, hedonic values serve as a situational and pragmatic pathway to PEB within the model.

H14. Hedonic values have a positive effect on PEB.

3. Materials and Methods

3.1. Study Area

This research was conducted in Tehran (Fig. 2), the capital and largest metropolitan area of Iran. This case study provides a unique and appropriate setting for examining the role of values in shaping PEB within urban forests. As a densely populated megacity with about nine million residents (Azargoshasbi et al., 2023), Tehran faces acute environmental challenges, including air pollution, rapid urbanization, and limited green infrastructure. These pressures have heightened the importance of urban forests, which function as vital ecological assets by improving air quality, reducing urban heat, preserving biodiversity, and offering recreational and cultural spaces for citizens. The significance of these green areas is not merely ecological but also social and cultural, as they represent some of the few accessible natural environments for diverse groups of urban residents. The selection of Tehran as the study area is strongly aligned with the theoretical framework of this research. The framework emphasizes the interplay of cultural, religious, spiritual, aesthetic, hedonic, and biospheric values in shaping PEB. Tehran's social fabric, characterized by a rich cultural heritage and strong religious traditions, provides fertile ground for exploring how cultural and religious values operate as foundational drivers of environmental behavior.

3.2. Participants and Sampling

The target population for this study comprised visitors to urban forests located within Tehran. These sites were deliberately selected as they represent the most accessible and frequently utilized natural spaces in the city, thereby offering a suitable context for investigating the relationship between human values and PEB. To ensure representativeness, a stratified random sampling approach was employed. Stratification was based on key demographic indicators, including gender, age, educational attainment, and socioeconomic status, with the aim of capturing heterogeneity within the study population. This strategy minimized the biases associated with convenience sampling and enhanced the generalizability of the findings. To achieve this objective, five

geographically suitable areas in Tehran were initially selected. Within each area, two primary urban forests were chosen for sampling. According to the Krejcie and Morgan (1970) table, a sample size of 384 was deemed necessary for this research. However, to enhance accuracy, a larger number of samples were utilized in the study. A total of 389 fully completed questionnaires were collected, yielding an adequate sample size for Structural Equation Modeling (SEM). The sample size of this study is adequate for Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is particularly suitable for models with moderate sample sizes and complex structural relationships. Following the “10-times rule,” the minimum sample size should be ten times the largest number of structural paths directed at any endogenous construct. In this model, the most complex endogenous variable (PEB) has a maximum of eight direct predictors, resulting in a minimum required sample size of 80. The obtained sample substantially exceeds this requirement.

3.3. Data Collection

Data were collected through a structured questionnaire survey administered on-site to visitors of Tehran’s urban forests. The instrument was designed to capture latent constructs central to the study, including cultural, religious, biospheric, altruistic, egoistic, aesthetic, hedonic, spiritual values, and PEB (Table 1). All measurement items were adapted from validated scales widely applied in previous research, thereby ensuring both content validity and comparability with existing studies. Responses were recorded using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) (Likert, 1932). Prior to the main survey, a panel of experts meeting and pilot test with 30 participants to evaluate the clarity, reliability, and interpretability of the items were conducted. Feedback from the pilot study (Cronbach, (1951) alpha higher than 0.7) resulted in minor refinements to item wording, enhancing overall comprehensibility while maintaining conceptual equivalence. The survey was conducted in printed form with response rate of 73%. Trained research assistants approached potential respondents, explained the purpose of the study, and invited participation. Participation in the study was voluntary, no financial incentives were offered, reducing the likelihood of participation bias linked to monetary compensation. Anonymity and confidentiality were strictly maintained in compliance with ethical research standards, thereby encouraging candid responses and reducing social desirability bias. This study received ethical approval from Research Ethics Committees of the Lorestan University of Medical Sciences in accordance with all relevant guidelines and regulations for research involving human participants, including the Declaration of Helsinki with Approval Number of 1402.321. All participants gave informed consent, and their anonymity and confidentiality were ensured.

Table 1
The constructs of model with statements

Constructs	Code	Statements	References
Religious values	RV1	Caring for the environment is part of my religious duty.	(Afsar et al., 2016; Bamberg et al., 2023; Das et al., 2025; Gull et al., 2024; Hossu et al., 2024; Kala and Chaubey, 2024; Li et al., 2022; Maleknia et al., 2024a)
	RV2	My faith encourages me to protect nature as God's creation.	
	RV3	I believe my religion expects me to respect and conserve natural resources.	
Cultural values	CV1	Preserving nature is an important part of my cultural traditions.	
	CV2	In my culture, taking care of shared natural spaces is a collective responsibility.	
	CV3	Environmental responsibility is strongly supported in my community's traditions.	
Biospheric values	BV1	The well-being of plants and animals matters deeply to me.	
	BV2	Human progress should not come at the cost of nature.	
	BV3	I try to reduce my ecological footprint to protect the planet.	
Altruistic values	AV1	I support environmental protection because it improves society's well-being.	
	AV2	I act environmentally friendly because it benefits other people.	
	AV3	Conserving resources is important so others can also benefit from them.	
Egoistic values	EV1	I care about the environment only when it directly benefits me.	
	EV2	I am less likely to engage in environmental protection if it requires personal sacrifice.	
	EV3	I value nature when it contributes to my personal comfort or lifestyle.	
Spiritual values	SV1	I feel spiritually connected to nature when I spend time in green spaces.	
	SV2	Caring for the environment is part of my spiritual beliefs.	

Constructs	Code	Statements	References
	SV3	Protecting the environment helps me feel closer to a higher purpose.	
Aesthetic values	AEV1	I enjoy the beauty of urban forests.	
	AEV2	I feel inspired when I see beautiful forests.	
	AEV3	Preserving urban forests matters because they enrich life through beauty.	
	AEV4	I prefer living in an environment with natural harmony and greenery.	
Hedonic values	HV1	I enjoy spending time in urban forests because it makes me feel good.	
	HV2	Visiting urban forests gives me pleasure and relaxation.	
	HV3	Protecting green spaces is important because they provide comfort and leisure.	
Behavior	PEB1	I participate in or support urban forests conservation programs.	
	PEB2	I encourage other forests visitors to act in environmentally responsible ways.	
	PEB3	I avoid activities that can harm the environment.	
	PEB4	I try to conserve urban forest my visiting.	

3.4. Data Analysis

The analytical process followed a two-stage procedure, beginning with the evaluation of the measurement model to ensure construct reliability and validity, and followed by the assessment of the structural model to test the hypothesized relationships among variables. This dual approach was necessary to establish the robustness of the latent constructs prior to examining causal pathways within the proposed framework (Hair and Alamer, 2022). $SPSS_{24}$ was employed for preliminary descriptive statistics and data screening, while $SmartPLS_3$ was used for SEM. This approach was selected for several reasons. First, the primary objective of the study is explanatory and predictive, aiming to assess how a multidimensional system of values collectively explains pro-environmental behavior rather than to confirm a single, well-established covariance structure. Second, the proposed model is relatively complex, incorporating multiple latent constructs and mediating relationships, which makes PLS-SEM particularly suitable. Third, PLS-SEM does not require multivariate normal data distribution and is therefore appropriate for Likert-scale survey data collected in real-world field contexts. Finally, given the sample size relative to model complexity, PLS-SEM provides greater robustness and estimation efficiency than covariance-based SEM.

These considerations align with methodological recommendations in environmental and behavioral research (Hair and Alamer, 2022).

3.4.1. Reliability and Validity Assessment

Internal consistency reliability was assessed using Cronbach's alpha (α) and composite reliability (CR). Cronbach's alpha values above 0.70 are generally considered acceptable (Cronbach, 1951), although values between 0.60 and 0.70 may be tolerated in exploratory studies. Composite reliability, which accounts for the actual loadings of items, provides a more precise measure of reliability in SEM contexts. A CR threshold of 0.70 or higher was applied to ensure that each construct demonstrated adequate internal consistency. Convergent validity was evaluated through factor loadings and average variance extracted (AVE). Factor loadings greater than 0.60 were considered satisfactory, as they indicate that items meaningfully represent their corresponding latent construct. The AVE criterion requires values above 0.50, meaning that more than half of the variance in the indicators is explained by the construct rather than by error. These criteria ensured that each construct was empirically well represented by its measurement items and exhibited adequate explanatory power.

Discriminant validity was assessed through two complementary procedures. First, the Fornell–Larcker criterion was applied, whereby the square root of each construct's AVE should exceed its correlations with other constructs (Fornell and Larcker, 1981). This ensures that constructs are more strongly associated with their own indicators than with those of different constructs. Second, the Heterotrait–Monotrait (HTMT) ratio was calculated, with values below 0.85 considered indicative of satisfactory discriminant validity. HTMT is widely regarded as a more stringent and reliable measure than the Fornell–Larcker criterion, particularly in complex models. By employing both approaches, the study minimized the risk of construct overlapping and confirmed that the latent variables captured distinct conceptual domains.

3.4.2. Structural Model Evaluation

Once the measurement model satisfied reliability and validity criteria, the structural model was examined to evaluate the hypothesized relationships among constructs. The primary indicators of model quality included path coefficients, coefficient of determination (R^2), and predictive relevance (Q^2). Path coefficients were used to assess both the magnitude and direction of relationships, with significance levels established through bootstrapping procedures. The R^2 statistic indicated the proportion of variance in the endogenous constructs explained by the model, with values of 0.25, 0.50, and 0.75 typically interpreted as weak, moderate, and substantial explanatory power, respectively. Predictive relevance was assessed using the Stone–Geisser Q^2 statistic, obtained through blindfolding procedures. A Q^2 value greater than zero indicates that the model possesses predictive relevance for the endogenous constructs (Hair et al., 2019). To examine indirect effects, bootstrapping with 5,000 resamples was conducted. Bootstrapping is a non-parametric resampling technique that provides robust estimates of mediation effects by generating bias-corrected confidence intervals. Indirect pathways were considered statistically significant when the confidence intervals did not include zero. This procedure allowed for a rigorous evaluation of the mediating roles of biospheric, altruistic, egoistic, aesthetic, hedonic, and spiritual values in linking cultural and religious values to

4. Results

4.1. Demographic characteristics

The demographic characteristics of the study (Table 2) sample indicate a broad age distribution, with respondents ranging from 18 to 73 years (M = 46.0, SD = 12.20), suggesting representation across both younger and older cohorts. Gender composition was relatively balanced, though slightly male-dominated, with 56% of participants identifying as male and 44% as female. In terms of marital status, single individuals comprised 53% of the sample, while 47% were married, reflecting a fairly even distribution between the two groups. Educational attainment varied, with the largest proportion of respondents holding a diploma (43%), followed by university degrees (35%). A smaller share reported school-level education (18%), while only a small minority (4%) were illiterate. Overall, the sample reflected a moderately well-educated population, with a notable concentration in middle-age and diploma-level qualifications.

Table 2
The demographic profile of respondents

Variables		**Min**	**Max**	**Mean**	**Std. Deviation**
I. Continuous					
Age		18	73	46	12.20
II. Categorial		Categories	Frequency	Percentages	Mode
Gender	1. Female	1–2	171	44	
	2. Male		218	56	*
Marital Status	1. single	1–2	206	53	*
	2. married		183	47	
Educational Status	1. Illiterate	1–4	15	4	
	2. School degrees		69	18	
	3. Diploma		168	43	*
	4. University degrees		137	35	

4.2. Measurement Model Evaluation

The results of reliability and validity of measurement model are illustrated in Table 3. Cronbach's alpha values ranged from 0.705 to 0.939, exceeding the minimum recommended cut-off of 0.70 (Cronbach, 1951). These results indicate that the indicators consistently measured their respective constructs. CR values for all constructs exceeded the recommended threshold of 0.70, ranging from 0.804 for aesthetic values to 0.957 for PEB (Hair and Alamer, 2022). These findings provide strong evidence of reliability across the latent constructs included in the model. Convergent validity was established as the AVE values for all constructs exceeded the recommended minimum of 0.50. The AVE ranged from 0.508 (aesthetic values) to 0.877 (egoistic values), demonstrating that a substantial proportion of variance in the indicators was explained by their respective latent constructs. These results confirm that the measurement model demonstrated satisfactory reliability and validity. All constructs met or surpassed the established thresholds for internal consistency and convergent validity, thereby providing a robust foundation for subsequent testing of the structural model.

Table 3
Results of reliability and validity of measurement model

Constructs	Cronbach's alpha	composite Reliability	Average variance extracted (AVE)
Aesthetic values	0.705	0.804	0.508
Altruistic values	0.834	0.9	0.75
Behavior	0.939	0.957	0.847
Biospheric values	0.836	0.902	0.754
Cultural values	0.895	0.934	0.826
Egoistic values	0.93	0.956	0.877
Hedonic values	0.782	0.873	0.696
Religious values	0.835	0.901	0.751
Spiritual values	0.8	0.883	0.715

The result of Fornell–Larcker criterion is shown in Table 4. The square root of the AVE for each construct exceeded its correlations with other constructs, indicating that each latent variable shared greater variance with its own indicators than with other constructs. For example, the square root of AVE for PEB (0.92) was higher than its correlations with another constructs. These results confirm adequate discriminant validity across the measurement model (Fornell and Larcker, 1981). The HTMT values further supported discriminant validity (Table 5), as all values were below the conservative threshold of 0.9. For instance, the HTMT between behavior and religious values was 0.898, and between behavior and altruistic values 0.818, both falling within the acceptable range. Together, the Fornell– Larcker criterion and HTMT analysis provided strong evidence that the constructs were empirically distinct. This ensures that the relationships tested in the structural model are not the result of measurement overlaps, thereby enhancing the robustness of subsequent hypothesis testing.

Table 4
The result of Fornell–Larcker criterion

Constructs	1	2	3	4	5	6	7	8
Altruistic values	0.519							
Behavior	0.733	0.818						
Biospheric values	0.578	0.712	0.84					
Cultural values	0.539	0.626	0.8	0.723				
Egoistic values	0.485	0.415	0.662	0.574	0.588			
Hedonic values	0.881	0.493	0.683	0.536	0.452	0.497		
Religious values	0.553	0.783	0.898	0.846	0.743	0.575	0.58	
Spiritual values	0.606	0.658	0.818	0.798	0.675	0.536	0.647	0.761

Table 5
The results of HTMT values

Constructs	Aesthetic values	Altruistic values	Behavior	Biospheric values	Cultural values	Egoistic values	Hedonic values	Religious values
Altruistic values	0.519							
Behavior	0.733	0.818						
Biospheric values	0.578	0.712	0.84					
Cultural values	0.539	0.626	0.8	0.723				
Egoistic values	0.485	0.415	0.662	0.574	0.588			
Hedonic values	0.881	0.493	0.683	0.536	0.452	0.497		
Religious values	0.553	0.783	0.898	0.846	0.743	0.575	0.58	
Spiritual values	0.606	0.658	0.818	0.798	0.675	0.536	0.647	0.761

The reported PLS-SEM fit indices indicated an acceptable overall model fit (Table 6). The estimated SRMR (0.081) is within the acceptable range for variance-based SEM, and the lower SRMR of the saturated model (0.072) suggests adequate measurement model specification. The modest increases in d_ULS and d_G from the saturated to the estimated model do not indicate meaningful model misspecification. Although NFI values are below conventional CB-SEM thresholds, they are considered acceptable given the predictive orientation and complexity of the model. Overall, the measurement and structural models are adequately specified.

Table 6
The fit indices of the model

Saturated Model	d_ULS	d_G	SRMR	NFI	Chi-Square
	2.258	**0.737**	**0.072**	**0.802**	**1,725.15**
Estimated Model	2.851	0.798	0.081	0.797	1,771.72

4.3. Coefficient of Determination and Predictive Relevance

The structural model demonstrated strong explanatory power (Table 7, Fig. 3). Biospheric values (R^2 = 0.550; adjusted R^2 = 0.548) were moderately explained by the predictors, suggesting that more than half of the variance in this construct can be attributed to religious and cultural values. Altruistic values showed a similar level of explanation (R^2 = 0.458; adjusted R^2 = 0.455), while egoistic values displayed a weaker, though still meaningful, level of explanation (R^2 = 0.335; adjusted R^2 = 0.332). Behavior exhibited a very high (R^2 = 0.844; adjusted R^2 = 0.841), indicating that the model accounts for the vast majority of variance in PEB. Predictive relevance values (Q^2) confirmed the model's accuracy. Biospheric (Q^2 = 0.392), altruistic (Q^2 = 0.323), and egoistic values (Q^2 = 0.276) demonstrated moderate predictive strength, while behavior (Q^2 = 0.669) showed high predictive strength. These results indicate that the model is not only explanatory but also possesses substantial predictive validity.

Table 7
The results of coefficient of determination (R^2), and predictive relevance (Q^2).

Constructs	R^2	R^2 adjusted	Q^2
Biospheric values	0.55	0.548	0.392
Altruistic values	0.458	0.455	0.323
Egoistic values	0.335	0.332	0.276
Behavior	0.844	0.841	0.669

4.4. Hypothesis Testing

The results of the path analysis are presented in Table 8. All hypothesized relationships were statistically significant. Religious values exerted significant positive effects on biospheric ($t = 10.511$, $p < 0.001$), altruistic ($t = 9.896$, $p < 0.001$), and egoistic values ($t = 5.062$, $p < 0.001$). In addition, they had a direct positive effect on behavior ($t = 6.588$, $p < 0.001$) with total effect of 0.423 which is the strongest effect on behavior amount constructs of model. This indicates that religious orientations serve as a central driver of both value formation and behavioral outcomes. Cultural values also had a significant role in shaping values and behavior. They positively predicted biospheric ($t = 6.780$, $p < 0.001$), altruistic ($t = 3.976$, $p < 0.001$), and egoistic values ($t = 6.928$, $p < 0.001$), as well as directly influencing behavior ($t = 4.946$, $p < 0.001$) and second most important determinants of behavior. These findings suggest that cultural context contributes to both value orientations and behavioral expression.

Among the mediating constructs, biospheric values ($t = 2.752$, $p = 0.000$), altruistic values ($t = 6.560$, $p < 0.001$), and egoistic values ($t = 5.384$, $p < 0.001$) significantly predicted behavior. Egoistic values negatively influenced PEB. This pattern reflects the relevance of different value orientations, self-transcendence as well as self-enhancement, in shaping pro-environmental action. Additional dimensions of values also significantly contributed to behavioral prediction. Spiritual ($t = 3.565$, $p < 0.001$), aesthetic ($t = 5.603$, $p < 0.001$), and hedonic values ($t = 2.189$, $p = 0.03$) all showed positive relationships with behavior. This indicates that non-material motivations such as spirituality, appreciation of beauty, and enjoyment also play a role in fostering PEB. The results confirm that both religious and cultural values are powerful antecedents of biospheric, altruistic, and egoistic orientations, and they also exert direct effects on behavior. In turn, all examined value dimensions including biospheric, altruistic, egoistic, spiritual, aesthetic, and hedonic were found to significantly predict PEB. The high R^2 and Q^2 values for behavior highlight the robustness of the model and emphasize that value-based drivers collectively explain a substantial proportion of behavioral variance.

Table 8
The results hypotheses of study

Hypotheses		Total effect	t value	p value	Result
H1	Religious values > biospheric values		10.511	0.00	confirmed
H2	Religious values > altruistic values		9.896	0.00	confirmed
H3	Religious values > egoistic values		5.062	0.00	confirmed
H4	Religious values > behavior	0.423	6.588	0.00	confirmed
H5	Cultural values > biospheric values		6.78	0.00	confirmed
H6	Cultural values > altruistic values		3.976	0.00	confirmed
H7	Cultural values > egoistic values		6.928	0.00	confirmed
H8	Cultural values > behavior	0.295	4.946	0.00	confirmed
H9	Biospheric values > behavior	0.099	2.752	0.006	confirmed
H10	Altruistic values > behavior	0.159	6.56	0.00	confirmed
H11	Egoistic values > behavior	-0.133	5.384	0.00	confirmed
H12	Spiritual values > behavior	0.112	3.565	0.00	confirmed
H13	Aesthetic values > behavior	0.159	5.603	0.00	confirmed
H14	Hedonic values > behavior	0.068	2.189	0.03	confirmed

5. Discussion

The primary objective of this study was to investigate the extent to which cultural and religious values, alongside biospheric, altruistic, egoistic, spiritual, aesthetic, and hedonic orientations, predict PEB among urban forest visitors in Tehran. By integrating diverse dimensions of human motivation into a single comprehensive model, this study advances current knowledge of the psychological and sociocultural foundations of environmental action. The model's explanatory power was exceptionally high, accounting for 84% of the variance in PEB. This surpasses the explanatory capacity reported in many prior studies using the theory of planned behavior (Xie et al., 2024), value-belief-norm theory (Su et al., 2022), or social frameworks (Erfanian et al., 2024), which typically explain lower percentages of behavioral variance. The findings thus confirm that values constitute a powerful foundation for understanding environmentally responsible behavior. This global result not only validates the multidimensional framework but also underscores the importance of moving beyond narrow attitudinal models toward a richer, value-oriented perspective that reflects both rational and affective drivers of behavior. Following the hypotheses of study will be discussed independently.

Religious values emerged as strong predictors, exerting significant influence on biospheric (H1), altruistic (H2), and egoistic values (H3), as well as directly predicting PEB (H4). This aligns with previous evidence that religious worldviews often encourage ecological stewardship through principles of humility, compassion, and care for creation (Das et al., 2025). Pervious research often portrayed religiosity as antithetical to self-interest in environmental matters (Chung et al., 2019; Shrestha et al., 2025), yet the results of this research suggest that religion may simultaneously legitimize personal and communal benefits derived from ecological practices. This

duality may reflect the sociocultural context where religious identity is closely tied to social recognition, prestige, and moral status, making PEB both a moral obligation and a socially rewarded act. The direct effect of religion on behavior emphasizes that religious commitments can bypass intermediary values and foster immediate behavioral change, a finding consistent with Maleknia et al. (2024b) but rarely demonstrated in urban forest contexts. These results imply that religion functions both as a moral compass and as a social mechanism, offering unique leverage for policymakers and educators who wish to frame conservation as both a spiritual duty and a socially beneficial practice.

Cultural values were also confirmed as significant predictors of biospheric (H5), altruistic (H6), and egoistic orientations (H7), as well as direct antecedents of PEB (H8). This corroborates studies that link cultural norms with sustainability practices, demonstrating how collective traditions shape environmental worldviews (Chwialkowska et al., 2020; Tam, 2025). The results for hypotheses 5 to 8 highlight the central role of cultural values in shaping PEB both directly and indirectly through their influence on biospheric, altruistic, and egoistic orientations. These results confirm that in collectivist societies like Tehran, traditions emphasizing harmony with nature and intergenerational responsibility provide a strong foundation for eco-centric worldviews (Shen et al., 2022). Similarly, the significant effect on altruistic values reflects how cultural practices rooted in solidarity and social cohesion foster empathy and responsibility toward others, aligning with studies in Asian and Middle Eastern contexts where communal traditions strengthen environmental responsibility for future generations (Hussain and Huang, 2022). Cultural values had a negative influence on egoistic orientation, a finding that shows people with higher perceived cultural values have less egoistic orientation and might not behave in way that harms environment. Therefore, these values not only empower positive personal values, but also decrease negative personal norms and values. Importantly, cultural values also exerted a direct effect on PEB, demonstrating that beyond shaping intermediate value orientations, cultural traditions in Tehran prescribe behavioral norms that legitimize conservation as a matter of cultural identity. This finding consistent with other studies in various environmental fields confirm the important role of culture in shaping PEB (Yang et al., 2024). Together, these findings underscore that cultural values are dynamic and context-dependent, simultaneously reinforcing PEB directly and indirectly. This implies that conservation strategies in traditional societies should appeal not only to ecological concerns but also strategically integrate personal values, while embedding environmental responsibility within cultural rituals, narratives, and collective identities to ensure broad and sustained engagement.

Biospheric values significantly predicted PEB (H9), consistent with decades of research establishing ec-ocentric orientations as central to environmentalism (Sampene et al., 2024; Stern et al., 1995). Importantly, this study demonstrates that biospheric values mediate the effects of both cultural and religious values, providing empirical confirmation of their bridging role between broad social frameworks and individual action. This mediating mechanism has been rarely tested in urban forest contexts. The novelty of this finding lies in embedding biospheric concern within a multidimensional value system, showing that ecological responsibility is not solely an individual disposition but one cultivated through cultural and religious scaffolding. For policy, this suggests that reinforcing biospheric orientations through culturally and religiously aligned messaging can enhance their behavioral impact, strengthening conservation outcomes in urban forests.

Altruistic values also exerted strong effects on behavior (H10), confirming prior studies that highlight empathy, intergenerational responsibility, and concern for societal well-being as major motivators of sustainability (Hossu et al., 2024). The results reinforce the idea that protecting the environment is often perceived as a moral obligation to safeguard the health and livelihoods of others (Lou et al., 2025). What distinguishes this study is the demonstration that altruistic orientations are shaped simultaneously by cultural and religious frameworks. Cultural

traditions of solidarity and collective welfare, together with religious teachings emphasizing compassion and stewardship, combine to strengthen altruistic concern (Das et al., 2025; Yang et al., 2024). This integrated pathway adds nuance to existing knowledge by showing that altruistic values do not emerge solely from individual moral reasoning but from the interaction of broader sociocultural systems. The findings indicate interventions targeting PEB can be more effective when they appeal to collective and intergenerational responsibility, framed through both cultural narratives and religious ethics.

Egoistic values showed a significant diverse influence on behavior in this study (H11). Prior research has typically emphasized that egoistic orientations, focused on personal cost, convenience, or comfort, undermine sustainability (Nguyen and Dekhili, 2024). In the Tehran context, egoistic orientations appear to compete with collective and moral motivations, reducing the likelihood of conservation-oriented choices. This is consistent with findings from other cultural settings, where egoistic values are linked to short-term personal gains at the expense of long-term ecological responsibility (Gansser and Reich, 2023). The negative pathway also suggests that self-enhancing values, when not aligned with broader cultural or religious frameworks, may undermine sustainability initiatives by framing environmental action as costly, inconvenient, or irrelevant to personal goals. From a practical standpoint, this finding implies that interventions aimed at reducing egoistic tendencies such as reframing conservation as a shared cultural or religious duty, or minimizing perceived personal costs of engagement are critical to enhancing PEB (Wnuk, 2025). Policies and educational efforts may need to counteract egoistic orientations by shifting the focus from individual sacrifice to collective benefit and by strengthening social and moral norms that discourage purely self-centered choices.

Spiritual values significantly predicted PEB, affirming the role of transcendental and experiential connections with nature (H12). This finding along with prior research (Creţan et al., 2024; Raza et al., 2024) highlights that spiritual orientations extend beyond institutionalized religion, functioning as an independent motivational pathway that emphasizes unity with nature and the sacredness of life. Previous studies have documented the spiritual value of forests and green spaces, but this research integrates spirituality into a broader cultural-religious framework, demonstrating its complementary role. The novelty lies in showing that spirituality operates both alongside and beyond religious institutions, suggesting that even in secular or pluralistic contexts, spiritual experiences can powerfully motivate conservation. For management of urban forests, this implies that creating opportunities for reflective, restorative, and spiritual encounters with nature can foster deeper commitments to sustainability.

Aesthetic values were also found to directly influence behavior (H13), consistent with literature (Jayakody et al., 2024; Li et al., 2022) emphasizing the importance of beauty, harmony, and sensory experiences in motivating ecological concern. The present findings advance this body of knowledge by highlighting that in urban forest settings, aesthetic appreciation is not merely secondary but a primary driver of behavior. Unlike utilitarian or moral motivations, aesthetic experiences operate through affective and emotional pathways, encouraging individuals to conserve the beauty they cherish. The novelty here lies in situating aesthetic values within a multidimensional value framework, demonstrating their strength alongside biospheric and altruistic orientations. For practice, this suggests that highlighting the visual and sensory qualities of urban forests in campaigns and educational programs may be particularly effective in mobilizing public support for conservation.

Hedonic values, though weaker in magnitude (H14), were significant predictors of behavior, supporting the idea that enjoyment and pleasure can serve as entry points to sustainability. (Bouman et al., 2020; Lou et al., 2025). Prior research has shown that hedonic motives can either hinder or facilitate PEB depending on whether sustainable actions are perceived as enjoyable or restrictive (Wensing et al., 2025). This study confirms the

supportive role, showing that when urban forest visits are associated with leisure, comfort, and enjoyment, hedonic orientations can reinforce pro-environmental commitments. The novel contribution is to demonstrate that hedonic enjoyment, often treated as trivial or even counterproductive, can be constructively integrated into sustainability strategies. For practice, this implies that designing pro-environmental programs that emphasize fun, relaxation, or well-being such as eco-festivals, family-oriented green events, or leisure-friendly conservation activities—can attract wider participation, especially among groups less motivated by moral or ecological appeals.

5.1. Implications

5.1.1 Theoretical Implications

This study makes several theoretical contributions to the literature on environmental psychology and sustainability science by extending existing models of value–behavior relationships into the context of urban forests in a traditional religious society. First, the results demonstrate that religious values play a dual role, simultaneously strengthening self-transcendent orientations (biospheric and altruistic) and supporting self-enhancing orientations (egoistic), while also exerting a direct influence on behavior. This is a novel contribution, as previous models have primarily positioned religiosity as a direct source of PEB. The findings from Tehran suggest that in societies where religion permeates social life, PEB may be motivated not only by moral duties of stewardship but also by personal and communal prestige associated with religiously endorsed actions. This duality refines current theory by showing that religious contexts can activate diverse motivational pathways, challenging the dichotomy between egoistic and self-transcendent values. Second, the study contributes to theory by demonstrating that cultural values are dynamic rather than monolithic. In Tehran, cultural norms were found to reinforce biospheric and altruistic orientations, consistent with collectivist traditions, but also to support egoistic orientations, reflecting consumerist and individualist trends. This highlights the evolving and hybrid nature of culture in transitional societies and expands theoretical perspectives that often treat culture as a stable predictor of environmental attitudes.

Third, by incorporating spiritual, aesthetic, and hedonic values into the value–behavior framework, this study advances theory beyond the traditional focus on moral or rational motivations. The results indicate that non-material and affective dimensions such as beauty, enjoyment, and transcendence can significantly and directly shape PEB. This underscores the importance of recognizing experiential and emotional drivers in addition to normative and cognitive ones. For contexts like Iran, where spiritual traditions and aesthetic appreciation of nature are deeply ingrained, these findings provide a richer, culturally embedded understanding of environmental motivation. Finally, the exceptionally high explanatory power of the model (R^2 = 0.844 for behavior) illustrates the value of integrating multiple value dimensions into a unified framework. Theoretically, this contributes to a more holistic and culturally responsive model of PEB, bridging Western-centric frameworks with the lived realities of traditional religious societies. By situating values within the social fabric of Iran, this research demonstrates how global theories of environmental psychology can be adapted and expanded to account for religious, cultural, and experiential contexts, thereby enhancing their cross-cultural validity and applicability.

5.1.2. Policy and Practical Implications

The findings of this study offer several actionable implications for forest policy design and environmental governance. First, the differentiated effects of psychological and social drivers across population groups suggest that uniform conservation policies are unlikely to be equally effective. Policymakers should adopt targeted

behavioral interventions, tailoring communication strategies to specific demographic segments. For instance, strengthening subjective norms and institutional trust through community-based programs and local leadership engagement may be particularly effective for older generations, while younger cohorts may respond better to digital outreach, social media campaigns, and peer-driven initiatives. Second, the significant role of non-regulatory drivers highlights the importance of complementing command-and-control policies with soft governance instruments. Forest authorities and environmental agencies can leverage social norms, place-based identity, and perceived benefits to enhance voluntary compliance, thereby reducing enforcement costs and improving policy legitimacy. This is particularly relevant in contexts where monitoring capacity is limited or where formal enforcement alone has proven insufficient.

Third, the results underscore the need to integrate behavioral insights into forest management planning and participatory governance frameworks. Designing conservation programs that actively involve local communities through co-management arrangements, participatory monitoring, and benefit-sharing mechanisms can strengthen pro-environmental intentions and long-term stewardship. Such approaches align with broader sustainability goals by fostering local ownership and social acceptance of forest policies. Finally, for practitioners and decision-makers, the study provides empirical guidance for evidence-based policy evaluation. The validated behavioral constructs can be incorporated into impact assessments to anticipate public responses to new forest regulations or conservation initiatives. By embedding behavioral diagnostics into policy design, forest managers can improve both the effectiveness and social sustainability of conservation interventions. **Limitations and Future Research Directions**

Despite the strengths of this study, several limitations should be acknowledged. First, the study relied on self-reported survey responses, which may be subject to social desirability bias. Participants might have overstated their PEB or value orientations to align with socially approved norms, particularly in contexts where religion and culture strongly shape social identity. Future research could incorporate behavioral observations, experimental interventions, or longitudinal tracking to validate self-reported intentions with actual practices. Second, as a cross-sectional study, the findings cannot establish causality. While structural equation modeling captures pathways among values and behavior, temporal ordering remains uncertain. Future research should employ longitudinal designs to track how values evolve over time and how they dynamically influence pro-environmental actions. Third, the study was conducted in Tehran's urban forests, which limits the generalizability of findings. Tehran's unique combination of religious traditions, collectivist cultural norms, and emerging consumerist trends may not reflect other urban or rural contexts. Replication in different cultural settings and cities, both within Iran and internationally, would strengthen the cross-cultural validity of the framework. Fourth, while this research examined a wide range of values, other potentially relevant drivers were not addressed. For example, political values, economic constraints, and institutional trust may also shape environmental behavior. Future research should consider integrating these additional dimensions into the value–behavior framework. Fifth, although validated scales were adapted, the study may not fully capture the contextual nuances of values in Tehran. Concepts such as spirituality or aesthetics may carry culturally specific meanings that standardized scales only partly reflect. Future studies could benefit from mixed methods approaches, combining quantitative surveys with qualitative interviews or ethnographic observation.

6. Conclusion

This study examined the complex interplay of cultural, religious, biospheric, altruistic, egoistic, spiritual, aesthetic, and hedonic values in shaping PEB among urban forest visitors in Tehran. By developing and empirically testing an

integrated theoretical framework, the research demonstrated that values are not only central drivers of environmental behavior but also operate through multidimensional pathways that reflect both self-transcendent and self-enhancing orientations. The structural model exhibited exceptionally high explanatory power, accounting for 84% of the variance in PEB, thereby surpassing many existing models in environmental psychology and sustainability research. The findings underscore three key contributions. First, religious and cultural values were shown to be powerful antecedents of both individual-level value orientations and direct behavioral outcomes, highlighting the foundational role of sociocultural contexts in environmental action. Second, the inclusion of non-traditional dimensions such as spiritual, aesthetic, and hedonic values revealed that experiential and affective motivations are as significant as moral or cognitive ones in promoting sustainable behavior. Third, the study challenged conventional assumptions by demonstrating that egoistic values, typically seen as barriers, can under certain conditions foster pro-environmental behavior when linked to personal benefits or social recognition. Practically, the study emphasizes the need for culturally sensitive and value-based interventions. Policymakers, educators, and urban forest managers can leverage religious narratives, cultural traditions, aesthetic appreciation, and recreational enjoyment to promote sustainability in ways that resonate with diverse motivations. Particularly in societies with strong religious traditions and hybrid cultural dynamics, framing conservation as both a moral obligation and a source of personal or communal benefit can enhance engagement and long-term commitment. While the study advances theoretical understanding and practical insights, its limitations highlight the need for further research. Future studies should adopt longitudinal and comparative approaches, integrate additional psychological and structural drivers, and employ mixed methods to deepen contextual understanding. In conclusion, this research demonstrates that promoting sustainability requires moving beyond narrow attitudinal models toward holistic frameworks that recognize the full spectrum of human values. By bridging cultural, religious, and experiential perspectives, the study provides a comprehensive account of how diverse motivational systems can be mobilized to foster pro-environmental behavior in urban forests and beyond. Such an approach holds promise for designing more inclusive and impactful strategies to address environmental challenges in rapidly urbanizing societies.

Declarations

Ethical Approval:

This study was approved by Research Ethics Committees of the Lorestan University of Medical Sciences in accordance with all relevant guidelines and regulations for research involving human participants, including the Declaration of Helsinki. Approval ID/Number: 1402.321. The approval date was 15th January 2024. Data collection commenced only after ethical approval was obtained.

Informed consent:

Written informed consent was obtained from all participants prior to their participation. Consent was obtained by trained research assistants on 15th June– 15th January 2024. Participants were fully informed about the study purpose, procedures, risks, benefits, and their right to withdraw at any time.

Consent for publication:

All authors read and consent publication.

Competing interests:

Authors declared no conflict of interest.

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Author Contribution

Conceptualization: S.E.; R.M.; Data gathering: R.M.; Data Analysis: S.E.; R.M.; Writing first draft: S.E; Writing-editing: R.M.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

1. Afsar B, Badir Y, Kiani US (2016) Linking spiritual leadership and employee pro-environmental behavior: The influence of workplace spirituality, intrinsic motivation, and environmental passion. J Environ Psychol 45:79–88. https://doi.org/10.1016/j.jenvp.2015.11.011
2. Aglozo EY, Cohen AB (2025) Religious values and consumer behavior. J Consum Psychol. https://doi.org/10.1002/jcpy.1464
3. Ahsan Iqbal M, Shaheen WA, Shabir S, Ullah U, Ionel-Alin I, Mihut M-I, Raposo A, Han H (2025) Towards a green economy: Investigating the impact of sustainable finance, green technologies, and environmental policies on environmental degradation. J Environ Manage 374:124047. https://doi.org/10.1016/j.jenvman.2025.124047
4. Al Mamun A, Hayat N, Mohiuddin M, Salameh AA, Ali MH, Zainol NR (2022) Modelling the significance of value-belief-norm theory in predicting workplace energy conservation behaviour. Front Energy Res 10:1–15. https://doi.org/10.3389/fenrg.2022.940595
5. Alghamdi OA, Agag G (2024) Understanding Factors Affecting Consumers' Conscious Green Purchasing Behavior. Sustain 16:1–22. https://doi.org/10.3390/su16020705
6. Ang YSM (2023) The Effects of Personal Values on Online Buying Intention. Adv Soc Sci Res J 10:138–158. https://doi.org/10.14738/assrj.106.2.15007
7. Azargoshasbi F, Ashrafi K, Ehsani AH (2023) Role of urban boundary layer dynamics and ventilation efficiency in a severe air pollution episode in Tehran. Iran Meteorol Atmos Phys 135:1–18. https://doi.org/10.1007/s00703-023-00972-3
8. Bamberg S, Diehl Y, Weber T, van Deuren C, Mues AW, Schmidt P (2023) Testing the cross-cultural invariance of an extended theory of planned behaviour in predicting biodiversity-conserving behavioural intentions. J Environ Psychol 89:102042. https://doi.org/10.1016/J.JENVP.2023.102042

9. Bassett CG, Day SD, Konijnendijk CC, Roman LA, Yee CK, Chan KMA (2026) The best laid plans: How do adopted city sustainability goals influence site-level action in urban forestry? Ambio 55:591–607. https://doi.org/10.1007/s13280-025-02247-0
10. Baumeister CF, Gerstenberg T, Plieninger T, Schraml U (2020) Exploring cultural ecosystem service hotspots: Linking multiple urban forest features with public participation mapping data. Urban Urban Green 48. https://doi.org/10.1016/j.ufug.2019.126561
11. Bouman T, Steg L, Zawadzki SJ (2020) The value of what others value: When perceived biospheric group values influence individuals ' pro-environmental engagement. J Environ Psychol 71:101470. https://doi.org/10.1016/j.jenvp.2020.101470
12. Bruzzese S, Brun F, Galati A, Borsellino V, Mirabella C, Brunori A, Blanc S (2025) Examining the adoption of PEFC chain of custody certification in the Italian forest-based industry: An empirical study on motivations and impacts. Policy Econ 170:103385. https://doi.org/10.1016/j.forpol.2024.103385
13. Calza F, Cannavale C, Zohoorian Nadali I (2020) How do cultural values influence entrepreneurial behavior of nations? A behavioral reasoning approach. Int Bus Rev 29:101725. https://doi.org/10.1016/j.ibusrev.2020.101725
14. Chen Y, Young D, de Koff J, Britwum K (2023) Extension Agents' Perceptions, Practices, and Needs of Urban Forestry: A Case Study from Tennessee, United States. Sustainability 15:15328. https://doi.org/10.3390/su152115328
15. Chevrier M, Bosone L, Zenasni F, Delhomme P (2025) Beyond the individual: testing and applying a collective protection motivation model for pro-environmental behaviors. Curr Psychol. https://doi.org/10.1007/s12144-025-07517-4
16. Chung MG, Kang H, Dietz T, Jaimes P, Liu J (2019) Activating values for encouraging pro-environmental behavior: the role of religious fundamentalism and willingness to sacrifice. J Environ Stud Sci 9:371–385. https://doi.org/10.1007/s13412-019-00562-z
17. Chwialkowska A, Bhatti WA, Glowik M (2020) The influence of cultural values on pro-environmental behavior. J Clean Prod 268:122305. https://doi.org/10.1016/j.jclepro.2020.122305
18. Creţan R, Chasciar D, Dragan A (2024) Forests and Their Related Ecosystem Services: Visitors' Perceptions in the Urban and Peri-Urban Spaces of Timișoara. Romania Forests 15:2177. https://doi.org/10.3390/f15122177
19. Cronbach LJ (1951) Coefficient alpha and the internal structure of tests. Psychometrika 16:297–334. https://doi.org/https://doi.org/10.1007/BF02310555
20. Das M, Lim WM, Paul S, Roy A, Purohit S (2025) How Can Religion Shape Pro-Environmental Behavior in a Materialistic World? Contrasting Idealism With Realism Religious Epics. J Consum Behav 24:1300–1326. https://doi.org/10.1002/cb.2464
21. Davari D, Nosrati S, Kim S (Sam) (eds) (2024) Do cultural and individual values influence sustainable tourism and pro-environmental behavior? Focusing on Chinese millennials. J. Travel Tour. Mark. 41, 559–577. https://doi.org/10.1080/10548408.2024.2309180
22. de Boer J, Aiking H (2026) How do European citizens prioritize environment and climate issues? The role of the value Respect for the planet in combination with education and cultural background. https://doi.org/10.1007/s13280-026-02350-w. Ambio
23. Dehaghi MR, Goodarzi M, Arazi ZK (2012) The Effect of Spiritual Values on Employees' Organizational Commitment and Its Models. Procedia - Soc Behav Sci 62:159–166.

https://doi.org/10.1016/j.sbspro.2012.09.025
24. Druica E, Ianole-c R, Puiu A-I (2023) When Less Is More: Understanding the Adoption of a Minimalist Lifestyle Using the Theory of Planned Behavior
25. Duong CD (2023) Cultural values and energy-saving attitude-intention-behavior linkages among urban residents: a serial multiple mediation analysis based on stimulus-organism-response model. Manag Environ Qual Int J 34:647–669. https://doi.org/10.1108/MEQ-09-2022-0258
26. Erfanian S, Maleknia R, Azizi R (2024) Environmental Responsibility in Urban Forests: A Cognitive Analysis of Visitors' Behavior. Forests 15:1773. https://doi.org/10.3390/f15101773
27. Filimonau V, Matute J, Kubal-Czerwińska M, Mika M (2023) Religious values and social distance as activators of norms to reduce food waste when dining out. Sci Total Environ 868:161645. https://doi.org/10.1016/j.scitotenv.2023.161645
28. Fornell C, Larcker DF (1981) Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. J Mark Res 18:39–50. https://doi.org/10.1177/002224378101800104
29. Gansser OA, Reich CS (2023) Influence of the New Ecological Paradigm (NEP) and environmental concerns on pro-environmental behavioral intention based on the Theory of Planned Behavior (TPB). J Clean Prod 382:134629. https://doi.org/10.1016/j.jclepro.2022.134629
30. Ghasemi B, Bruskotter JT (2026) Political ideology as a predictor of conservation attitudes: Mechanisms and implications. https://doi.org/10.1007/s13280-026-02352-8. Ambio
31. Ghazali EM, Mutum DS, Ariswibowo N (2018) Impact of religious values and habit on an extended green purchase behaviour model. Int J Consum Stud 42:639–654. https://doi.org/10.1111/ijcs.12472
32. Gull M, Parveen S, Umar A, Ali Q (2024) Impact of the spiritual and environmental-specific servant leadership on pro-environmental behaviors with the moderating effect of perceived organizational environmental support. Environ Dev Sustain. https://doi.org/10.1007/s10668-024-05092-5
33. Hair J, Alamer A (2022) Research Methods in Applied Linguistics Partial Least Squares Structural Equation Modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. Res Methods Appl Linguist 1:100027. https://doi.org/10.1016/j.rmal.2022.100027
34. Hair JF, Risher JJ, Sarstedt M, Ringle CM (2019) When to use and how to report the results of PLS-SEM. Eur Bus Rev 31:2–24. https://doi.org/10.1108/EBR-11-2018-0203
35. Hossu CA, Artmann M, Saito T, Van Lierop M, Ioja CI, Pauleit S (2024) Understanding residents' engagement for the protection of urban green spaces by enriching the value-belief-norm theory with relational values—A case study of Munich (Germany). People Nat 6:1538–1555. https://doi.org/10.1002/pan3.10654
36. Hussain S, Huang J (2022) The impact of cultural values on green purchase intentions through ecological awareness and perceived consumer effectiveness: An empirical investigation. Front Environ Sci 10. https://doi.org/10.3389/fenvs.2022.985200
37. Jayakody DY, Adams VM, Pecl G, Lester E (2024) What makes a place special? Understanding drivers and the nature of place attachment. Appl Geogr 163:103177. https://doi.org/10.1016/j.apgeog.2023.103177
38. Jebarajakirthy C, Sivapalan A, Das M, Maseeh HI, Ashaduzzaman M, Strong C, Sangroya D (2024) A meta-analytic integration of the theory of planned behavior and the value-belief-norm model to predict green consumption. Eur J Mark 58:1141–1174. https://doi.org/10.1108/EJM-06-2021-0436
39. Joffe-Nelson N, van Riper CJ, Stedman RC (2024) Values and pro-environmental behavior: What is the role of trust? J Outdoor Recreat Tour 46:100745. https://doi.org/10.1016/j.jort.2024.100745

40. Kala D, Chaubey DS (2024) Pro-Environmental Behavior of Religious Tourists: Moderating Role of Religious Beliefs. Cornell Hosp Q 65:105–119. https://doi.org/10.1177/19389655231182090
41. Kang J, Tolppanen S, Kim H, Ha M (2024) Exploring the role of biospheric/egoistic values, scientific engagement, and cross-cultural effects in high school students' willingness to take climate action. Environ Educ Res 1–18. https://doi.org/10.1080/13504622.2024.2437125
42. Karakaş G (2023) Investigation of sustainable water consumption behavior within the framework of value belief norm. Environ Dev Sustain 26:28465–28483. https://doi.org/10.1007/s10668-023-03819-4
43. Kim JJ, Yoon Y, Gan M, Hwang J (2025) Voluntary and collective payment intentions for sustainable island tourism: an investigation using an extended value-belief-norm theory. Asia Pac J Tour Res 30:500–515. https://doi.org/10.1080/10941665.2025.2455977
44. Kokash HA, Almosa S, Ahsan N, Alam SS, Ahmed S (2025) Cultural Values, Environmental Concern, and Ease of Purchase: A Behavioral Model for Remanufactured Product Adoption in Saudi Arabia. Circ Econ Sustain. https://doi.org/10.1007/s43615-025-00639-8
45. Krejcie RV, Morgan DW (1970) Determining Sample Size for Research Activities. Educ Psychol Meas 30:607–610. https://doi.org/https://doi.org/10.1177/001316447003000308
46. Kubala R (2025) Non-Monotonic Theories of Aesthetic Value. Australas J Philos 103:449–468. https://doi.org/10.1080/00048402.2024.2408691
47. Li H, You C, Li J, Li M, Tan M, Zhang G, Zhong Y (2022) Influence of Environmental Aesthetic Value and Anticipated Emotion on Pro-Environmental Behavior: An ERP Study. Int J Environ Res Public Health 19. https://doi.org/10.3390/ijerph19095714
48. Likert R (1932) Technique for the measurement of attitudes. Arch Psychol 140:5–53
49. López-Mosquera N, García T, Barrena R (2014) An extension of the Theory of Planned Behavior to predict willingness to pay for the conservation of an urban park. J Environ Manage. https://doi.org/10.1016/j.jenvman.2014.01.019
50. Lou X, Ito K, Li LMW (2025) Rethinking environmental values in psychology from the perspective of anthropocentrism. J Environ Psychol 101:102518. https://doi.org/10.1016/j.jenvp.2025.102518
51. Maleknia R, Azizi R, Hălălișan AF (2024a) Developing a specific model to exploring the determinant of individuals' attitude toward forest conservation. Front Psychol 15. https://doi.org/10.3389/fpsyg.2024.1481087
52. Maleknia R, Heindorf C, Rahimian M, Saadatmanesh R (2024b) Do Generational Differences Determine the Conservation Intention and Behavior towards Sacred Trees? Trees, For. People 100591 https://doi.org/10.1016/J.TFP.2024.100591
53. Maleknia R, Pakravan-Charvadeh MR (2025) Cultural roots in urban landscapes: Examining psychological and place attachment factors in heritage tree conservation. J Nat Conserv 84:126816. https://doi.org/10.1016/j.jnc.2024.126816
54. Marie M, Lemessa D, Esa E, Tadesse B, Azadi H (2024) Determinants of Farmers' Perceptions towards Socioecological Benefits of Agroforestry Practices in Northwestern Ethiopia. Int. J. For. Res. 2024, 1–14. https://doi.org/10.1155/2024/5543119
55. Martens D, Gutscher H, Bauer N (2011) Walking in wild and tended urban forests: The impact on psychological well-being. J Environ Psychol 31:36–44. https://doi.org/10.1016/j.jenvp.2010.11.001

56. Nadal M, Skov M (2024) The sensory valuation account of aesthetic experience. Nat Rev Psychol 4:49–63. https://doi.org/10.1038/s44159-024-00385-y
57. Nguyen T, Dekhili S (2024) What drives responsible consumption in collectivistic developing countries? An analysis of Vietnamese consumers' motivations with value–belief–norm theory. Bus Strateg Environ 33:7527–7543. https://doi.org/10.1002/bse.3879
58. Ormsby AA (2021) Diverse values and benefits of urban sacred natural sites. Trees People 6:100136. https://doi.org/10.1016/j.tfp.2021.100136
59. Plieninger T, Quintas-Soriano C, Torralba M, Samani M, Shakeri K, Z (2020) Social dynamics of values, taboos and perceived threats around sacred groves in Kurdistan. Iran People Nat 2:1237–1250. https://doi.org/10.1002/pan3.10158
60. Rafferty A (2025) The Moderating Role of Societal Cultural Values and Practices on the Relationship Between Workplace Aggression and Employee Engagement. Hum Resour Manag J 35:754–765. https://doi.org/10.1111/1748-8583.12593
61. Rampedi IT, Ifegbesan AP (2022) Understanding the Determinants of Pro-Environmental Behavior among South Africans: Evidence from a Structural Equation Model. Sustain. 14. https://doi.org/10.3390/su14063218
62. Raza SA, Khan KA, Hakim F (2024) Whether organizational citizenship behavior is triggered by employee CSR perception and spiritual values: the moderating role of Islamic work ethics. Manag Res Rev 47:353–373. https://doi.org/10.1108/MRR-10-2022-0714
63. Riaz W, Gul S, Lee Y (2023) The Influence of Individual Cultural Value Differences on Pro-Environmental Behavior among International Students at Korean Universities. sustainability 15, 4490
64. Roux JL, Konczal AA, Bernasconi A, Bhagwat SA, Vreese R, De, Doimo I, Govigli VM, Kašpar J, Kohsaka R, Pettenella D, Plieninger T, Shakeri Z, Shibata S, Stara K, Takahashi T, Torralba M, Tyrväinen L, Weiss G, Winkel G (2022) Exploring evolving spiritual values of forests in Europe and Asia: a transition hypothesis toward re-spiritualizing forests. Ecol Soc 27. https://doi.org/10.5751/ES-13509-270420
65. Saleem RMA (2019) Religious Values and Worldviews. Oxford Research Encyclopedia of Politics. Oxford University Press. https://doi.org/10.1093/acrefore/9780190228637.013.1158
66. Sampene AK, Li C, Wiredu J, Agyeman FO, Brenya R (2024) Examining the nexus between social cognition, biospheric values, moral norms, corporate environmental responsibility and pro-environmental behaviour. Does Environ Knowl matter? Curr Psychol 43:6549–6569. https://doi.org/10.1007/s12144-023-04832-6
67. Shakeri Z, Mohammadi-Samani K, Bergmeier E, Plieninger T (2021) Spiritual values shape taxonomic diversity, vegetation composition, and conservation status in woodlands of the northern zagros, iran. Ecol Soc 26. https://doi.org/10.5751/ES-12290-260130
68. Shen G, Xiong R, Tian Y, Luo Z, Jiangtulu B, Meng W, Du W, Meng J, Chen, Yuanchen, Xue B, Wang B, Duan Y, Duo J, Fan F, Huang L, Ju T, Liu F, Li S, Liu X, Li Y, Wang M, Nan Y, Pan B, Pan Y, Wang L, Zeng E, Zhan C, Chen Y, Shen H, Cheng H, Tao S (2022) Substantial transition to clean household energy mix in rural China. Natl Sci Rev 9:nwac050. https://doi.org/10.1093/nsr/nwac050
69. Shrestha R, Bhattarai PC, Pant P (2025) Influence of Religion on Pro-Environmental Behavior: A Systematic Literature Review. J Relig Health 64:3699–3715. https://doi.org/10.1007/s10943-025-02399-z
70. Siyavooshi M, Foroozanfar A, Sharifi Y (2019) Effect of Islamic values on green purchasing behavior. J Islam Mark 10:125–137. https://doi.org/https://doi.org/10.1108/JIMA-05-2017-0063

71. Sockhill NJ, Dean AJ, Oh RRY, Fuller RA (2022) Beyond the ecocentric: Diverse values and attitudes influence engagement in pro-environmental behaviours. People Nat 4:1500–1512. https://doi.org/10.1002/pan3.10400
72. Stern PC, Dietz T, Abel T, Guagnano GA, Kalof L (1999) A value-belief-norm theory of support for social movements: The case of environmentalism. Hum. Ecol. Rev
73. Stern PC, Dietz T, Kalof L (1993) Value Orientations, Gender, and Environmental Concern. Environ Behav 25:322–348. https://doi.org/10.1177/0013916593255002
74. Stern PC, Kalof L, Dietz T, Guagnano GA (1995) Values, Beliefs, and Proenvironmental Action: Attitude Formation Toward Emergent Attitude Objects. J Appl Soc Psychol 25:1611–1636. https://doi.org/10.1111/j.1559-1816.1995.tb02636.x
75. Su K, Ren J, Cui C, Hou Y, Wen Y (2022) Do Value Orientations and Beliefs Play a Positive Role in Shaping Personal Norms for Urban Green Space Conservation? Land 11, 262. https://doi.org/10.3390/land11020262
76. Tam K-P (2025) Culture and pro-environmental behavior. Curr Opin Psychol 62:101986. https://doi.org/10.1016/j.copsyc.2024.101986
77. Wang Y, Li LMW (2025) Mastery goal orientations and pro-environmental behavior among secondary students across cultures: the mediating role of environmental knowledge. Environ Educ Res 1–15. https://doi.org/10.1080/13504622.2025.2527831
78. Wensing J, Rubiconto F, Lazaro A, van Leeuwen E (2025) Diverse paths to circularity: Clusters of circular food behaviors and their predictors. Sustain Prod Consum 58:91–99. https://doi.org/10.1016/j.spc.2025.06.016
79. Wnuk M (2025) The Indirect Relationship Between Religious Practices and Egoism at Work Through Dark-Triad Traits? A Sample of Polish Employees. J Relig Health. https://doi.org/10.1007/s10943-025-02363-x
80. Wu K, Guo Y, Han X (2024) The relationship research between restorative perception, local attachment and environmental responsible behavior of urban park recreationists. Heliyon 10:e35214. https://doi.org/10.1016/j.heliyon.2024.e35214
81. Xie J, Li H, Furuya K, Chen J, Luo S (2024) Participatory intention and behavior in green cultural heritage conservation: an application of the extended theory of planned behavior. Herit Sci 12:1–24. https://doi.org/10.1186/s40494-024-01407-x
82. Xie J, Luo S, Furuya K, Wang H, Zhang J, Wang Q, Li H, Chen J (2023) The Restorative Potential of Green Cultural Heritage: Exploring Cultural Ecosystem Services' Impact on Stress Reduction and Attention Restoration. Forests 14. https://doi.org/10.3390/f14112191
83. Yang G, Sato M (2025) The effect of culture on domestic water saving. J Environ Manage 373:123928. https://doi.org/10.1016/j.jenvman.2024.123928
84. Yang Y, Yuan Y, Liu P, Wu W, Huo C (2024) Crucial to Me and my society: How collectivist culture influences individual pro-environmental behavior through environmental values. J Clean Prod 454:142211. https://doi.org/10.1016/j.jclepro.2024.142211
85. Zhou W, Fan S, Wu Y, Wang G, Lan S (2024) How leisure involvement impacts visitors' perceived health benefits in urban forest parks: examining the moderating role of place attachment. Front Psychol 15:1–17. https://doi.org/10.3389/fpsyg.2024.1493422

Figures

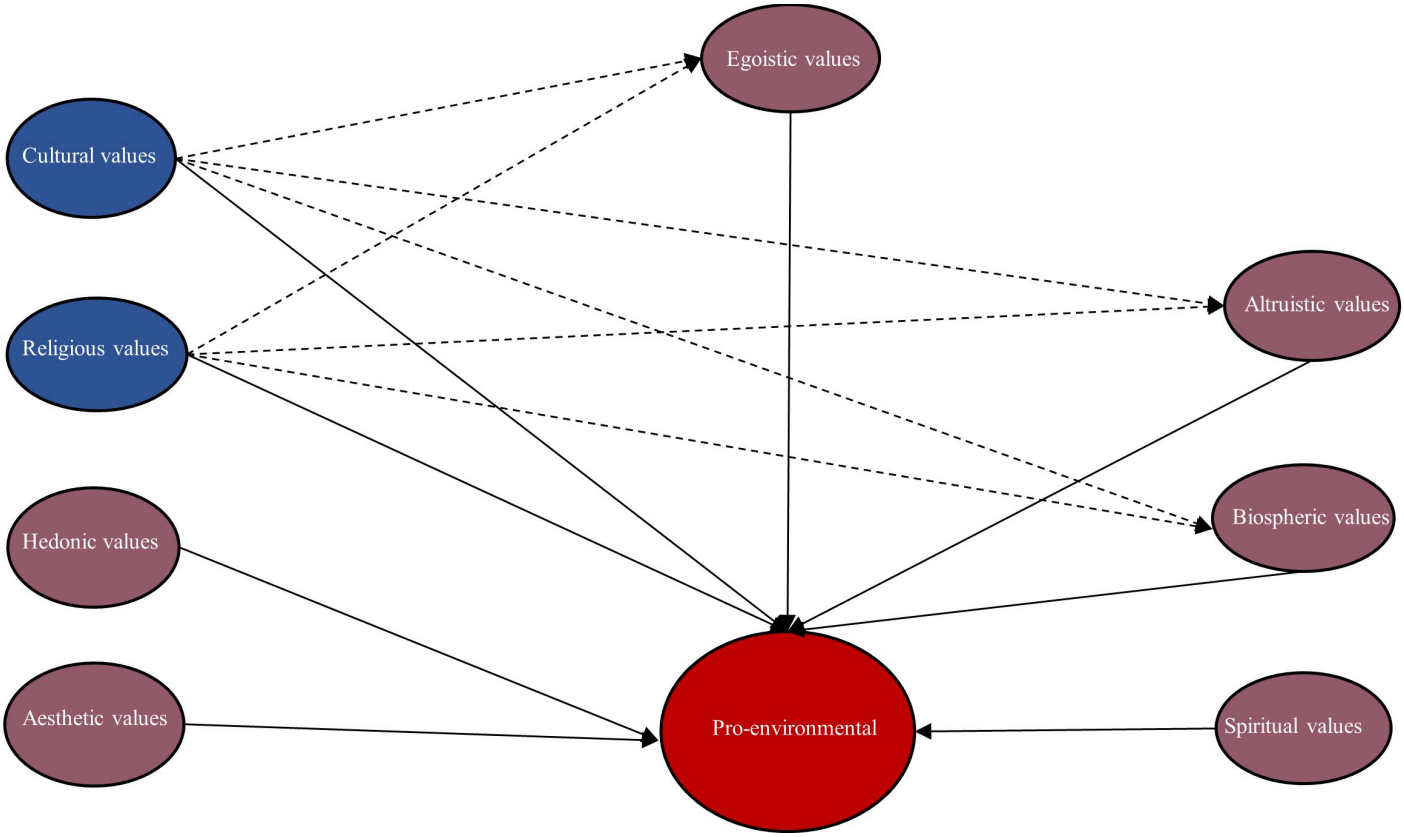


Figure 1

The conceptual framework of research with hypothesized direction of influences

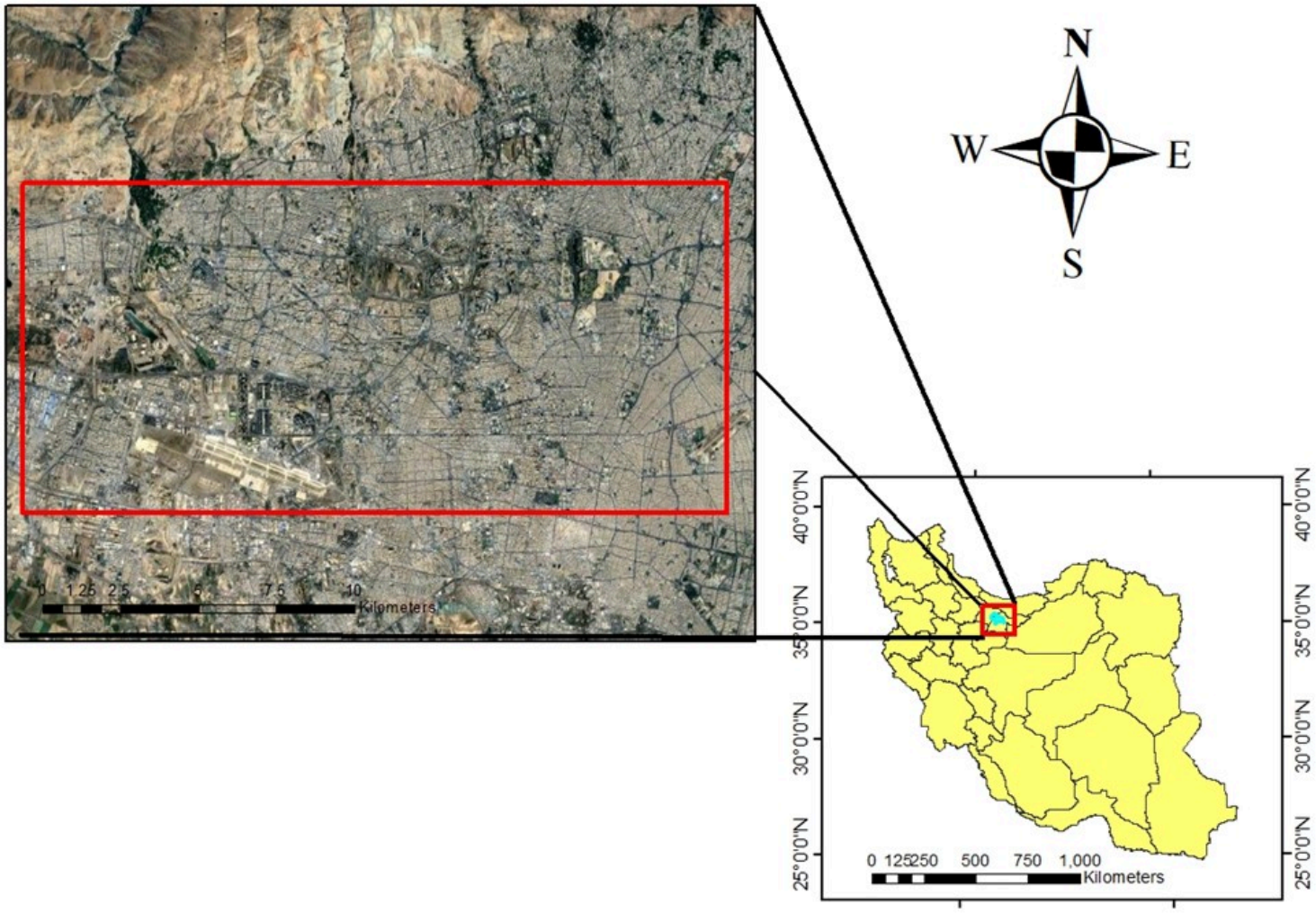


Figure 2

Location of study area

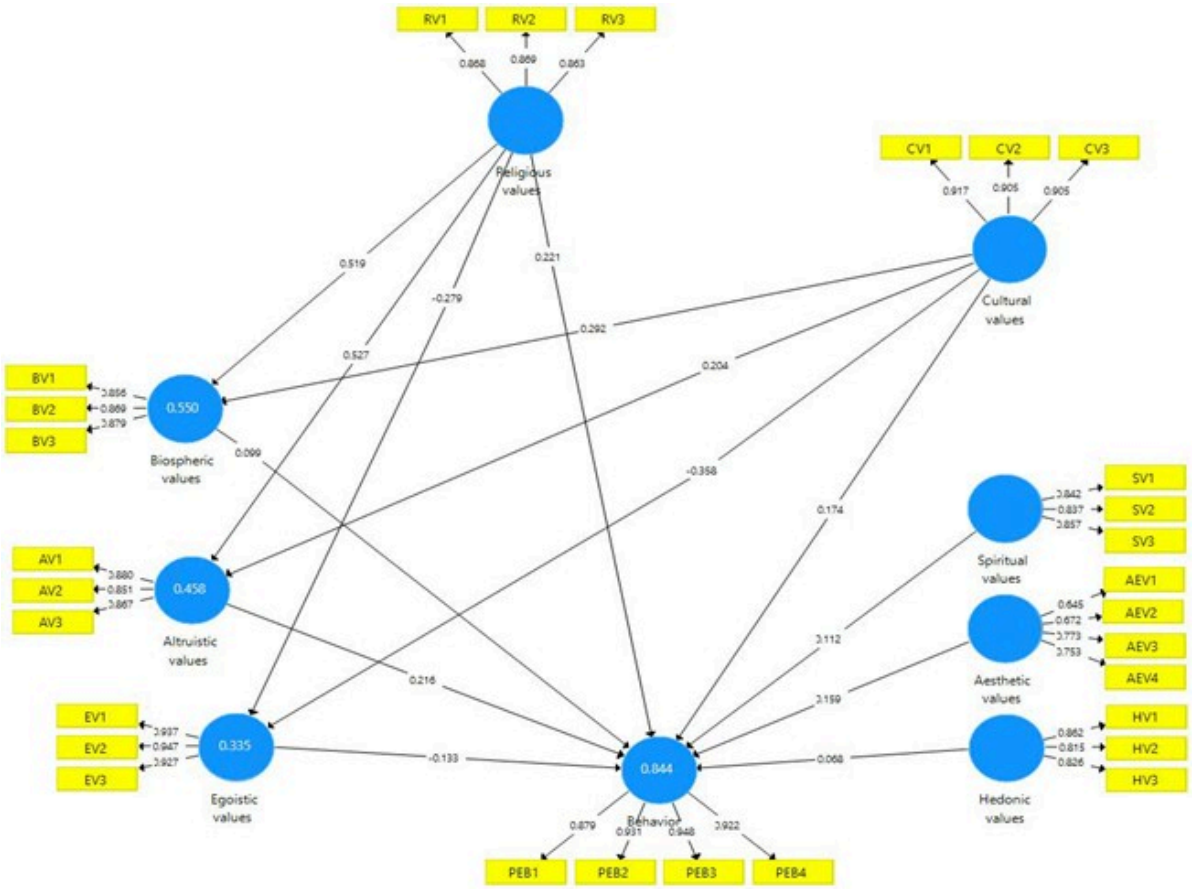


Figure 3

The structural model of study with path coefficients.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- data.csv
- data1.sav