



Analyzing the Impact of Deconstructivist and Biophilic Design on Spatial Risk Perception, Place Attachment, and Investment Behavior in Iranian Urban Cultural Spaces: A Human-Centered Approach Based on Environmental Psychology and Behavioral Economics

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Abstract

This applied, descriptive-analytical study examines how two contrasting architectural paradigms—deconstructivist and biophilic design—affect spatial risk perception, place attachment, and investment behavior in Iranian urban cultural spaces. Grounded in environmental psychology and behavioral economics, the research adopts a human-centered, interdisciplinary framework to explore the psychological and economic implications of architectural form.

Data were collected via a structured questionnaire from 312 participants—including citizens, architects, and cultural investors—across five major Iranian cities. Statistical analyses were conducted using SPSS (v26) and AMOS (v24), incorporating Pearson correlation, multiple regression, and structural equation modeling (SEM). The results revealed that deconstructivist design significantly increased perceived spatial risk ($\beta = -0.28$, $p < 0.001$) and weakened place attachment, thereby reducing investment intent. In contrast, biophilic design enhanced emotional bonding and positively predicted investment behavior ($\beta = +0.31$, $p < 0.001$). The model demonstrated good fit indices (CFI = 0.94, RMSEA = 0.048, $\chi^2/df = 2.14$).

These findings underscore the performative role of architectural form in shaping psychological security and economic trust, offering actionable insights for culturally responsive design in urban development.

Keywords: Deconstructivist Architecture, Biophilic Design, Spatial Risk Perception, Place Attachment, Investment Behavior, Environmental Psychology

1- Introduction

In recent decades, architectural design in urban cultural spaces has undergone a paradigm shift—from aesthetic formalism toward a deeper engagement with the psychological, behavioral, and economic dimensions of user experience. Within this evolving landscape, two contrasting design approaches—deconstructivist and biophilic architecture—have emerged as influential frameworks that shape spatial perception in fundamentally different ways. Deconstructivist design, rooted in Derrida's philosophy of deconstruction, challenges conventional order through fragmented forms, asymmetry, and nonlinear structures, often provoking cognitive tension and perceptual dissonance (Derrida, 1967; Eisenman, 1994; Tschumi, 1996). In contrast, biophilic design integrates natural elements such as light, vegetation, and organic patterns to foster psychological well-being, reduce stress, and strengthen emotional bonds with place (Wilson, 1986; Ulrich, 1993; Beatley, 2011).

In the cultural and economic context of Iran, urban landmarks such as Tehran's Nature Bridge, the Book Garden, and cultural centers in Isfahan exemplify the coexistence of these two design paradigms. These spaces have elicited diverse reactions from citizens, architects, and investors—

yet their behavioral impacts remain underexplored in a systematic, interdisciplinary manner.

From the perspective of environmental psychology, spatial risk perception and place attachment are critical factors influencing protective, participatory, and economic behaviors in urban environments (Gifford, 2007; Devlin, 2012; Scannell & Gifford, 2010). Meanwhile, behavioral economics suggests that investment decisions in architectural spaces are shaped by cognitive biases, symbolic framing, and emotional evaluations (Kahneman & Tversky, 1979; Thaler & Sunstein, 2008; Barberis & Thaler, 2003).

Addressing this research gap, the present study adopts a human-centered, interdisciplinary approach to examine how deconstructivist and biophilic design influence spatial risk perception, place attachment, and investment behavior in Iranian urban cultural spaces. The primary aim is to propose a conceptual framework that elucidates the interplay between architectural form, psychological experience, and economic decision-making within a culturally grounded urban context.

2- Statement of the problem

In recent decades, the design of urban cultural architecture has evolved beyond aesthetic formalism, embracing the psychological, behavioral, and economic dimensions of human experience. This shift reflects a deeper epistemological turn in architectural theory—one that recognizes space not merely as a visual construct, but as a medium of perception, emotion, and decision-making.

Within this paradigm, two divergent approaches—deconstructivist architecture, rooted in Derridean philosophy, and biophilic design, grounded in Wilson's theory of biophilia—offer contrasting spatial experiences. Deconstructivist design disrupts conventional order through fragmented geometries and non-linear forms, provoking cognitive dissonance and challenging spatial legibility (Derrida, 1967; Eisenman, 1994; Tschumi, 1996). In contrast, biophilic design integrates natural elements, organic patterns, and sensory cues to foster psychological comfort, reduce stress, and strengthen emotional bonds with place (Wilson, 1986; Ulrich, 1993; Beatley, 2011).

In the Iranian urban context, cultural landmarks such as the Nature Bridge in Tehran and the Book Garden exemplify the coexistence of these paradigms, eliciting varied responses from users, designers, and investors. Yet, the behavioral implications of these design strategies—particularly in relation to spatial risk perception, place attachment, and investment behavior—remain underexplored in a culturally grounded, interdisciplinary framework.

Drawing on environmental psychology and behavioral economics, this study investigates how architectural form mediates human experience and economic decision-making. By examining the psychological and symbolic effects of deconstructivist and biophilic design in Iranian cultural spaces, the research aims to construct a conceptual model that links spatial aesthetics to cognitive bias, emotional engagement, and financial intent.

3- Significance and Rationale of the Study

Urban cultural spaces are not merely physical environments—they are psychological landscapes where architecture becomes a medium of meaning, emotion, and decision-making. In contexts where public investment and user engagement are shaped by spatial perception and emotional resonance, understanding how architectural form influences behavior is no longer optional—it is essential.

Despite the growing relevance of this issue, few studies have systematically examined the behavioral effects of deconstructivist and biophilic design within Iranian cultural settings. This research addresses that gap by exploring how form-driven aesthetics interact with cognitive biases, emotional attachment, and economic intent. The findings are expected to inform urban design strategies, enhance the psychological quality of public spaces, and support more confident, culturally sensitive investment in architectural projects.

4- Research Sample

The target population of this study comprised three distinct groups: (1) citizens visiting urban cultural spaces, (2) architects and urban designers involved in cultural

projects, and (3) investors and project managers overseeing cultural developments.

A stratified random sampling method was employed to ensure diversity across geographic regions and professional backgrounds. The sample size was calculated using Cochran's formula with a 95% confidence level. After excluding incomplete responses, a total of 312 valid questionnaires were collected from five major Iranian cities: Tehran, Isfahan, Shiraz, Tabriz, and Yazd.

5- Research Methodology

To explore how architectural form influences psychological perception and economic behavior in cultural spaces, this study adopts a mixed-method quantitative approach grounded in environmental psychology and behavioral economics. The research is applied in purpose and descriptive-analytical in nature.

Data were collected through a structured questionnaire designed to measure spatial risk perception, place attachment, and investment behavior. The analytical process involved multiple statistical techniques, including descriptive statistics, Pearson correlation, multiple regression analysis, and structural equation modeling (SEM). All analyses were performed using SPSS (version 26) and AMOS (version 24), ensuring methodological rigor and model validation.

6- Data Analysis Methods

To examine the relationships between architectural design styles and behavioral responses in Iranian cultural spaces, a multi-stage statistical analysis was conducted using SPSS (version 26) and AMOS (version 24). The process included both descriptive and inferential techniques, structured as follows:

- Descriptive statistics were used to summarize demographic and behavioral data, including means, standard deviations, and frequency distributions.
- Pearson correlation analysis was applied to explore the initial associations among spatial risk perception, place attachment, and investment behavior.
- Multiple regression analysis was conducted to assess the predictive strength of independent variables on investment behavior.
- Structural Equation Modeling (SEM) was employed to test the conceptual framework and evaluate the causal pathways between variables.

Model fit was assessed using standard goodness-of-fit indices, including the Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and the chi-square to degrees of freedom ratio (χ^2/df). The results indicate a satisfactory fit between the proposed model and the observed data, as shown in Table 1.

Table 1. Model Fit Indices for the Structural Equation Model

Fit Index	Recommended Threshold	Obtained Value
χ^2/df	< 3.00	2.14
RMSEA	< 0.06	0.048
CFI	> 0.90	0.94
TLI	> 0.90	0.92

Source: Authors' analysis using AMOS 24

7- Findings and Results

To evaluate the behavioral impact of architectural design styles in Iranian cultural spaces, data from 312 valid questionnaires were analyzed. The sample included visitors, architects, and cultural investors from five major cities: Tehran, Isfahan, Shiraz, Tabriz, and Yazd.

7-1- Descriptive Statistics of Demographic Variables

The demographic distribution of participants is presented in Table 2, covering gender, age, education level, and city of residence.

Table 2. Demographic Characteristics of Respondents

Category	Subgroup	Frequency	Percentage
Gender	Male	178	57.1%
	Female	134	42.9%
Age	18–25 years	66	21.2%
	26–35 years	124	39.7%
	36–50 years	89	28.5%
	Over 50 years	33	10.6%
	Diploma	21	6.7%
Education Level	Bachelor's	142	45.5%
	Master's	102	32.7%
	PhD	47	15.1%
	Tehran	98	31.4%
City of Residence	Isfahan	64	20.5%
	Shiraz	53	17.0%
	Tabriz	47	15.1%
	Yazd	50	16.0%

7-2- Descriptive Statistics of Main Variables

Mean scores and standard deviations for the three key behavioral variables are summarized in Table 3.

Table 3. Descriptive Statistics of Core Variables

Variable	Number of Items	Mean	SD	Min	Max
Spatial Risk Perception	8	3.42	0.76	1.75	4.85
Place Attachment	10	3.87	0.69	2.10	4.95
Investment Behavior	6	3.65	0.81	1.90	4.90

7-3- Pearson Correlation Analysis

Pearson's correlation test was used to examine initial relationships among the variables. As shown in Table 4, spatial risk perception was negatively correlated with both place attachment and investment behavior, while place attachment showed a strong positive correlation with investment behavior.

Table 4. Pearson Correlation Matrix

Variable A	Variable B	Correlation Coefficient (r)
Spatial Risk ↔ Place Attachment		-0.41**
Spatial Risk ↔ Investment Behavior		-0.36**
Place Attachment ↔ Investment Behavior		+0.52**

Note: All correlations are significant at $p < 0.01$.

7-4- Multiple Regression Analysis

To assess the predictive power of the independent variables on investment behavior, a multiple regression analysis was conducted. The results in Table 5 indicate that place attachment had the strongest positive effect, while spatial risk perception had a significant negative impact.

Table 5. Multiple Regression Results for Investment Behavior

Predictor Variable	Standardized β	t-value	Significance (p)
Spatial Risk Perception	-0.28	-5.12	< 0.001
Place Attachment	+0.43	+7.84	< 0.001
Architectural Design (Biophilic)	+0.31	+6.02	< 0.001

The model yielded an R^2 value of 0.46, indicating moderate predictive strength.

8- Discussion and Conclusion

Architecture is not merely a spatial practice—it is a behavioral proposition. The way a space is shaped, framed, and perceived directly influences how individuals feel, remember, and act within it. This study sought to examine how two divergent architectural paradigms—deconstructivist and biophilic—affect users' psychological perception and economic behavior in Iranian cultural spaces.

The findings reveal that architectural form is not neutral; it encodes affective cues that shape trust, attachment, and investment decisions.

8-1- Interpretation of Key Findings

The results indicate that deconstructivist architecture, with its fragmented geometries, visual tension, and deliberate ambiguity, tends to elevate spatial risk perception and weaken place attachment. This aligns with theories in environmental psychology suggesting that spatial incoherence and unpredictability can trigger cognitive overload and emotional distancing—particularly in public spaces where users seek orientation, meaning, and symbolic grounding.

In contrast, biophilic design, characterized by natural materials, organic patterns, and sensory comfort, was associated with reduced perceived risk, stronger emotional bonding, and increased willingness to invest. These findings support the hypothesis that environments which evoke familiarity, coherence, and multisensory engagement foster psychological security and economic confidence. The observed correlation between place attachment and investment behavior ($r = +0.52$) reinforces the behavioral economics premise that emotional valuation precedes financial commitment.

Moreover, the negative predictive effect of spatial risk perception ($\beta = -0.28$) suggests that perceived instability or ambiguity in architectural form may act as a cognitive deterrent to long-term engagement. In culturally symbolic settings, this effect is amplified by collective memory and socio-spatial expectations.

8-2- Theoretical and Practical Implications

Theoretically, this study contributes to a growing body of interdisciplinary research linking form-driven design with behavioral response. It bridges architectural semiotics, environmental psychology, and behavioral economics, offering a conceptual model in which spatial aesthetics are not merely expressive but performative—shaping how users interpret, trust, and invest in space.

Practically, the findings advocate for the strategic integration of biophilic principles—such as daylight access, vegetation, and tactile materials—into the design of cultural institutions, particularly in contexts where emotional resonance and public trust are critical. Conversely, deconstructivist elements, while architecturally provocative, may require contextual calibration, narrative framing, or symbolic anchoring to mitigate psychological resistance and economic hesitation.

8-3- Cultural Sensitivity and Spatial Identity

In the Iranian context, where cultural spaces often serve as vessels of collective identity and memory, architectural design must engage with local expectations of legibility, symbolism, and emotional coherence. The study underscores the need for culturally responsive design strategies that balance formal innovation with psychological accessibility. This is not a call for stylistic conservatism, but for empathetic design—where form is attuned to the behavioral and symbolic rhythms of its users.

8-5- Limitations and Future Research

This study is limited by its cross-sectional design and reliance on self-reported data, which may be influenced by perceptual bias or social desirability. Future research could employ longitudinal methods, immersive simulations, or neurophysiological metrics to deepen understanding of how architectural form modulates perception and behavior over time. Comparative studies across different cultural or climatic contexts may also reveal how universal—or contingent—these behavioral responses truly are.

9- Recommendations Based on Findings

Based on the statistical results and behavioral patterns identified in this study, the following recommendations are proposed for architects, urban planners, and cultural policymakers seeking to enhance user experience and investment potential in Iranian cultural spaces:

9-1- Integrate Biophilic Design Elements to Foster Emotional Engagement

Given the positive predictive effect of biophilic architecture on place attachment and investment behavior ($\beta = +0.31$), designers should prioritize natural lighting, vegetation, water features, and tactile materials in cultural buildings. These elements reduce spatial anxiety and promote emotional bonding, as supported by environmental psychology and the observed correlation between place attachment and investment behavior ($r = +0.52$).

9-2- Calibrate Deconstructivist Features with Cultural Anchors

The negative impact of deconstructivist design on spatial risk perception ($\beta = -0.28$) suggests that fragmented geometries and non-linear forms may hinder emotional trust in public spaces. If such styles are employed, they should be accompanied by symbolic references, narrative signage, or guided circulation to mitigate disorientation and reinforce cultural meaning.

9-3- Embed Place Attachment Strategies in Design Briefs

Design briefs should explicitly address emotional and cognitive bonding mechanisms—such as spatial legibility, memory cues, and sensory familiarity—to strengthen users' psychological connection to place. This is especially critical in culturally symbolic environments where emotional resonance influences behavioral outcomes.

9-4- Employ Behavioral Modeling in Early Design Phases

Interdisciplinary collaboration with environmental psychologists and behavioral economists can help anticipate user responses to spatial configurations. Predictive modeling based on variables such as perceived risk and attachment can inform design decisions that align with long-term engagement and investment behavior.

9-5- Implement Post-Occupancy Evaluation (POE) Protocols

Institutions should adopt structured POE frameworks to assess how users interact with cultural spaces over time. Feedback on spatial perception, emotional comfort, and behavioral outcomes can guide future design iterations and policy adjustments. This approach ensures that architectural interventions remain responsive to evolving user needs.

9-6- Consider Implementation Constraints and Cultural Sensitivities

While the recommendations are grounded in empirical findings, their execution may face challenges such as budget limitations, regulatory constraints, or cultural resistance. Designers and decision-makers should adapt strategies to local contexts, ensuring that innovation is balanced with emotional accessibility and social trust.

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