

Article

The Effect of Biophilic Design on Spirituality and Restorative Perception in Religious Buildings: The Case of Türkiye

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Abstract

The accelerating pace of urbanization and population growth has increasingly disrupted the relationship between the built environment and nature, contributing to a decline in individuals' psychological and spiritual well-being. Religious buildings—particularly mosques—have the potential to serve as restorative environments that support spiritual reflection and emotional balance. Within this context, the integration of biophilic design principles into sacred architecture has emerged as a significant area of contemporary research. This study investigates how biophilic elements in mosque interiors influence individuals' perceptions of spirituality and the restorative quality of the space. Mosque interior images were generated using artificial intelligence tools (Midjourney V6.1 and DALL·E 3), informed by biophilic design theory. Grounded in Attention Restoration Theory (ART), the study utilized a quantitative research framework to explore how biophilic elements influence spiritual and restorative perceptions in sacred architectural spaces. Data were collected from 390 individuals in Türkiye with prior worship experience in Republican-era mosques—structures marked by ideological and spatial transformations. Two instruments were used, the Perceived Restorativeness Scale (PRS) and the newly developed Biophilic Spiritual Perception Scale (BSPS), which demonstrated high internal consistency (Cronbach's $\alpha = 0.981$). Analyses included exploratory and confirmatory factor analyses, as well as parametric and non-parametric statistical tests. Findings suggest that biophilic design in mosque interiors positively influences both spiritual experience and perceived environmental restorativeness. These results support the view that biophilic design should not be seen merely as an esthetic or ecological approach but as a multidimensional strategy that enhances the emotional and spiritual quality of sacred spaces. Implications for future mosque design in Türkiye are discussed.

Keywords: biophilic design; spirituality perception; mosque interiors in Türkiye; perceived restorativeness; sacred space design; environmental psychology



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1. Introduction

The rapid growth of the global population has led to the expansion of the built environment and an increase in population density within urban areas [1,2]. According to data from the World Bank [3], more than half of the global population, approximately 4.4 billion people, currently live in cities. Projections for 2050 indicate that this trend will continue, and it is expected that seven out of ten people will live in urban areas. As a

result, the global urbanization rate is expected to reach 68% [4]. This increase in density has gradually decreased human interactions with nature, which have historically been a key part of life, leading to disconnection from natural environments in some regions [5,6].

The decreasing interaction between humans and nature, mainly caused by the spread of the built environment, significantly influences how people experience space and is vital for their cognitive and physical development [7–9]. The nexus between architectural environments and human well-being has become an increasingly important area of research across many fields, including education, health sciences, theology, environmental psychology, and architecture. In response, recent years have witnessed the emergence of diverse architectural design paradigms that prioritize sustainability, technology, and user-centered experiences. Among these emerging paradigms, sustainable architecture, parametric and digital design, smart and technology-integrated systems, inclusive and human-centered approaches, adaptive reuse, and biophilic design are prominent frameworks [10]. Biophilic design, in particular, has gained importance as a strategy to reconnect people with nature by incorporating natural elements into architectural environments [11,12]. This approach has become increasingly essential in mitigating the negative impacts of urbanization on individual well-being, encompassing physical, psychological, and spiritual aspects, and in fostering restorative environments through stronger connections between constructed forms and the natural world [13–15].

The concept of biophilic design is based on the term “biophilia” (love of life), which was first introduced by Erich Fromm in 1964 [12]. This idea was later expanded by naturalist and biologist Edward O. Wilson, who published the Biophilia Hypothesis in 1984, proposing that humans have an innate connection to nature and living systems [16]. In his later work, Wilson stressed that this natural bond requires meaningful interactions with the environment, showing that humans are evolutionarily inclined to seek closeness to natural elements [10,17,18]. The proximity between built environments and natural elements is vital for supporting psychological, emotional, and physiological well-being [19–21]. This notion has significantly influenced architects and urban planners who aim to design environments that improve well-being and facilitate psychological restoration, particularly in urban areas where access to nature is limited [21–23].

Biophilic design, which emphasizes the natural human connection to nature and the importance of contact with nature for human well-being, aims to strengthen human–nature bonds through architectural planning and design strategies [23–25]. However, this approach involves more than just adding plants to space. It includes a comprehensive process where biophilic design strategies are guided by the spatial context, functional needs, and the specific characteristics of the users engaging with the environment [26,27]. The core elements of biophilic design that architects and urban planners are encouraged to consider during the design process were categorized by Kellert [19] into six main themes. These include “environmental features, such as water, fire, and indoor vegetation; natural shapes and forms, including biomimicry and biomorphic structures; natural patterns and processes, such as fractals and sensory variability; light and space, including the use of natural daylight and spatial openness; place-based relationships, such as landscape ecology and orientation within natural contexts; and human–nature relationships, including principles of prospect and refuge, as well as reverence and spirituality” [19].

Today, people spend approximately 90% of their time indoors [28,29]. Therefore, interior spaces play a vital role in sustainable development and significantly affect human well-being, as well as physical and mental health [15,30]. In recent years, research on applying biophilic design in interior environments has mostly focused on office settings [29], healthcare facilities [31], educational buildings [9], shopping malls [32], and hospitality and tourism spaces [33]. These studies have highlighted the effects of various

biophilic design elements, such as natural light, water features, views of nature, organic forms, vegetation and green spaces, natural materials, and nature-inspired patterns and textures. Multiple studies demonstrate that incorporating biophilic design helps reduce carbon dioxide levels [34], improve air quality [35], enhance acoustic performance [36], and maintain optimal temperature and humidity conditions [37]. Additionally, by activating the parasympathetic nervous system, biophilic environments have been shown to lower stress and anxiety, improve cognitive performance and focus, accelerate recovery, increase esthetic enjoyment, support emotional health, and promote relaxation [38–40]. In this context, The Spheres, located at Amazon’s headquarters in Seattle, exemplifies the effective use of biophilic design in office environments by enabling employees to work in close contact with nature [41]. Similarly, Khoo Teck Puat Hospital in Singapore demonstrates the restorative effects of biophilic design in healthcare settings through its integration of native vegetation, interior courtyards, and open-air spaces [41]. In educational buildings, the Green School in Bali, built using natural and locally sourced materials, is notable for its use of natural light, seamless connection between indoor spaces and the surrounding environment, and its commitment to sustainable material practices [42]. In retail architecture, Hongkong Land’s Yorkville—The Ring in China incorporates various biophilic elements, including an indoor botanical garden, water features, the effective use of natural daylight, and organically inspired structural forms [43]. Within the hospitality and tourism sector, one notable example is the Six Senses Con Dao resort in Vietnam, which offers guests an immersive experience in nature through natural materials, open-plan architecture, and lush green landscapes [44]. These examples collectively demonstrate the potential of biophilic design to enhance user experience across different types of built environments.

Religious buildings are among the spatial settings that accommodate a wide range of human needs, including worship practices at specific times of the day or week, spiritual exploration, and social integration [45,46]. Throughout history, such spaces have served as environments for personal reflection, the performance of daily rituals by believers, the delivery of religious education, the reinforcement of social belonging and communal cohesion, and venues for cultural and touristic visitation [47].

In this context, a wide range of sacred structures, including monumental cathedrals in Europe and peaceful temples in Asia, have been built with the goal of fostering a connection with the divine and evoking a sense of transcendence. Architectural features such as soaring vaults, intricately designed stained-glass windows, and symbolic decorations are intentionally crafted to inspire feelings of awe, reverence, and deep reflection among worshippers [48]. For example, in Gothic architecture, the use of natural light is seen as a symbol of divine illumination, while in Islamic architecture, water features inside mosques represent purification and spiritual renewal [48,49].

Various psychological theories and measurement tools have been developed to assess and evaluate the restorative effects of biophilic design in spatial environments. Among the most recognized are the Attention Restoration Theory (ART) and the Perceived Restorativeness Scale (PRS). Developed by Kaplan and Kaplan [39], ART suggests that interaction with nature can reduce cognitive fatigue and increase attention capacity. This theory holds particular importance in the fields of cognitive psychology, environmental psychology, urban design, landscape architecture, and architecture. According to ART, an environment is considered restorative if it encompasses four foundational qualities [50]. These include “being away, which refers to a psychological or physical sense of detachment from daily pressures; fascination, the effortless and naturally rewarding way attention is engaged; extent, the feeling of being immersed in a coherent and richly detailed environment; and compatibility, which indicates alignment between the setting and the individual’s intentions, needs, and preferences” [50,51]. As a common framework used in environmental psychology and

design fields, ART is often measured with the PRS to assess the restorative potential of physical environments. The PRS, developed by Hartig et al. [52], is a psychological tool designed to measure how much an environment is perceived as restorative by individuals. The PRS includes items that assess the four main components of ART [51,53].

In this context, it is suggested that biophilic design implemented in religious buildings may influence individuals' spiritual experiences and that being present in such spaces may offer restorative effects. For instance, Rai et al. [54] demonstrated that colonial churches in Himachal Pradesh, India—characterized by biophilic architectural features—statistically enhanced visitors' perceived spirituality and sense of restoration. Similarly, Pretorius [55] showed that monastic gardens in medieval Chinese cities, which were deeply integrated with natural elements, contributed to improved mental, physical, and spiritual well-being among early urban populations. However, a review of the current literature shows that studies exploring the impact of biophilic design elements in religious settings on individuals' spirituality levels and their psychological well-being remain limited. Given the important role of religious buildings in supporting individuals' spiritual and emotional health, assessing how biophilic features in these spaces influence spiritual experiences and determining the extent to which these environments have restorative potential become vital areas for research.

This study aims to explore how the biophilic design approach, as applied to mosque interiors, influences individuals' perceptions of spirituality and the restorative qualities of these spaces. The study was guided by the following questions: How does incorporating biophilic design elements into mosque interiors impact individuals' sense of spirituality? What is the restorative potential of biophilic design in mosque interiors? Which biophilic design features are most favored by users in mosques? To address these questions, a questionnaire was developed, along with visual materials showing biophilic design elements specific to mosque interiors, which were then assessed by mosque congregants.

2. Materials and Methods

The research employed a structured quantitative methodology to examine the relationship between biophilic design features in mosque interiors and individuals' perceptions of spirituality and restorativeness. Following the formulation of the research question and clarification of the study's objectives, a comprehensive literature review was conducted. This review encompassed existing studies on biophilia, biophilic design, religious architecture, mosque interior characteristics, spatial perception, the psychological and physical effects of built environments, and the use of artificial intelligence (AI) in design. Based on this foundation, questionnaire-based data collection and visual stimulus evaluation were identified as the most suitable methodological tools to address the research aims (Figure 1).

2.1. The Architectural Structure of Mosques in Türkiye

Mosque architecture in Türkiye has historically been shaped by the shared architectural heritage of the Islamic world, alongside the vernacular building traditions of Anatolia. Regional variations in climate, construction materials, settlement patterns, and local cultural and esthetic preferences have contributed to diverse spatial configurations. Additionally, denominational dynamics and Sufi practices have influenced both the spatial organization and functional use of mosque interiors.

In 2021, the Presidency of Religious Affairs of the Republic of Türkiye [56] published official guidelines for mosque planning and design. These guidelines aim to standardize construction processes by establishing clear criteria that ensure mosques are compatible with their environmental context, resilient to disasters, energy-efficient, spatially accessible, and esthetically coherent. While these parameters offer centralized direction, they also

provide flexibility to accommodate regional and local architectural interpretations. This dual approach supports the integration of mosques into urban identity and ensures they continue to reflect evolving social and spiritual values.

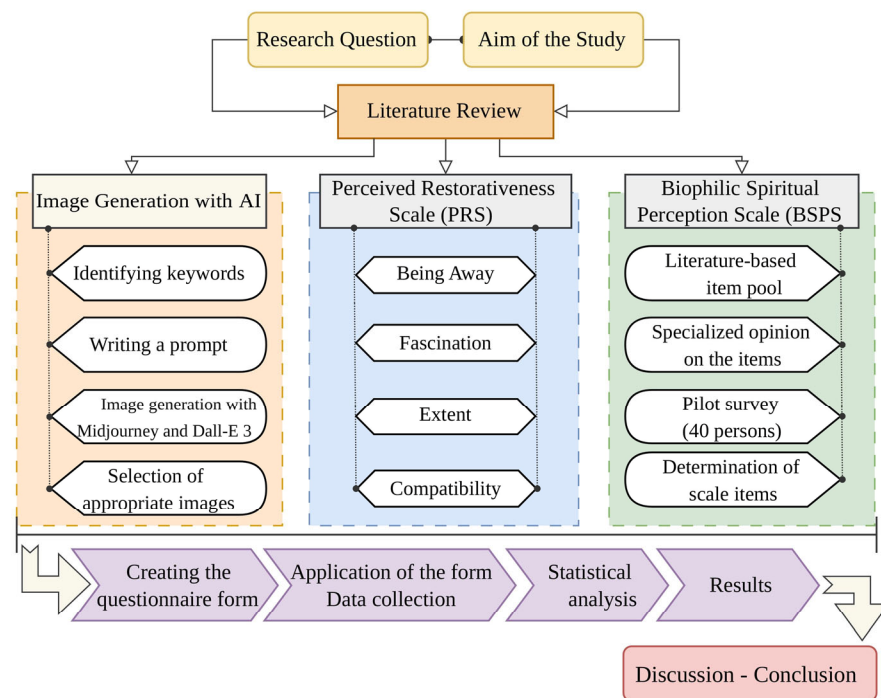


Figure 1. Flowchart of the study methodology.

2.2. Data Acquisition Methods

In this study, a structured questionnaire served as the primary data collection tool. The questionnaire consisted of three main sections. The first section gathered participants' sociodemographic information, including age, gender, educational background, employment status, and income level. The second section included items related to participants' familiarity with the concept of biophilic design, their preferences for using biophilic elements in different spatial settings, and their overall perceptions of biophilic design. In the final section, biophilic design elements found in mosque interiors were evaluated based on participants' responses, and the restorative effects of these elements on users were assessed. The influence of biophilic components on individuals was examined through visual materials created for this purpose. At this stage, the PRS, based on ART, was used, suggesting that interactions with nature aid in attentional recovery. The Turkish version of this scale, along with its validity and reliability tests, was developed by Özçifçi et al. [53].

The Biophilic Spiritual Perception Scale (BSPS) was developed to measure the influence of biophilic design in mosque interiors on individuals' perception of spirituality. The item pool was created based on a comprehensive theoretical framework drawn from both biophilic design and the literature on spiritual experiences in sacred architecture. Key sources included Kaplan and Kaplan's Attention Restoration Theory [39], Ulrich's (1984) Stress Reduction Theory [38], and Kellert's biophilic design principles [19], along with studies on spatial perception in architectural settings [57–60]. Qualitative user expressions from individuals with mosque experience were also considered to generate culturally and contextually relevant items. The initial item pool was reviewed by a panel of experts from relevant disciplines, including landscape architecture ($n = 3$), architecture ($n = 1$), interior design ($n = 2$), theology ($n = 2$), and art history ($n = 1$). Experts evaluated the content for clarity, scope, and relevance. Based on their feedback, items were revised or removed. A pilot study involving 40 participants with mosque experience was conducted to assess item

comprehensibility and scale structure. The final version of the BSPS was refined accordingly prior to full-scale data collection.

The visual stimuli used in the final section of the questionnaire—mosque interior images incorporating biophilic design elements—were generated using the AI-based tools Midjourney V6.1 and DALL·E 3. To ensure cultural relevance, scientific reproducibility, and ecological validity, the image generation process followed a structured procedure. Prompts were developed based on a comprehensive literature review conducted through Web of Science, Scopus, and Google Scholar. Keywords included “biophilic design,” “sacred space design,” “mosque interior,” “nature-based design,” “spiritual atmosphere,” and “restorative environment.” Each prompt incorporated specific biophilic design elements such as natural lighting (e.g., stained glass, dome openings), vegetation (e.g., indoor plants), water features (e.g., fountains), natural materials (e.g., wood, marble), organic forms, and nature-inspired patterns. For each prompt, 12 to 15 image variations were generated. These variations were then evaluated by the research team based on criteria including the clarity of biophilic components, architectural compatibility with mosque interiors, spatial coherence, and cultural sensitivity. Four images that best aligned with the study’s objectives were selected as experimental stimuli (Figure 2).



Figure 2. The visuals were generated with AI tools and used in the study.

2.3. Determining the Sample Size

The study was conducted with adults aged 18 years and above living in Antalya, a city in southern Türkiye located in the Mediterranean region, representing diverse demographic characteristics. Participants were selected through a probability random sampling method, ensuring equal chances for every individual and enhancing the generalizability

of the results. In the final part of the questionnaire, participants were asked to evaluate mosque interior visuals designed with biophilic elements based on their prior experiences in mosque interiors. In line with this, only the responses of individuals who had participated in worship practices within mosques built during the Turkish Republican Period were included in the data analysis. The responses of participants who did not have this experience were excluded from the dataset and considered outside the scope of the study.

The survey was administered using two distinct methods: both online and face-to-face. The online questionnaires were conducted through the Google Forms platform. During the process of determining the sample size, the Equal 1 formula was applied, as the number of individuals in the target population was known [61].

$$n = Nt^2pq/d^2(N - 1) + t^2pq. \quad (1)$$

The parameters used in the formula are defined as follows: t denotes the reliability coefficient corresponding to the selected significance level. N refers to the total number of individuals in the population, and n indicates the number of individuals to be included in the sample. p indicates the probability of occurrence of the characteristic being studied. Additionally, q denotes the probability of non-occurrence, calculated as $q = 1 - p$. d indicates the acceptable sampling error based on the expected frequency of the characteristic [61].

The required ethical approval for this study was obtained from Akdeniz University Scientific Research and Publication Ethics Committee for Science and Engineering (protocol code: 1157170 and date of approval: 5 March 2025). Following the approval, data were collected from a total of 390 participants over a two-month fieldwork period.

2.4. Data Analysis

The construct validity of the scales used in the study was assessed through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). When reviewing the CFA results, the fit indices χ^2 , χ^2/df , CFI, RMSEA, TLI, and SRMR were considered. For data processing and analysis, IBM SPSS V26 and the lavaan package in R were employed [62]. Before conducting the analyses, basic assumptions were checked, and the distribution characteristics of the variables in the dataset were examined. The assumption of normality was assessed using skewness and kurtosis coefficients. Skewness and kurtosis values within the range of ± 1.5 were considered indicative of normality [63]. Variables in this range were considered appropriate for parametric tests. In group comparisons, Levene's test was used to check the assumption of equal variances. When variances were found to be equal, independent samples t -tests and one-way analysis of variance (ANOVA) were performed. If the assumption of equal variances was not met or the normality assumption was violated, the non-parametric Kruskal–Wallis H test was used for comparisons between two groups. For independent samples, t -tests were performed. When comparing three or more groups, either one-way ANOVA or the Kruskal–Wallis test was used, depending on the distribution of the data. If the ANOVA revealed a statistically significant difference, the Tukey HSD post hoc test was applied to identify which groups differed significantly. Following the Kruskal–Wallis test, pairwise group comparisons were performed using the Bonferroni correction. Additionally, simple linear regression analyses were conducted in the study. During the regression analyses, the assumption of multicollinearity was assessed. Since the tolerance values were 1.00 and the VIF values were also 1.00, no multicollinearity problem was identified. The normal distribution of residuals was visually assessed using histograms and normal probability plots. The homogeneity of variance was confirmed. In the regression analyses, the dependent variables included the sub-dimensions of detachment, fascination, scope, and coherence, while the independent variable was the BSPS. The results of the regression analyses included standardized regression coefficients

(β) and correlation coefficients (r). All findings were evaluated within a 95% confidence interval and at a significance level of 0.05.

3. Results

3.1. Sociodemographic Characteristics of the Participants

An examination of the gender distribution of the participants revealed that females constituted 63.8% of the sample, while men accounted for 36.2%. Regarding age distribution, the majority of participants (56.9%) were between 18 and 30 years old, followed by those aged 31 to 50 (29.7%) and over 51 (13.4%). An assessment of participants' educational backgrounds showed that nearly half (46.7%) held a bachelor's degree, followed by associate degree graduates (21%) and individuals with postgraduate qualifications (14.1%). Participants with only high school or primary school education constituted 18.2% of the sample. Regarding occupational status, 48.5% of the participants were employed, while 32.1% were students. Participants identified as housewives (5.1%), retirees (8.2%), and unemployed individuals (6.2%) were less represented. An analysis of income distribution showed that most participants (38.5%) earned between TRY 23,001 and 50,000 per month, followed by those in the TRY 50,001–100,000 income range (30.3%). Participants in the lowest income group (TRY $\leq$ 23,000) accounted for 13.1%, while 18.2% reported a monthly income over TRY 100,000 (Table 1).

Table 1. Descriptive information on the sociodemographic characteristics of the participants.

Independent Variable		Number (n)	Percentage (%)
Gender	Female	249	63.8
	Male	141	36.2
Age	18–30	222	56.9
	31–50	116	29.7
	51<	52	13.3
Education Level	Elementary education	17	4.4
	High school	54	13.8
	Associate degree	82	21.0
	Bachelor's degree	182	46.7
	Postgraduate	55	14.1
Occupation	Working	189	48.5
	Student	125	32.1
	Housewife	20	5.1
	Retired	32	8.2
	Unemployed	24	6.2
Income *	23,000>	51	13.1
	23,001–50,000	150	38.5
	50,001–100,000	118	30.3
	10,0001<	71	18.2

* The currency used is the Turkish Lira.

3.2. Participants' Perceptions of Biophilic Design and Its Elements

A total of 7.7% of the participants reported having detailed knowledge about the concept of biophilic design, while 37.7% stated that they had heard of the concept but lacked in-depth understanding. The remaining 54.6% indicated that they had never encountered the term before.

All participants who reported having detailed knowledge of the concept of biophilic design correctly identified it as the integration of natural elements into human-made environments. Among those who had heard of the concept but lacked detailed knowledge, 46.3% demonstrated a partial understanding of its meaning. In contrast, 85.4% of partici-

pants who had never encountered the term reported a lack of knowledge about its meaning. This difference was found to be statistically significant ($\chi^2 = 314.725$, Cramer's $V = 0.635$, $p < 0.001$).

A total of 54.1% of participants reported having previously been in a space that incorporated biophilic design elements. Among these participants, 53.6% stated that they encountered such environments occasionally, with 30.8% encountering it rarely, 13.3% encountering it frequently, and 2.4% encountering it regularly.

A large majority of participants (84.4%) expressed a desire for more biophilic design elements to be used in their living and working environments. Among those who supported wider use of these elements, 54.4% preferred them in homes, 58.4% in offices, 71.1% in schools, 59.9% in hospitals, 41.0% in places of worship, 65.7% in parks and green spaces, 44.7% in shopping centers, and 61.4% in cafes and restaurants.

There was a statistically significant difference in opinions regarding the use of biophilic design elements in religious buildings between individuals who had previously worshiped in a mosque incorporating such elements and those who had not ($t(388) = 2.45$, $p = 0.015$). In this context, participants who had worshiped in a biophilic mosque ($M = 4.07$, $SD = 1.041$) found the inclusion of biophilic design elements in religious spaces more important than those who had not ($M = 3.79$, $SD = 1.120$). Furthermore, 77.2% of participants supported the inclusion of natural light, 66.2% preferred vegetation and green spaces, 64.4% supported the use of water features, 45.1% valued organic forms, 55.6% endorsed natural patterns and textures, and 57.2% favored natural materials in the biophilic design of religious spaces.

3.3. Data Analysis

3.3.1. Exploratory Factor Analysis (EFA)

Before conducting the EFA for the BSPS, the appropriateness of the data for factor analysis was assessed using the Kaiser–Meyer–Olkin (KMO) coefficient and Bartlett's test of sphericity. A KMO value above 0.90 is considered excellent [63–66], and in this analysis, the KMO value was 0.961. Bartlett's test of sphericity was also statistically significant ($\chi^2 = 5392.176$, $df = 36$, $p = 0.001$). Based on these findings, the data were deemed suitable for factor analysis (Table 2).

Table 2. The results of KMO and Bartlett's test.

Test		Value
Kaiser–Meyer–Olkin Measure of Sampling Adequacy		0.961
Bartlett's Test of Sphericity	χ^2	5392.176
	sd	36
	p	0.001

The principal axis factoring revealed a single component with an eigenvalue greater than 1. In this context, the total variance explained and the scree plot (Figure 3) indicated the unidimensional structure of the scale.

In the scree plot presented in Figure 3, the curve flattens after the first point, indicating that the subsequent factors only contribute minimally and similarly to the explained variance. In the exploratory factor analysis, the minimum factor loading cutoff was set at 0.32 [67–69], and no item was found to fall below this threshold. The contribution of the single factor identified in the analysis to the total variance was calculated as 85.146% (Table 3). Additionally, the factor pattern and factor loadings of the scale are presented in Table 4.

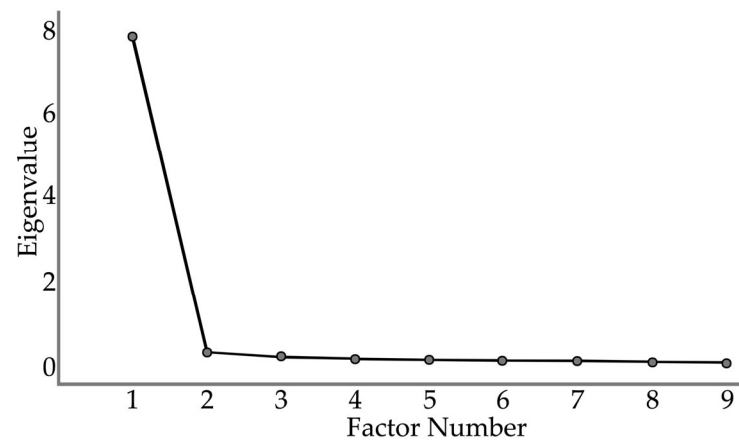


Figure 3. Scree plot of BSPS.

Table 3. Explained the total variance of the BSPS.

Factor	Initial Eigen Values			Extraction Sum of Squared Loadings		
	Total	% of Variance	% Cumulative	Total	% of Variance	% Cumulative
1	7.809	86.770	86.770	7.663	85.146	85.146

Table 4. Factor loading coefficients of the items of the BSPS.

Factors	Items	Factor Loadings
1	It makes the space more inviting.	0.948
	It helps me establish a spiritual connection with the space.	0.942
	It enhances my concentration during worship.	0.936
	It creates a sense of spiritual purification.	0.934
	It positively influences my worship experience.	0.930
	It makes me feel more mentally and spiritually at peace.	0.926
	It reduces my stress levels.	0.923
	It contributes esthetically to the space.	0.908
	It enables me to connect with nature.	0.855

The evaluation of the factor pattern and factor loadings revealed that the loadings in the BSPS ranged from 0.855 to 0.948. The highest loading was for item I1, “Biophilic design in mosque interiors makes the space more inviting” (0.948). The lowest was for item I9, “Biophilic design in mosque interiors enables me to connect with nature” (0.855).

3.3.2. Confirmatory Factor Analysis (CFA)

An examination of the CFA results for the BSPS showed that all t-values exceeded 2.56 and were statistically significant at the 0.01 level. Regarding error variances, no item had an error variance above 0.90 (Table 5). All factor loadings of the items on the scale were statistically significant, ranging from 0.84 to 0.94.

Table 5. Confirmatory factor analysis results for the BSPS.

	χ^2	sd	χ^2/sd	RMSEA(%90 CI)	CFI	TLI	SRMR
Model	77.431	27	2.86	0.069 (0.052–0.088)	0.996	0.995	0.016

Based on the fit indices from the factor analysis, a χ^2/df ratio below 3 indicates an ideal model fit [70]. An RMSEA value under 0.08 suggests a good fit [71], while CFI and TLI values above 0.95 indicate an excellent fit [72]. Additionally, an SRMR value below

0.05 also demonstrates a strong model fit [73]. These results confirm the unidimensional structure of the BSPS.

At this stage, confirmatory factor analysis was performed on the PRS. The scale was modeled based on a 4-factor structure, consisting of being away, fascination, extent, and compatibility, with a total of 26 items evaluated. In the initial model, the loadings of items I11 and I13 on the fascination factor were examined. According to the results of the confirmatory factor analysis, the loadings of items I11 and I13 on the fascination factor were found to be -0.010 and 0.006 , respectively. These coefficients indicated that the items did not adequately represent the factor and did not contribute to the model. Therefore, to improve the conceptual integrity and construct validity of the PRS, items I11 and I13 were removed from the model. Additionally, based on the modification indices, error covariances were added between specific items to enhance the model.

Accordingly, error covariances were established between items I24 and I25, I25 and I26, and I24 and I26. These adjustments were justified by the content overlap among the related items and the acceptability of local dependency. The final confirmatory factor analysis results, based on the remaining 24 items, are shown in Table 6.

Table 6. Confirmatory factor analysis results of PRS.

	χ^2	sd	χ^2	RMSEA(%90 CI)	CFI	TLI	SRMR
Model	808.85	243	3.32	0.077(0.071–0.083)	0.957	0.951	0.032

Based on the results of the confirmatory factor analysis for the PRS, all t-values exceeded 2.56 and were statistically significant at the 0.01 level. Error variances indicated that no item had an error variance above 0.90. Additionally, all factor loadings of the scale items were substantial, ranging from 0.76 to 0.95. An evaluation of the model fit indices showed that a χ^2/df ratio below 5 indicates an acceptable level of model fit (Figure 4). Based on these results, the four-factor structure of the PRS was confirmed.

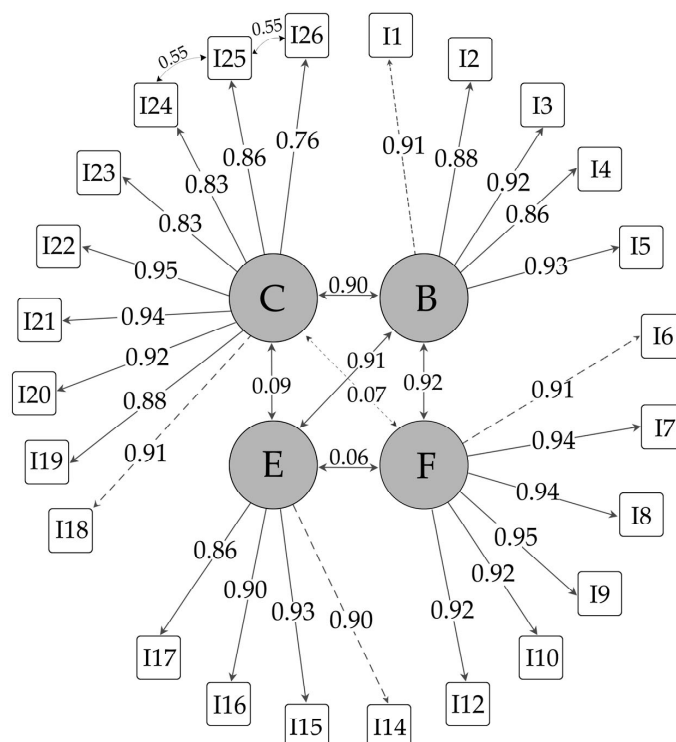


Figure 4. Path diagram of confirmatory factor analysis of PRS.

3.3.3. Reliability Analysis

To assess the internal consistency reliability of the scales, Cronbach's alpha coefficients were calculated. The Cronbach's alpha reliability coefficient for the BSPS was 0.981. For the PRS, the overall reliability coefficient was 0.970, while the reliability coefficients for its sub-dimensions—being away, fascination, extent, and compatibility—were 0.956, 0.975, 0.944, and 0.970, respectively (Table 7). In both scales, the Cronbach's alpha coefficients exceeded the 0.70 threshold proposed by Nunnally and Bernstein [74], indicating a high level of reliability across all sub-dimensions.

Table 7. Reliability results.

Scales	Subscales	Cronbach's Alpha
BSPS		0.981
PRS		0.970
	Being Away	0.956
	Fascination	0.975
	Extent	0.944
	Compatibility	0.970

3.4. Relationship Between Sociodemographic Characteristics and Scales

3.4.1. Findings by Gender

The study investigated whether BSPS and perceived restorativeness scores varied by gender. Females ($M = 33.32$, $SD = 10.39$) scored significantly higher than men ($M = 28.67$, $SD = 12.48$) on the BSPS ($t(388) = 3.94$, $p < 0.001$). Regarding the sub-dimensions of the PRS, females also scored significantly higher than men in being away ($t(388) = 3.92$, $p < 0.001$), fascination ($t(388) = 4.11$, $p < 0.001$), and compatibility ($t(388) = 2.51$, $p = 0.013$). No significant difference was found between females ($M = 8.27$, $SD = 4.15$) and men ($M = 8.48$, $SD = 4.62$) in the extent sub-dimension ($t(388) = -0.44$, $p = 0.658$).

3.4.2. Findings by Age

The presence of significant differences in BSPS scores and the sub-dimensions of the PRS across age groups was examined using one-way ANOVA. No statistically significant difference was found between age groups in BSPS scores ($F(2, 387) = 0.11$, $p = 0.899$). Similarly, there were no significant differences across age groups in the sub-dimensions of being away ($F(2, 387) = 1.23$, $p = 0.295$), fascination ($F(2, 387) = 0.57$, $p = 0.566$), extent ($F(2, 387) = 0.75$, $p = 0.472$), or compatibility ($F(2, 387) = 0.79$, $p = 0.457$) (Table 8).

Table 8. Variations in BSPS and PRS by age.

	Age	Mean $\pm$ SS	Min–Max	Medyan	Q1–Q3	p^1
BSPS	18–30	31.73 $\pm$ 11.36	9–45	36	27–41	0.899
	31–50	31.27 $\pm$ 11.35	9–45	34	22–39	
	51–65	32.08 $\pm$ 11.84	9–45	36	18–43	
Being Away	18–30	16.86 $\pm$ 6.08	5–25	18	13–21	0.295
	31–50	17.02 $\pm$ 5.99	5–25	18	14–21	
	51–65	18.29 $\pm$ 5.3	5–25	19	16–21	
Fascination	18–30	21.51 $\pm$ 7.6	6–30	24	18–27	0.566
	31–50	21.45 $\pm$ 7.47	6–30	24	18–27	
	51–65	22.67 $\pm$ 6.65	6–30	24	18–28.5	

Table 8. Cont.

	Age	Mean $\pm$ SS	Min–Max	Medyan	Q1–Q3	p^1
Extent	18–30	8.49 $\pm$ 4.24	4–20	8	5–10	0.472
	31–50	7.94 $\pm$ 4.42	4–20	8	4–10	
	51–65	8.63 $\pm$ 4.51	4–20	8	5–11	
Compatibility	18–30	30.48 $\pm$ 10.43	9–45	33	26–36	0.457
	31–50	30.32 $\pm$ 10.65	9–45	33	25–37	
	51–65	32.35 $\pm$ 9.25	9–45	35	28.5–38	

¹ One-way ANOVA.

3.4.3. Findings by Educational Background

The Kruskal–Wallis H test was used to determine whether there were significant differences in participants' educational backgrounds and their BSPS scores, as well as in the sub-dimensions of the PRS. A significant difference was found between BSPS scores and education levels ($\chi^2(4) = 14.47$, $p = 0.002$). Post hoc comparisons revealed significant differences between high school graduates and bachelor's degree holders ($p = 0.024$), and between high school graduates and those with postgraduate degrees ($p = 0.010$). A significant difference was also found between associate degree holders and participants with postgraduate education ($p = 0.045$).

Although a significant difference was found between education levels and the being away sub-dimension ($\chi^2(4) = 9.28$, $p = 0.026$), post hoc comparisons with Bonferroni correction showed no statistically significant differences. An important difference was also observed between education levels and the Fascination sub-dimension ($\chi^2(4) = 11.27$, $p = 0.024$). However, after applying the Bonferroni correction, there were no significant differences between high school graduates and bachelor's degree holders ($p = 0.139$), or between associate degree holders and bachelor's degree holders ($p = 0.149$). No significant differences were found between education levels and the extent ($\chi^2(4) = 2.28$, $p = 0.555$) or compatibility ($\chi^2(4) = 4.11$, $p = 0.395$) sub-dimensions (Table 9).

Table 9. Variations in BSPS and PRS by educational background.

	Educational Background	Mean $\pm$ SS	Min–Max	Medyan	Q1–Q3	p^1
BSPS	Primary Education	32.41 $\pm$ 11.12	12–45	36	27–38	0.002
	High School	27.02 $\pm$ 12.42	9–45	28	18–37	
	Associate Degree	29.33 $\pm$ 11.81	9–45	34	18–36	
	Bachelor's Degree	32.77 $\pm$ 11.26	9–45	36	27–42	
	Postgraduate Degree	35.62 $\pm$ 7.94	9–45	36	32–42	
Being Away	Primary Education	19.24 $\pm$ 4.85	10–25	20	18–23	0.026
	High School	14.94 $\pm$ 7.08	5–25	15.5	10–20	
	Associate Degree	16.12 $\pm$ 6.2	5–25	18	10–20	
	Bachelor's Degree	17.57 $\pm$ 5.74	5–25	18	15–22	
	Postgraduate Degree	18.44 $\pm$ 4.65	5–25	19	17–21	
Fascination	Primary Education	23.35 $\pm$ 6.07	12–30	25	18–29	0.024
	High School	18.98 $\pm$ 8.74	6–30	21	12–27	
	Associate Degree	20.11 $\pm$ 8.13	6–30	23	12–25	
	Bachelor's Degree	22.51 $\pm$ 7.06	6–30	24	18–28	
	Postgraduate Degree	23.2 $\pm$ 5.42	6–30	24	20–27	
Extent	Primary Education	10.06 $\pm$ 5.83	4–20	8	5–12	0.555
	High School	8.48 $\pm$ 5.1	4–20	8	4–9	
	Associate Degree	8.8 $\pm$ 4.38	4–20	8	4–11	
	Bachelor's Degree	8.09 $\pm$ 4.12	4–20	8	4–10	
	Postgraduate Degree	7.84 $\pm$ 3.45	4–16	8	4–10	

Table 9. Cont.

	Educational Background	Mean $\pm$ SS	Min–Max	Medyan	Q1–Q3	p^1
Compatibility	Primary Education	33.53 $\pm$ 8.46	18–45	36	28–38	0.395
	High School	27.48 $\pm$ 12.51	9–45	28	17–37	
	Associate Degree	29.73 $\pm$ 11.06	9–45	33	23–37	
	Bachelor’s Degree	31.3 $\pm$ 9.92	9–45	33	27–37	
	Postgraduate Degree	32.31 $\pm$ 8.03	9–45	33	30–36	

¹ Kruskal–Wallis H test.

3.4.4. Findings by Employment Status

The question of whether there were significant differences in the sub-dimensions of the BSPS and PRS based on participants’ employment status was analyzed using the Kruskal–Wallis H test. A statistically significant difference was found between employment status groups in terms of BSPS scores ($\chi^2(4) = 13.01$, $p = 0.011$). Post hoc comparisons revealed a statistically significant difference between unemployed individuals and housewives ($p = 0.025$); however, no other pairwise comparisons yielded significant differences (Bonferroni-adjusted $p > 0.05$).

A significant difference was also observed between groups in the being away sub-dimension of the PRS ($\chi^2(4) = 10.18$, $p = 0.040$). However, post hoc pairwise comparisons revealed no statistically significant differences between unemployed individuals and the other groups after applying the Bonferroni correction (all adjusted $p > 0.05$).

Similarly, a significant difference was observed between employment status groups in the fascination sub-dimension ($\chi^2(4) = 10.18$, $p = 0.040$); however, post hoc comparisons showed no statistically significant differences after applying the Bonferroni correction ($p > 0.05$).

On the other hand, no statistically significant differences were found between employment status groups in the extent ($\chi^2(4) = 7.48$, $p = 0.114$) and compatibility ($\chi^2(4) = 7.68$, $p = 0.109$) sub-dimensions (Table 10).

Table 10. Variations in BSPS and PRS by employment status.

	Employment Status	Mean $\pm$ SS	Min–Max	Medyan	Q1–Q3	p^1
BSPS	Employed	30.67 $\pm$ 11.55	9–45	34	19–38	0.011
	Student	32.59 $\pm$ 10.97	9–45	36	27–42	
	Housewife	37.35 $\pm$ 7.8	15–45	38	36–45	
	Retired	34.03 $\pm$ 10.83	9–45	36	27–45	
	Unemployed	26.29 $\pm$ 13.07	9–45	24.5	16–36	
Being Away	Employed	16.87 $\pm$ 6.27	5–25	18	13–21	0.040
	Student	17.33 $\pm$ 5.65	5–25	18	15–21	
	Housewife	19 $\pm$ 5.32	5–25	20	16–23.5	
	Retired	18.72 $\pm$ 4.77	10–25	19	15–23	
	Unemployed	13.96 $\pm$ 5.97	5–25	13.5	9–18.5	
Fascination	Employed	21.08 $\pm$ 7.63	6–30	24	18–26	0.040
	Student	22.32 $\pm$ 7.12	6–30	24	18–27	
	Housewife	23.1 $\pm$ 6.78	6–30	24	19.5–30	
	Retired	24.03 $\pm$ 6.05	12–30	24.5	20.5–30	
	Unemployed	18.25 $\pm$ 8.5	6–30	21	10.5–24	
Extent	Employed	7.95 $\pm$ 4.14	4–20	8	4–10	0.114
	Student	8.86 $\pm$ 4.25	4–20	8	5–11	
	Housewife	7.4 $\pm$ 4.83	4–20	4	4–10	
	Retired	9.25 $\pm$ 5.25	4–20	8	4–12	
	Unemployed	8.37 $\pm$ 4.21	4–19	8	4.5–9	

Table 10. Cont.

	Employment Status	Mean $\pm$ SS	Min–Max	Medyan	Q1–Q3	p^1
Compatibility	Employed	29.97 $\pm$ 10.66	9–45	33	25–36	0.109
	Student	31 $\pm$ 9.83	9–45	33	27–37	
	Housewife	32.7 $\pm$ 10.38	9–45	36	27.5–38	
	Retired	34.5 $\pm$ 8.74	18–45	36	28.5–43	
	Unemployed	27.83 $\pm$ 11.49	9–45	32.5	18–36	

¹ Kruskal–Wallis H test.

3.4.5. Findings by Income Level

The presence of significant differences in BSPS and its sub-dimensions across income level groups was assessed using one-way ANOVA. A significant difference was identified between BSPS scores and income groups ($F(3, 386) = 2.97, p = 0.032$). The post hoc Tukey HSD test results showed that participants in the income group above 100,000 TL ($M = 34.32, SD = 10.12$) scored higher on BSPS than those in the 23,000–50,000 TL income range ($M = 29.69, SD = 11.89$); however, this difference was not statistically significant in pairwise comparisons (adjusted $p > 0.05$). No significant differences were observed among the other income groups either.

No significant differences were found between income levels and the sub-dimensions of the PRS: being away ($F(3, 386) = 1.82, p = 0.143$), fascination ($F(3, 386) = 1.70, p = 0.167$), extent ($F(3, 386) = 0.40, p = 0.755$), and compatibility ($F(3, 386) = 2.54, p = 0.056$) (Table 11).

Table 11. Variations in BSPS and PRS by income level.

	Income Range *	Mean $\pm$ SS	Min–Max	Medyan	Q1–Q3	p^1
BSPS	Below 23,000	32.25 $\pm$ 11.75	9–45	36	25–42	0.032
	Between 23,001 and 50,000	29.69 $\pm$ 11.89	9–45	33.5	18–38	
	Between 50,001 and 100,000	32.22 $\pm$ 11.03	9–45	36	27–40	
	Above 100,001	34.32 $\pm$ 10.12	9–45	36	30–44	
Being Away	Below 23,000	16.76 $\pm$ 5.83	5–25	18	14–21	0.143
	Between 23,001 and 50,000	16.45 $\pm$ 6.52	5–25	18	10–21	
	Between 50,001 and 100,000	17.29 $\pm$ 5.39	5–25	18	15–20	
	Above 100,001	18.39 $\pm$ 5.6	5–25	19	16–23	
Fascination	Below 23,000	21.61 $\pm$ 7.64	6–30	24	17–27	0.167
	Between 23,001 and 50,000	20.81 $\pm$ 8.1	6–30	24	12–27	
	Between 50,001 and 100,000	21.79 $\pm$ 6.83	6–30	23.5	18–27	
	Above 100,001	23.21 $\pm$ 6.64	6–30	24	23–28	
Extent	Below 23,000	8.9 $\pm$ 4.97	4–20	8	4–11	0.755
	Between 23,001 and 50,000	8.17 $\pm$ 4.19	4–20	8	5–10	
	Between 50,001 and 100,000	8.42 $\pm$ 4.16	4–20	8	4–11	
	Above 100,001	8.2 $\pm$ 4.44	4–20	8	4–10	
Compatibility	Below 23,000	32.2 $\pm$ 10.31	9–45	35	27–41	0.056
	Between 23,001 and 50,000	29.19 $\pm$ 10.98	9–45	32	18–37	
	Between 50,001 and 100,000	30.58 $\pm$ 9.85	9–45	32	26–36	
	Above 100,001	32.92 $\pm$ 9.4	9–45	34	29–39	

¹ One-way ANOVA. * The currency used is the Turkish Lira.

3.5. Relationship Between BSPS and PRS

Firstly, there is no statistically significant difference between participants' frequency of visiting mosques and their views on the use of biophilic design elements in mosque interiors ($F(2, 387) = 0.424, p = 0.655$). Additionally, when the effect of mosque attendance frequency on BSPS scores was examined, no statistically significant difference was observed between mosque attendance frequency and BSPS scores ($t(183.71) = -0.73, p = 0.468$) (Table 12).

Table 12. Results by frequency of mosque attendance.

	Frequency of Mosque Attendance	Mean $\pm$ SS	Min–Max	Medyan	Q1–Q3	p^1
Biophilic Spirituality Perception Scale	Once or several times a week	30.29 $\pm$ 13.11	9–45	35	18–42	0.468
	Once or several times a month	32.35 $\pm$ 10.45	9–45	36	28–39	
	Once or several times a year	31.55 $\pm$ 11.38	9–45	35	25–39	

¹ Independent sample *t*-test.

The analysis of the being away variable revealed that the regression model was statistically significant ($F(1, 388) = 603.67, p < 0.001$). The BSPS variable explained 61% of the variance in being away scores ($R^2 = 0.609$), with a strong and positive effect ($\beta = 0.780$).

Regarding the fascination dimension, the regression results also revealed a statistically significant model ($F(1, 388) = 739.83, p < 0.001$). In this case, BSPS accounted for 66% of the variance in fascination scores ($R^2 = 0.656$), demonstrating a strong positive relationship ($\beta = 0.810$).

In contrast, the model for the extent variable was not statistically significant ($F(1, 388) = 0.76, p = 0.384$). The BSPS variable explained only 0.2% of the variance in extent scores ($R^2 = 0.002$), and the relationship between the two variables was not significant ($\beta = -0.044$). Finally, the regression analysis for the compatibility variable produced a statistically significant model ($F(1, 388) = 512.29, p < 0.001$). The BSPS variable accounted for 57% of the variance in compatibility scores ($R^2 = 0.569$), with a strong and positive effect ($\beta = 0.754$) (Table 13).

Table 13. Results of the regression analysis.

Dependent Variable	B	B (BSPS)	β	t	p	R	R ²	Adjusted R ²	r
Being Away	4.19	0.41	0.78	24.57	<0.001	0.780	0.609	0.608	0.780
Fascination	4.93	0.53	0.81	27.20	<0.001	0.810	0.656	0.655	0.810
Extent	8.88	−0.02	−0.04	−0.87	0.384	0.044	0.002	−0.001	−0.044
Compatibility	9.02	0.69	0.75	22.63	<0.001	0.754	0.569	0.568	0.754

B = regression coefficient; β = standardized coefficient; r = correlation values.

4. Discussion

The effects of the built environment on individuals' physical health [60,75], psychological well-being [57], and spiritual perceptions [76] have been thoroughly documented. Built environments are settings that require ongoing attention and interaction in daily life [77]. However, the high density of stimuli in these environments can lead to mental fatigue and cognitive exhaustion [27,78]. The current literature in environmental psychology suggests that urban stimuli place a greater load on the cognitive system than natural environments, thereby increasing cognitive fatigue [79,80]. In this context, the potential negative effects of

built environments have heightened the need for biophilic spaces that support attentional restoration and psychological balance.

Increased interaction with natural elements enhances individual well-being, enhances attentional capacity, and helps relieve stress [9,25,81]. However, urbanization has reduced opportunities for people to connect with natural environments, and built environments have become a major barrier to human–nature interaction [30,59]. In this context, biophilic design acts as a bridge between the built environment and nature, improving interaction with natural elements [26,58]. However, as McGee and Park [82] point out, implementing biophilic design in interior spaces is a complex process because of nature’s multidimensional and diverse character.

Aligned with the aim of this study, the impact of biophilic design on individuals’ perception of spirituality in mosque interiors is examined. Since no existing scale in the literature directly measured this specific relationship, the BSPS was created as a new measurement tool. The scale’s development process was meticulously conducted through expert evaluations and pilot testing, with its one-dimensional structure and high levels of validity and reliability confirmed through EFA and CFA. As a result, the BSPS provides an innovative and reliable instrument for assessing how biophilic elements in mosque interiors influence perceptions of spirituality, thereby contributing to the existing literature. To assess the restorative effects of biophilic mosque interiors, ART and its measurement instrument, the PRS, were employed. Two items from the fascination dimension of ART were removed due to structural inconsistency; this adjustment ensured the scale’s conceptual coherence, improved the validity of the measurement model, and increased its reliability.

Recent studies [83–85] indicate a growing use of AI-based visual production tools in architectural research, particularly in conceptual visualization and user perception studies. While these tools offer valuable opportunities, their use in culturally and religiously sensitive environments—such as mosque interiors—requires careful consideration. As highlighted by Obaid and Omar [86] and Sukkar et al. [87,88] current AI models often lack the cultural specificity and symbolic depth necessary to fully represent sacred architectural spaces. For this reason, expert oversight and contextual knowledge are crucial in interpreting or applying AI outputs in Islamic architectural settings. In the present study, mosque interiors were generated in a culturally respectful manner by avoiding figurative or inappropriate elements and adhering to the general spatial and material characteristics of Islamic architecture. The sole purpose of these images was to facilitate perception-related assessments of biophilic design. The visual materials were reviewed by researchers with architectural and theological backgrounds to ensure alignment with ethical research standards and cultural sensitivities.

The study’s findings showed that the restorative impact of biophilic mosque interiors and perceptions of spirituality varied by gender. Females reported higher perceptions than men, particularly in the being away, fascination, and compatibility sub-dimensions. This may be due to females’ increased sensitivity to environmental stimuli and their greater psychological benefits from nature-inspired settings [89,90]. Additionally, females’ greater interest in spiritual matters and higher levels of religious commitment compared to men also support this result [91,92]. These findings help explain why females demonstrated greater interest in this study, which focused on the evaluation of biophilic mosque interiors. Moreover, when it comes to spiritually and restoratively perceived environmental stimuli like biophilic design, females’ heightened environmental sensitivity and emotional awareness are believed to influence these perceptions.

The analysis revealed that neither the perception of spirituality nor the restorative effect of biophilic mosque interiors varies across age groups. Unlike some earlier studies, this suggests that the spiritual influence of biophilic design elements in mosque interiors

is not exclusive to older people; individuals of different ages can also experience similar spiritual benefits within religious spaces. Several studies in the literature indicate that advancing age often leads people to think more introspectively due to factors like seeking meaning in life, contemplating the afterlife, losing close social ties, and facing increasing health challenges [93–95]. This inward focus then encourages them to turn to spiritual resources. However, in modern contexts, individuals' lifestyles, levels of introversion, and environmental sensitivity complicate the relationship between age, spiritual perception, and restorative impact. Within this context, it can be suggested that biophilic design in sacred spaces like mosques has a universal ability to foster inner peace, providing restorative support across different age groups.

The study reveals that the effect of biophilic design in mosque interiors on spirituality perception tends to grow as education level increases. However, because spiritual perception is a subjective and personal experience, it cannot be solely linked to educational attainment. This inconsistency across empirical studies suggests that the relationship between education and spirituality remains context-dependent and theoretically debated. While Kırac [96] reported the existence of a positive link between educational attainment and spirituality levels, Gürsu and Ay [97] argued that education does not have a significant effect on spiritual well-being. Additionally, the literature indicates that people's awareness of nature and environmental sensitivity generally rises with higher levels of education [98,99]. However, in this study, no statistically significant differences were observed between educational levels and the dimensions of restorative effect, particularly in multiple comparison analyses.

Biophilic design in mosque interiors appears to support restorative perceptions across individuals from various socioeconomic backgrounds. However, the analysis indicated no statistically significant differences in this perception based on participants' income or employment status. Notably, although income level did not have a meaningful impact on spiritual perception, a significant difference emerged between housewives and other non-working participants. This may be because individuals who spend more time indoors, like housewives, tend to develop a deeper spiritual connection with sacred spaces.

The analysis revealed that mosque attendance frequency is not associated with the impact of biophilic design on spiritual perception. This suggests that the influence of biophilic design on spiritual experiences is not necessarily tied to time but is more affected by spatial and environmental factors. As highlighted by Kaplan and Kaplan [39] and Ulrich [38], even brief interactions with natural elements can greatly foster psychological and spiritual renewal. In *The Luminous Ground*, the fourth book in *The Nature of Order* series, Alexander [100] claims that space not only has a physical dimension, but also an existential and spiritual one. According to Alexander, the living structure enhances the sense of life of both the space and the user through the holistic relationship of its centers [100]. This approach overlaps with the effects of biophilic design on the perception of spirituality in mosque interiors discussed in this study. In mosque architecture, central elements such as the dome and mihrab are compatible with Alexander's concept of centers; through these elements, the user establishes a deep connection with the space and lives a spiritual experience. In this context, the findings of the studies on the relationship between biophilic design and spirituality, when supported by Alexander's theoretical framework, offer a deeper perspective on how both spiritual and vital integrity can be built in religious buildings.

The findings of this study demonstrate that biophilic design in mosque interiors contributes to stress reduction, enhanced emotional well-being, cognitive support, and a heightened sense of spiritual calm. These outcomes reinforce the value of integrating natural light, vegetation, water elements, natural materials, and organic forms within sacred

interiors. In parallel, Agboola et al. [101] emphasize that biophilic design also contributes meaningfully to sustainability goals in architecture. Together, these perspectives support the development of a holistic design strategy that addresses both user well-being and environmental sustainability.

Mosques serve as spaces where Muslims practice their faith, engage in worship, and express their cultural identity [46]. Throughout history, mosques have experienced structural changes, influenced by the socio-cultural and architectural traits of their respective construction periods [102,103]. After the industrialization efforts of the Republican period, unplanned and rapid urbanization processes negatively impacted mosque architecture in Türkiye. Several legal frameworks, such as Law No. 3194 on Zoning, the Regulation on the Preparation of Spatial Plans, and the Zoning Regulation for Planned Areas, have been established. However, there is currently no legal regulation that explicitly governs the architectural and esthetic qualities of mosques.

The official guideline developed to assist relevant individuals and institutions in planning and designing mosques does not include any provisions related to biophilic design principles. This omission is probably due to a lack of awareness about biophilic design, as well as the inadequacy of existing design guidelines, industry standards, and methodological frameworks in this area.

5. Conclusions

Since ancient times, sacred structures have led the way in biophilic design through their symbolic, functional, and spatial links to nature. From Egypt and Mesopotamia's religious monuments to East Asian temples, and from Hellenistic sanctuaries to the sacred architecture of Abrahamic faiths, natural elements have consistently been key parts of sacredness and spirituality. In Islamic architecture, especially in mosque design, traditional biophilic features such as water elements inspired by paradise gardens, shade trees, and large open courtyards help to create a richer biophilic experience (e.g., the Alhambra Palace, and the Süleymaniye, Selimiye, and Blue Mosques).

This study is one of the pioneering efforts used to quantitatively examine how biophilic design principles in mosque interiors influence individuals' perceptions of spirituality and their experience of restorative spaces. It emphasizes the multidimensional impact of these principles on perceptions of spirituality and restorative experiences within mosque interiors. The BSPS, created as part of this research, makes a valuable contribution to the literature as a new measurement tool used for the first time in this field, with a high level of internal consistency ($\alpha = 0.981$). This scale provides a strong foundation for assessing how biophilic elements affect the link between mosque interiors and people's inner spiritual worlds. Moreover, the study's innovative methodological aspect is the creation of mosque interior visuals using AI tools and utilizing these visuals as data collection methods in the scale application.

Empirical evidence from the study confirms that biophilic design should be seen not just as an esthetic approach but as a comprehensive strategy that promotes psychological, emotional, and spiritual well-being. Mosque interiors that incorporate biophilic elements were found to enhance individuals' perception of spirituality by 70.3% and amplify their restorative experience by 67.6%. These findings strongly suggest that spatial design is closely linked to mental functions like attention restoration, stress reduction, and the cultivation of inner peace.

Furthermore, the fact that the impact of biophilic design appears to be independent of demographic variables, such as age, income level, and frequency of mosque visits, suggests its broad applicability. Notably, female participants reported higher scores in the

dimensions of being away, fascination, and compatibility, highlighting the decisive role of environmental sensitivity and spiritual awareness in shaping individual experiences.

Nonetheless, the lack of biophilic design criteria in current planning and design laws in Türkiye is a significant shortcoming that hampers the development of mosque interiors in this area. Incorporating Kellert's biophilic design principles into mosque design guidelines and relevant regulations not only enhances architectural quality but also contributes to the creation of culturally and psychologically enriching worship environments.

The architecture of mosques in Türkiye has been shaped by both the shared traditions of the Islamic world and the local building culture of Anatolia. Regional factors such as climate, materials, settlement patterns, and cultural values have contributed to architectural variation. While this study focuses on mosque interiors from the Turkish Republican period, which reflects a modernized and state-guided interpretation of mosque design, it does not encompass the full diversity of mosque architecture across history or geography. Future studies that include different styles and periods will provide a more holistic understanding of how biophilic design affects spiritual and restorative perceptions in sacred architecture.

Finally, biophilic design proves to be a multidimensional approach that supports individuals' spiritual and psychological well-being within sacred spaces like mosques. The institutional recognition of this approach is crucial not only for improving spatial quality but also for enriching the worship experience.

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Abbreviations

The following abbreviations are used in this manuscript:

ART	Attention Restoration Theory
PRS	Perceived Restorativeness Scale
BSPS	Biophilic Spiritual Perception Scale
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis

References

1. Li, Z.; Luan, W.; Zhang, Z.; Su, M. Relationship between urban construction land expansion and population/economic growth in Liaoning Province, China. *Land Use Policy* **2020**, *99*, 105022. [CrossRef]
2. Lu, H.; Shang, Z.; Ruan, Y.; Jiang, L. Study on urban expansion and population density changes based on the inverse s-shaped function. *Sustainability* **2023**, *15*, 10464. [CrossRef]
3. World Bank. Available online: <https://www.worldbank.org/en/topic/urbandevelopment/> (accessed on 19 May 2025).

4. Gilman, J.; Wu, J. Identifying broken linkages coupling water availability and dryland urbanization for sustainability: The case of the Phoenix metropolitan region, USA. *J. Environ. Manag.* **2024**, *352*, 120097. [CrossRef]
5. Cox, D.T.; Shanahan, D.F.; Hudson, H.L.; Fuller, R.A.; Gaston, K.J. The Impact of urbanisation on nature dose and the implications for human health. *Landsc. Urban Plan.* **2018**, *179*, 72–80. [CrossRef]
6. Tomasso, L.P.; Yin, J.; Cedeño Laurent, J.G.; Chen, J.T.; Catalano, P.J.; Spengler, J.D. The relationship between nature deprivation and individual wellbeing across urban gradients under Covid-19. *Int. J. Environ. Res. Public Health* **2021**, *18*, 1511. [CrossRef]
7. Salingaros, N.A.; Masden II, K.G. Neuroscience, the natural environment, and building design. In *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*, 1st ed.; Kellert, S.R., Heerwagen, J.H., Mador, M.L., Eds.; John Wiley & Sons: Hoboken, NJ, USA, 2008; pp. 59–83.
8. Akyıldız, N.A. Bibliometric analysis of graduate thesis on biophilic design. *Urban Acad.* **2023**, *16*, 879–904.
9. Fadda, R.; Congiu, S.; Roeyers, H.; Skoler, T. Elements of biophilic design increase visual attention in preschoolers. *Buildings* **2023**, *13*, 1160. [CrossRef]
10. Russo, A.; Andreucci, M.B. Raising healthy children: Promoting the multiple benefits of green open spaces through biophilic design. *Sustainability* **2023**, *15*, 1982. [CrossRef]
11. Akyıldız, N.A.; Olğun, T.N. Investigation of biophilic design traces in Darende—Balaban traditional settlement texture. *Urban Acad.* **2021**, *14*, 560–577.
12. Grazuleviciute-Vileniske, I.; Daugelaite, A.; Viliunas, G. Classification of biophilic buildings as sustainable environments. *Buildings* **2022**, *12*, 1542. [CrossRef]
13. Beatley, T. Biophilic cities and healthy societies. *Urban Plan.* **2017**, *2*, 1–4. [CrossRef]
14. Ives, C.D.; Abson, D.J.; von Wehrden, H.; Dorninger, C.; Klaniecki, K.; Fischer, J. Reconnecting with nature for sustainability. *Sustain. Sci.* **2018**, *13*, 1389–1397. [CrossRef]
15. Zhong, W.; Schröder, T.; Bekkering, J. Biophilic design in architecture and its contributions to health, well-being, and sustainability: A critical review. *Front. Archit. Res.* **2022**, *11*, 114–141. [CrossRef]
16. Wilson, E.O. *Biophilia*, Revised ed.; Harvard University Press: Cambridge, MA, USA, 1984; pp. 1–157.
17. Browning, W.; Ryan, C.; Clancy, J. *14 Patterns of Biophilic Design: Improving Health & Well-Being in the Built Environment*; Terrapin Bright Green: New York, NY, USA, 2014; pp. 3–60.
18. Samalavičius, A. Biophilic architecture: Possibilities and grinders. *Logos* **2020**, *105*, 109–118.
19. Kellert, S.R. Dimensions, elements, and attributes of biophilic design. In *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*, 1st ed.; Kellert, S.R., Heerwagen, J.H., Mador, M.L., Eds.; John Wiley & Sons: Hoboken, NJ, USA, 2008; pp. 3–19.
20. Kellert, S.R.; Calabrese, E.F. The Practice of Biophilic Design. Available online: https://biophilicdesign.umn.edu/sites/biophilic-net-positive.umn.edu/files/2021-09/2015_Kellert%20The_Practice_of_Biophilic_Design.pdf (accessed on 3 March 2025).
21. Andreucci, M.B.; Loder, A.; Brown, M.; Brajković, J. Exploring challenges and opportunities of biophilic urban design: Evidence from research and experimentation. *Sustainability* **2021**, *13*, 4323. [CrossRef]
22. Gómez-Baggethun, E.; Barton, D.N. Classifying and valuing ecosystem services for urban planning. *Ecol. Econ.* **2013**, *86*, 235–245. [CrossRef]
23. O’Sullivan, K.; Shirani, F.; Hale, R.; Pidgeon, N.; Henwood, K. Identity, place narrative and biophilic urban development: Connecting the past, present and future for sustainable liveable cities. *Front. Sustain. Cities* **2023**, *5*, 1139029. [CrossRef]
24. Xue, F.; Gou, Z.; Lau, S.S.Y.; Lau, S.; Chung, K.; Zhang, J. From biophilic design to biophilic urbanism: Stakeholders’ perspectives. *J. Clean. Prod.* **2019**, *211*, 1444–1452. [CrossRef]
25. Dobson, J.; Birch, J.; Brindley, P.; Henneberry, J.; McEwan, K.; Mears, M.; Richardson, M.; Jorgensen, A. The magic of the mundane: The vulnerable web of connections between urban nature and wellbeing. *Cities* **2021**, *108*, 102989. [CrossRef]
26. Gillis, K.; Gatersleben, B. A review of psychological literature on the health and wellbeing benefits of biophilic design. *Buildings* **2015**, *5*, 948–963. [CrossRef]
27. Marte, E.; Calumpit, A.; Toledo, A.; Fadda, R.; Skoler, T. Testing reliability of biophilic design matrix within urban residential playrooms. *Front. Psychol.* **2020**, *11*, 570099. [CrossRef]
28. Roberts, T. We Spend 90% of Our Time Indoors. Says Who? Available online: <https://www.buildinggreen.com/blog/we-spend-90-our-time-indoors-says-who> (accessed on 5 March 2025).
29. Aristizabal, S.; Byun, K.; Porter, P.; Clements, N.; Campanella, C.; Li, L.; Mullan, A.; Ly, S.; Senerat, A.; Nenadic, I.Z.; et al. Biophilic office design: Exploring the impact of a multisensory approach on human well-being. *J. Environ. Psychol.* **2021**, *77*, 101682. [CrossRef]
30. Wijesooriya, N.; Brambilla, A. Bridging biophilic design and environmentally sustainable design: A critical review. *J. Clean. Prod.* **2021**, *283*, 124591. [CrossRef]
31. Susam, K.; Özdemir, Ş. Analysis of healthcare buildings according to biophilic design criteria: Istanbul Başakşehir Çam and Sakura City Hospital example. *Istanb. Sabahattin Zaim Univ. J. Inst. Sci. Technol.* **2024**, *6*, 36–52.

32. Rosenbaum, M.S.; Ramirez, G.C.; Camino, J.R. A dose of nature and shopping: The restorative potential of biophilic lifestyle center designs. *J. Retail. Consum. Serv.* **2018**, *40*, 66–73. [\[CrossRef\]](#)
33. Guzzo, R.F.; Suess, C.; Legendre, T.S. Biophilic design for urban hotels—Prospective hospitality employees’ perspectives. *Int. J. Contemp. Hosp. Manag.* **2022**, *34*, 2914–2933. [\[CrossRef\]](#)
34. Torpy, F.; Irga, P.; Burchett, M. Profiling indoor plants for the amelioration of high CO₂ concentrations. *Urban For. Urban Green.* **2014**, *13*, 227–233. [\[CrossRef\]](#)
35. Osimani, A.; Garofalo, C.; Milanović, V.; Taccari, M.; Aquilanti, L.; Polverigiani, S.; Clementi, F. Indoor air quality in mass catering plants: Occurrence of airborne eumycetes in a university canteen. *Int. J. Hosp. Manag.* **2016**, *59*, 1–10. [\[CrossRef\]](#)
36. D’Alessandro, F.; Asdrubali, F.; Mencarelli, N.; D’Alessandro, F.; Asdrubali, F.; Mencarelli, N. Experimental evaluation and modelling of the sound absorption properties of plants for indoor acoustic applications. *Build Environ.* **2015**, *94*, 913–923. [\[CrossRef\]](#)
37. Demirbaş, G.U.; Demirbaş, Ö.O. The interface between landscape architecture and interior architecture in the context of biophilic design: Comparison of the educational programs. *Turk. J. Landsc. Res.* **2019**, *2*, 50–60.
38. Ulrich, R.S. View through a window may influence recovery from surgery. *Science* **1984**, *224*, 420–421. [\[CrossRef\]](#)
39. Kaplan, R.; Kaplan, S. *The Experience of Nature: A Psychological Perspective*, 1st ed.; Cambridge University Press: New York, NY, USA, 1989; pp. 1–340.
40. Maas, J.; Verheij, R.A.; de Vries, S.; Spreeuwenberg, P.; Schellevis, F.G.; Groenewegen, P.P. Morbidity is related to a green living environment. *J. Epidemiol. Community Health* **2009**, *63*, 967–973. [\[CrossRef\]](#)
41. UBE. What is Biophilic Architecture? 15 Real-World Examples in the Built Environment. Available online: <https://www.ube.ac.uk/whats-happening/articles/biophilia-examples-built-environment/> (accessed on 9 June 2025).
42. Green School. Available online: <https://www.greenschool.org/> (accessed on 12 June 2025).
43. PH Alpha Design. Hongkong Land’s Yorkville—The Ring. Available online: <https://architizer.com/projects/hongkong-lands-yorkville-the-ring/> (accessed on 11 June 2025).
44. Six Senses. Available online: <https://www.sixsenses.com/en/hotels-resorts/asia-the-pacific/vietnam/con-dao/> (accessed on 9 June 2025).
45. Mazumdar, S.; Mazumdar, S. Religion and place attachment: A study of sacred places. *J. Environ. Psychol.* **2004**, *24*, 385–397. [\[CrossRef\]](#)
46. Kepenek, B.S.; Kepenek, E.; Bakır, İ. Trade and the Mosque: An investigation of commercial activities and mosques in Antalya with spatial, legal and functional recommendations. *Religions* **2022**, *13*, 958. [\[CrossRef\]](#)
47. Bermudez, J. Deconstructing the Effects of Spiritual Architecture. Templeton Religion Trust. Available online: https://templetonreligiontrust.org/explore/spiritual-architecture-effects/?utm_source=chatgpt.com (accessed on 15 March 2025).
48. Smith, H. Gothic Cathedrals: Architecture & Divine Light. World History Encyclopedia. Available online: <https://www.worldhistory.org/article/1649/gothic-cathedrals-architecture-/-divine-light/> (accessed on 5 March 2025).
49. Dhannoon, A.A. Water elements in Islamic architectures. *Int. Transact. J. Eng. Manage. Appl. Sci. Technol.* **2021**, *12*, 1–13.
50. Kaplan, S. The restorative benefits of nature: Toward an integrative framework. *J. Environ. Psychol.* **1995**, *15*, 169–182. [\[CrossRef\]](#)
51. Lindal, P.J.; Hartig, T. Effects of urban street vegetation on judgments of restoration likelihood. *Urban For. Urban Green.* **2015**, *14*, 200–209. [\[CrossRef\]](#)
52. Hartig, T.; Korpela, K.; Evans, G.W.; Gärling, T. A measure of restorative quality in environments. *Scand. Hous. Plan. Res.* **1997**, *14*, 175–194. [\[CrossRef\]](#)
53. Özçifçi, İ.; Kaymaz, I.; Tazebay, İ.; Elmalı, F. Measurement of environmental restorativeness quality: Adaptation of “Perceived Restorativeness Scale” into Turkish. *Eur. J. Sci. Technol.* **2021**, *23*, 288–295.
54. Rai, S.; Asim, F.; Shree, V. The significance of biophilic architecture in perceived restorativeness: Cases of colonial churches of Himachal Pradesh. *Preprints* **2019**, 2019040134. [\[CrossRef\]](#)
55. Pretorius, J. Restorative Healing Environments: How Can Mental, Physical and Spiritual Wellbeing be Improved through a Biophilic Design Approach? Master Thesis, University of Cape Town, Cape Town, South Africa, 2021.
56. Guidelines for Mosque Planning and Design. Available online: <https://yonetimhizmetleri.diyaret.gov.tr/> (accessed on 17 June 2025).
57. Altomonte, S.; Allen, J.; Bluysen, P.M.; Brager, G.; Heschong, L.; Loder, A.; Schiavon, S.; Veitch, J.A.; Wang, L.; Wargocki, P. Ten questions concerning well-being in the built environment. *Build. Environ.* **2020**, *180*, 106949. [\[CrossRef\]](#)
58. Mohammed, I.; Onur, Z.; Çağnan, Ç. An Exploration of biophilic design features within preschool interiors. *Sustainability* **2023**, *15*, 11913. [\[CrossRef\]](#)
59. Shbaita, A.S.; Denerel, S.B.; Asilsoy, B. An evidence-based assessment of biophilic interior design in a traditional context: The case of the Kingdom of Saudi Arabia. *Sustainability* **2024**, *16*, 7979. [\[CrossRef\]](#)
60. Zhang, P.; Yu, Z.; Hou, G.; Shu, P.; Bo, Y.; Shi, Y.; Nie, R. Enhancing cognitive performance and physiological benefit in workspaces through patterns of biophilic design: A restorative approach. *Buildings* **2024**, *14*, 3293. [\[CrossRef\]](#)

61. Yazıcıoğlu, Y.; Erdoğan, S. *Bilimsel Araştırma Yöntemleri*, 1st ed.; Detay Yayıncılık: Ankara, Türkiye, 2014; pp. 1–448.
62. Rosseel, Y. lavaan: An R package for structural equation modeling. *J. Stat. Softw.* **2012**, *48*, 1–36. [[CrossRef](#)]
63. Tabachnick, B.G.; Fidell, L.S. *Using Multivariate Statistics*, 6th ed.; Pearson: Boston, MA, USA, 2013.
64. Şencan, H. *Sosyal ve Davranışsal Ölçümlerde Güvenilirlik ve Geçerlilik*, 1st ed.; Seçkin Yayıncılık: Ankara, Türkiye, 2005.
65. Tavşancıl, E. *Tutumların Ölçülmesi ve Spss ile Veri Analizi*, 6th ed.; Nobel Akademik Yayıncılık: Ankara, Türkiye, 2019.
66. Akyıldız, S. A conceptual analysis of curriculum literacy concept: A study of scale development. *Electron. J. Soc. Sci.* **2020**, *19*, 315–332.
67. Çokluk, Ö.; Şekercioğlu, G.; Büyüköztürk, Ş. *Sosyal Bilimler İçin Çok Değişkenli İstatistik: SPSS ve LISREL Uygulamaları*, 3rd ed.; Pegem Akademi: Ankara, Türkiye, 2014.
68. Direkci, B.; Şimşek, B.; Ayvalı, M. Development of technological pedagogical content knowledge scale for Turkish teachers. *J. Mehmet Akif Ersoy Univ. Fac. Educ.* **2020**, *56*, 272–291.
69. Gülen Canlı, M.; Tepeli, Y. Validity and reliability study of teacher susceptibility scale regarding use of Turkish: A pilot application. *J. Mother Tongue Educ.* **2022**, *10*, 277–290.
70. Kline, R.B. *Principles and Practice of Structural Equation Modeling*, 4th ed.; The Guilford Press: New York, NY, USA, 2016.
71. Jöreskog, K.G.; Sörbom, D. *LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language*; Scientific Software International: Lincolnwood, IL, USA, 1993.
72. Hu, L.; Bentler, P.M. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct. Equ. Modeling.* **1999**, *6*, 1–55. [[CrossRef](#)]
73. Brown, T.A. *Confirmatory Factor Analysis for Applied Research*, 2nd ed.; The Guilford Press: New York, NY, USA, 2015.
74. Nunnally, J.C.; Bernstein, I.H. *Psychometric Theory*, 3rd ed.; McGraw-Hill: New York, NY, USA, 1994.
75. Gong, Y.; Zoltán, E.S.; János, G. Healthy dwelling: The perspective of biophilic design in the design of the living space. *Buildings* **2023**, *13*, 2020. [[CrossRef](#)]
76. Eryücel, M.E.; Ceyhun, S.; Eryücel, S.; Şahan, H.; Turna, B.; Yıldırım, S.; Erdoğan, İ.H. Psychological needs in sports, spirituality index of well-being, and motivation in sports. *Religions* **2024**, *15*, 989. [[CrossRef](#)]
77. Thampanichwat, C.; Wongvorachan, T.; Bunyarittikit, S.; Chunhajinda, P.; Phaibulputhipong, P.; Wongmahasiri, R. The architectural design strategies that promote attention to foster mindfulness: A systematic review, content analysis and meta-analysis. *Buildings* **2024**, *14*, 2508. [[CrossRef](#)]
78. Yin, J.; Zhu, H.; Yuan, J. Health impacts of biophilic design from a multisensory interaction perspective: Empirical evidence, research designs, and future directions. *Land* **2024**, *13*, 1448. [[CrossRef](#)]
79. Bratman, G.N.; Hamilton, J.P.; Hahn, K.S.; Daily, G.C.; Gross, J.J. Nature experience reduces rumination and subgenual prefrontal cortex activation. *Proc. Natl. Acad. Sci. USA* **2015**, *112*, 8567–8572. [[CrossRef](#)] [[PubMed](#)]
80. Zijlema, W.L.; Avila-Palencia, I.; Triguero-Mas, M.; Gidlow, C.; Maas, J.; Kruize, H.; Andrusaityte, S.; Grazuleviciene, R.; Nieuwenhuijsen, M.J. Active commuting through natural environments is associated with better mental health: Results from the PHENOTYPE project. *Environ. Int.* **2018**, *121*, 721–727. [[CrossRef](#)] [[PubMed](#)]
81. Berto, R. The role of nature in coping with psycho-physiological stress: A literature review on restorativeness. *Behav. Sci.* **2014**, *4*, 394–409. [[CrossRef](#)]
82. McGee, B.; Park, N.K. Color, light, and materiality: Biophilic interior design presence in research and practice. *Interiority* **2022**, *5*, 27–52. [[CrossRef](#)]
83. Bölek, B.; Tural, O.; Özbaşaran, H. A systematic review on artificial intelligence applications in architecture. *J. Des. Resil. Archit. Plan.* **2023**, *4*, 91–104. [[CrossRef](#)]
84. Karadag, I.; Yıldız, A. Artificial Intelligence in Architecture: Innovations, Challenges, and Ethical Considerations. In *Making Art with Generative AI Tools*, 1st ed.; Hai-Jew, S., Ed.; IGI Global Scientific Publishing: Hershey, PA, USA, 2024; pp. 215–225.
85. Li, Y.; Chen, H.; Yu, P.; Yang, L. A review of artificial intelligence in enhancing architectural design efficiency. *Appl. Sci.* **2025**, *15*, 1476. [[CrossRef](#)]
86. Obaid, M.; Omar, O. Artificial intelligence-enhanced innovation: Blending contemporary aesthetics with Islamic heritage. *Smart Des. Policies* **2025**, *2*, 31–60. [[CrossRef](#)]
87. Sukkar, A.W.; Fareed, M.W.; Yahia, M.W.; Mushtaha, E.; De Giosa, S.L. Artificial intelligence Islamic architecture (AIIA): What is Islamic architecture in the age of artificial intelligence? *Buildings* **2024**, *14*, 781. [[CrossRef](#)]
88. Sukkar, A.W.; Fareed, M.W.; Yahia, M.W.; Abdalla, S.B.; Ibrahim, I.; Senjab, K.A.K. Analytical evaluation of midjourney architectural virtual lab: Defining major current limits in AI-generated representations of Islamic architectural heritage. *Buildings* **2024**, *14*, 786. [[CrossRef](#)]
89. He, M.; Wen, Y.; Qiu, Q.; Sheng, G.; Wei, Y.; Wang, Z.; Hu, Y. The effects and gender-related differences of guided forest therapy program on physiological and psychological health of graduating college students. *Int. J. Geoherit. Parks* **2023**, *11*, 483–496. [[CrossRef](#)]

90. Yang, Y.; Xu, M.; Lin, C.; Sun, Q.; Li, J.; Peng, L.; Chang, W. Gender differences in stress reduction: How the five senses forest therapy enhances well-being in university students. *Forests* **2024**, *15*, 2208. [CrossRef]
91. Baynal, F.; Yaman, E. Reasons for women's inclination, joining and adhering to religious groups. *J. Values Educ.* **2015**, *13*, 141–179.
92. Murphy, C. Women Generally Are More Religious than Men, but Not Everywhere. Pew Research Center. Available online: <https://www.pewresearch.org/short-reads/2016/03/22/women-generally-are-more-religious-than-men-but-not-everywhere/> (accessed on 5 April 2025).
93. Ceviz, F.H. Religiosity, Mystical Experience and Self-esteem in Middle and Old Age. Master's Thesis, Marmara University, İstanbul, Türkiye, 2009.
94. Dağcı, A. Psycho-social integration and spiritual needs of nursing home elders. *İlahiyat Araştırmaları Derg.* **2019**, *12*, 23–43.
95. Abay, K.C. A research on 'religious development in old age' literature (1967–2021) in Turkish psychology of religion studies. *Türk. J. Psychol. Relig.* **2021**, *4*, 45–67.
96. Kırış, F. Psycho-Religious Perceptions About Homosexuality and Spirituality: A Sample of Male Homosexuals. Ph.D. Thesis, Ankara University, Ankara, Türkiye, 2013.
97. Gürsu, O.; Ay, Y. Religion, spiritual well-being and aging. *J. Int. Soc. Res.* **2018**, *11*, 1176–1190. [CrossRef]
98. Özbebek Tunç, A.; Akdemir Ömür, G.; Düren, A.Z. Environmental awareness. *Istanb. Univ. Fac. Political Sci. J.* **2013**, *47*, 227–246.
99. Piao, X.; Managi, S. The international role of education in sustainable lifestyles and economic development. *Sci. Rep.* **2023**, *13*, 8733. [CrossRef] [PubMed]
100. Alexander, C. *The Nature of Order: An Essay on the Art of Building and the Nature of the Universe, Book 4—The Luminous Ground*, 12th ed.; The Center for Environmental Structure: Berkeley, CA, USA, 2004; pp. 1–354.
101. Agboola, O.P.; Nia, H.A.; Findikgil, M.M.; Yildirim, S.G. Assessing the effectiveness of biophilic design approach in contribution to sustainable architectural goals. *New Des. Ideas* **2024**, *8*, 114–169. [CrossRef]
102. Özçakı, M. Interpreting the mosque architecture. *Ulakbilge* **2018**, *6*, 459–483. [CrossRef]
103. Alnajjar, A.; Erdil Dinçel, T. Changing forms and functions: The transformation of mosque architecture from the early Islamic period to the present. *J. Spat. Sci.* **2024**, *1*, 94–106.

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