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Hotel Guest Environmental Perception and Overall Evaluation: Evidence from Online Reviews and Questionnaire Data

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Abstract

This study examines how hotel guests perceive and evaluate indoor environments in real consumption settings. A mixed-method design connected Ctrip review mining with structured questionnaire analysis. First, 1298 Ctrip hotel reviews were collected with Octopus Collector within a fixed one-month window from 24 April 2026 at 13:21 to 24 May 2026 at 13:21; after cleaning, 1267 valid reviews were analyzed in KH Coder. Second, a Wenjuanxing questionnaire launched on 24 April 2026 yielded 204 responses, and 203 valid cases were retained for composite-score analysis. Reliability and validity tests indicated acceptable measurement quality in complete cases: Cronbach's alpha = 0.861 and KMO = 0.802. Exploratory factor analysis extracted six dimensions: non-lighting visual elements, light environment, thermal environment, air quality, acoustic environment and overall environmental evaluation. ANOVA/Welch tests showed no robust style-group differences after Bonferroni correction. Hierarchical regression showed that thermal and acoustic environments significantly predicted overall environmental evaluation. The findings suggest that hotel evaluation is shaped less by style labels alone than by concrete multisensory comfort channels.

Keywords

Hotel Indoor Environment, Guest Perception, Consumer Evaluation, Online Reviews, Questionnaire Survey, Servicescape

1. Introduction

Hotel consumption has gradually shifted from a narrow lodging function to an integrated experience economy. Nanu et al. (2024) frame the hospitality physical

environment as a long-standing research stream in which spatial cues, atmosphere and customer responses are connected, while Spence (2022) further argues that hotel experience is multisensory rather than purely visual. In the same logic, Chang and Lin (2022) demonstrate that hotel atmosphere can shape perceived value and satisfaction, so this study treats color, materials, lighting, sound and comfort as experience cues rather than decorative details alone.

Liang et al. (2024) add that substantive servicescape cues can inspire customer satisfaction, which explains why this paper does not separate visual style from the broader stay environment. Nanu et al. (2025) show that room aesthetics influence booking preference, but their findings also imply that aesthetic preference needs to be interpreted together with guest purpose and experience context.

Existing hotel research has examined customer satisfaction, service quality, green hotels and indoor environmental quality (IEQ). Abdulaali et al. (2024) review how IEQ relates to comfort and satisfaction in green hotels, and Abdulaali et al. (2025) provide empirical evidence from former GBI-certified hotels. Kim et al. (2023) also show that hotel IEQ can affect guest behavior. However, these IEQ-oriented studies do not fully explain how interior design style, environmental perception and overall evaluation are combined in real post-stay judgments.

This gap is important because actual post-stay evaluation rarely isolates a single decorative feature. Hu and Dang-Van (2023), for example, examine emotional and behavioral responses to the IEQ of green luxury hotels, while Zhang et al. (2023) link visitors' satisfaction with IEQ in hotels and serviced apartments. These studies support the present paper's assumption that guests combine visual experience, sound conditions, thermal comfort, air quality, hygiene, facilities and service encounters into an overall judgment.

Controlled experiments are valuable for isolating design variables, as Xu et al. (2022a) show through a VR experiment on hotel interior color and emotional experience. Xu et al. (2022b) further compare how different decoration styles influence subjective evaluation of hotel indoor environments. The present study extends this logic to real consumption contexts, where price, hotel grade, facility maintenance, service process, stay purpose and individual expectations may dilute or moderate the effect of style labels.

Because real-stay data are more context-rich than controlled design experiments, this paper combines online review texts with questionnaire data. Ma et al. (2023) illustrate that large-scale Booking.com reviews can reveal IEQ complaints, and Zhang et al. (2025) use guest reviews to examine how IEQ affects tourist accommodation ratings. Following this evidence, online reviews are used here to identify naturally mentioned spatial and environmental factors, while survey data are used to test evaluation dimensions and their effects on overall evaluation.

The study focuses on four research questions. First, what indoor space, facility and environmental comfort issues do guests emphasize in Ctrip hotel reviews? Second, can hotel indoor environmental perception be summarized into interpretable dimensions? Third, do guests in different interior design style groups

show significant differences in these evaluation dimensions? Fourth, which environmental perception factors explain guests' overall environmental evaluation in real consumption settings?

2. Literature Review and Hypotheses

2.1. Hotel Indoor Environment, Servicescape and Guest Evaluation

From a servicescape perspective, the hotel indoor environment is not merely a physical background. Chang and Lin (2024) show that spatial layout can shape value perception and customer loyalty in theme hotels, and Liang et al. (2024) describe the substantive servicescape as a source of customer inspiration. Based on this view, the present study defines the hotel indoor environment as a set of cues that can influence emotion, perceived value, satisfaction and behavioral intention.

Guest assessment therefore begins with direct perception. Geng et al. (2023) demonstrate that illuminance, color and decoration style affect visual comfort in hotel lobbies; Gavilan and Al-shboul (2025) use guest experience data to identify innovation opportunities in hotel interior design; and Kim and Kang (2022) show that artwork and environmental awareness can be incorporated into urban hotel interiors. These studies justify examining whether colors are coordinated, materials feel refined, lighting is comfortable, the room is quiet, temperature and ventilation are appropriate, and layout supports use.

IEQ is a central basis for comfort and satisfaction. Shen et al. (2021) use text mining to assess IEQ in Chinese budget hotels, while Ma et al. (2023) identify IEQ complaints and dissatisfaction from Booking.com reviews. Nored et al. (2024) show that hotel-room VOC contamination can create air-quality and health-risk concerns. These studies explain why this paper separates light, thermal conditions, air quality, acoustics and visual environment into distinct perception channels.

The emphasis on bodily comfort is also supported by Zhang et al. (2025), who connect IEQ with tourist accommodation ratings, and by Kim et al. (2023), who relate IEQ to hotel guest behaviors. Therefore, poor lighting, inadequate air conditioning or ventilation, weak sound insulation, odor and stale air are treated not as minor operational complaints but as environmental signals that can influence perceived quality, hygiene inference and management evaluation.

Online reviews provide an important basis for identifying experience elements without imposing researcher assumptions too early. Bagherzadeh et al. (2021) demonstrate how a hotel dictionary can be created for sentiment analysis using TripAdvisor reviews; Nguyen and Ho (2021) apply topic modeling to hotel service experience; and Wen et al. (2023) compare BERT and ERNIE for sentiment analysis of Chinese hotel reviews. These studies support the use of review texts as analyzable evidence of consumer experience.

The specific review-mining logic also follows broader hospitality text-analysis work. Bi et al. (2024) review text analysis methods in tourism and hospitality, Qiao

et al. (2022) show that review valence and content jointly affect review value, and Wu et al. (2024) demonstrate that topic and sentiment information can predict hotel demand. Accordingly, this study uses review data to support questionnaire construction and to interpret hotel guests' natural expressions of indoor environmental experience.

2.2. Interior Design Style as a Spatial Cue

Interior design style refers to the integrated impression of perceptible color, materials, furniture, furnishings, spatial order and atmosphere. Liu et al. (2025) describe the new Chinese style as a combination of traditional cultural elements and contemporary interior design development, while Tan and Yan (2025) discuss hotel B&B interiors through spatial narrative. Lu (2026) links indoor environmental art decoration with visual comfort evaluation. These studies support the definition of style as a perceptual system constituted by color, material, form, lighting, display, scale and spatial order.

Non-lighting visual elements in this study therefore refer to visual design factors other than daylight and artificial lighting, including color, materials, furniture, soft furnishings and spatial layout. Che Abdullah et al. (2024) further connect sustainable interior design criteria with hotel operational effectiveness, which suggests that visual and spatial components should be considered together with environmental comfort rather than as isolated aesthetic surfaces.

Interior design style may influence first impressions and aesthetic preference, but its effect in real consumption settings may be diluted or moderated by comfort-related experiences. Nanu et al. (2025) show that room aesthetics can affect booking preference, yet Zhang et al. (2025) and Abdulaali et al. (2024) indicate that IEQ and comfort also matter for accommodation evaluation. Therefore, a distinctive room style may still receive a low evaluation if it is noisy, poorly ventilated or thermally uncomfortable.

This distinction is also why the hypotheses test style-group differences rather than assuming that style alone determines evaluation. Xu et al. (2022b) provide direct evidence that decoration styles can influence subjective hotel-environment evaluation, whereas Chang and Lin (2024) and Liang et al. (2024) suggest that spatial layout and servicescape cues work through perceived value, loyalty or inspiration. The present paper therefore treats style as a cue embedded in a complex consumption situation rather than as a stand-alone determinant.

2.3. Hypotheses

Because different interior design styles vary in color, material, spatial layout, furniture, decorative details and lighting atmosphere, they may be related to guests' indoor environmental perception. This expectation follows Xu et al. (2022b), who compare decoration styles in hotel IEQ evaluation, and Geng et al. (2023), who identify visual comfort effects of light, wall color and decoration style. On this basis, the following hypotheses were tested:

H1: Interior design style groups differ significantly in their evaluation of non-lighting visual elements.

H2: Interior design style groups differ significantly in their evaluation of the light environment.

H3: Interior design style groups differ significantly in their evaluation of the thermal environment.

H4: Interior design style groups differ significantly in their evaluation of air quality.

H5: Interior design style groups differ significantly in their evaluation of the acoustic environment.

H6: Interior design style groups differ significantly in their overall environmental evaluation.

3. Method

3.1. Research Design

A mixed-method design was used: online review text analysis, questionnaire measurement and statistical testing. The design follows the logic of Bagherzadeh et al. (2021) and Nguyen and Ho (2021), who use review texts to extract hotel-experience information, and it is consistent with Bi et al. (2024), who summarize text analysis as an important approach in tourism and hospitality research. The logic was to identify guests' real concerns in online reviews, combine those findings with prior literature to construct a questionnaire, and then use questionnaire data to test style-group differences and predictors of overall environmental evaluation.

In practical terms, the review-mining stage followed prior hotel text-analysis studies by using naturally occurring online comments to identify guest-experience themes. Wen et al. (2023) and Wu et al. (2024) show that sentiment and topic information in hotel reviews can reveal meaningful consumer responses, so the present questionnaire stage translated those themes into measurable IEQ and servicescape constructs rather than treating review words as isolated frequencies.

3.2. Online Review Data and Text Processing

The online review data were collected from hotel reviews on the Ctrip App by using Octopus Collector. Similar to Ma et al. (2023) and Zhang et al. (2025), who use platform-based accommodation reviews to study IEQ and guest ratings, the present corpus was designed to identify recurring hotel-environment themes rather than to estimate platform-wide prevalence. The review-extraction window was fixed before collection as one month, from 24 April 2026 at 13:21 to 24 May 2026 at 13:21. This time stamp records the actual start and end of web data extraction, and the corpus is described as a time-bounded, platform-based purposive sample rather than a probability sample of all Ctrip hotels. The sampling frame was defined as Ctrip hotel pages that met four criteria: 1) the hotel page contained identifiable indoor-space photographs or descriptions that allowed the room/interior style to be recognized; 2) the page provided public post-stay user reviews

rather than promotional descriptions; 3) the hotel was located in Chinese Mainland urban tourism or business destinations and represented commonly encountered commercial hotel settings; and 4) the review text contained substantive comments on room, environment, facilities, service or stay experience. Search and filtering focused on hotels that could be grouped into recognizable interior-style categories and excluded homestays, purely scenic-area inns, apartments without hotel-like service, pages with too few substantive comments, duplicate texts, advertisements and comments unrelated to hotel stays. The retained texts were public post-stay comments visible on the selected Ctrip review pages during the one-month extraction window. A total of 1298 review texts were collected. After cleaning, 1267 valid reviews remained, producing a validity rate of 97.61%. The data were used only for academic analysis and did not include identifiable personal information.

Cleaning included format standardization, duplicate removal, exclusion of empty or non-substantive comments, deletion of garbled text, advertising content, emojis, irrelevant symbols and content unrelated to hotel stays. Following Bagherzadeh et al. (2021), a user dictionary was constructed around space and vision, lighting, thermal environment, air quality, acoustics, facilities, hygiene, service and amenities. The cleaned texts were imported into KH Coder for high-frequency word statistics and co-occurrence semantic network analysis. Consistent with Qiao et al. (2022), service, hygiene and value-related words were retained as contextual evidence of integrated hotel experience, but they were not modeled as dependent environmental-perception dimensions because the theoretical focus of the survey was indoor environmental quality and interior spatial experience. The online review data and text-processing procedures are summarized in **Table 1**.

3.3. Questionnaire Design and Data Collection

The questionnaire was developed from the text analysis results and IEQ-related literature through a review-mining-to-item procedure. First, high-frequency words and co-occurrence clusters were screened to identify recurrent experience themes, including room, environment, facilities, hygiene, service, breakfast, sound insulation, air conditioning, smell, light, decoration and value. Second, themes directly related to indoor environmental perception were mapped to five environmental channels. This mapping follows Shen et al. (2021), Ma et al. (2023) and Nored et al. (2024), who respectively highlight hotel IEQ complaints, online-review-based IEQ dissatisfaction and air-quality/VOC concerns. Third, prior servicescape, IEQ and multisensory hotel-experience literature was used to convert these themes into measurable Likert items and to add an overall environmental-evaluation dimension.

The item-mapping procedure was therefore not arbitrary. Review terms such as sound insulation, air conditioning, smell, light and decoration were connected to IEQ and servicescape constructs already discussed by Abdulaali et al. (2024), Kim et al. (2023), Spence (2022), Chang and Lin (2024) and Nanu et al. (2024).

Table 1. Online review data and text processing summary.

Item	Description
Data source	Ctrip hotel review pages
Extraction window	24 April 2026 13:21 to 24 May 2026 13:21
Sampling frame	Public post-stay Ctrip review pages for hotels with identifiable indoor-space/style information and substantive review texts
Hotel location scope	Chinese Mainland urban tourism or business destinations represented in the selected Ctrip hotel pages
Hotel type/grade scope	Commercial hotel settings with recognizable interior design styles; homestays, purely scenic-area inns, apartments without hotel-like service and pages with too few substantive comments were excluded
Search/filtering conditions	Public post-stay reviews; comments related to room, environment, facilities, service or stay experience; pages with sufficient indoor photographs or descriptions for style grouping
Initial review texts	1298
Valid review texts after cleaning	1267
Validity rate	97.61%
Collection tool	Octopus Collector
Analysis software	KH Coder
Main procedures	High-frequency word statistics and co-occurrence semantic network analysis

At the same time, themes such as hygiene, service and value were excluded from the final structural model because they represent service-operation or value-evaluation constructs rather than indoor environmental perception itself; they were retained only to interpret the broader consumption context.

Interior design style groups were defined at the first survey stage as respondents' recognition of the main style of the hotel they had recently stayed in. The questionnaire provided concrete examples to reduce ambiguity: modern minimalist style, Nordic style, Japanese wabi-sabi/modern Japanese style, New Chinese style, American/British pastoral style, light luxury style, industrial style and other. For statistical analysis, conceptually adjacent categories with small cell sizes were combined into four style groups: modern/minimalist style (n = 73), Nordic/Japanese style (n = 41), New Chinese/American pastoral style (n = 45), and light luxury/industrial/other style (n = 44). Case assignment was therefore based on the respondent's reported recent-stay hotel style, with adjacent small categories merged to preserve interpretable groups and adequate sample size for ANOVA/Welch comparison.

The questionnaire was distributed online through Wenjuanxing. The survey was launched on 24 April 2026, the same date as the start of the Ctrip review-extraction window, so that the review-mining and questionnaire stages referred to

the same research period. Respondents were consumers with actual hotel stay experiences in the previous 12 months and who could clearly recall the room style and environmental details of a recent stay. The survey was anonymous, and all data were used only for academic purposes. In total, 204 questionnaires were collected. One questionnaire with all scale items unanswered was removed, leaving 203 valid cases for data checking and main analysis.

A univariate missing-data check across 31 scale items showed that 30 core items had very low item-level missing rates (approximately 0.5%, equivalent to one missing response per affected item), while one reverse-coded item had a missing rate of 13.3% (27/203). This higher missing rate was most likely caused by the negative wording of the item, "The room design style was messy and the visual experience was poor," which differed from the positively worded items and may have increased respondent hesitation or skipping. Because the missing rate was below 15% and the item was theoretically useful for response-quality checking, the item was retained and reverse-coded before scale construction. To avoid confusion between missing-data treatment and the inferential models, the revised analysis distinguishes three data sets: complete cases (n = 176) for reliability and exploratory factor analysis, available composite-score cases (n = 203) for the main ANOVA/Welch and regression tables, and five multiply imputed data sets used only as sensitivity checks. Composite dimension scores were calculated when respondents had valid answers for the majority of items in the relevant dimension, so a missing response to the reverse-coded item did not automatically remove the respondent from the main composite-score analyses.

The analysis proceeded through reliability testing, KMO and Bartlett tests, principal component analysis with varimax rotation, descriptive statistics, one-way ANOVA/Welch tests with Bonferroni correction and hierarchical regression. When Levene's test indicated unequal variances, Welch's robust test was interpreted. Because six environmental dimensions were tested simultaneously, the Bonferroni-adjusted significance threshold was 0.05/6 = 0.0083. For regression, overall environmental evaluation was the dependent variable, and non-lighting visual elements, light environment, thermal environment, air quality and acoustic environment were predictors. Multiple imputation in SPSS 26 used five imputed data sets, a linear-regression imputation model and a fixed random seed of 999; however, the main inferential tables report the non-imputed composite-score results to keep the reported F values, degrees of freedom and VIF values directly reproducible. A sensitivity comparison between the complete-case results and imputed-data checks did not change the substantive conclusions: style-group differences remained nonsignificant, and thermal and acoustic environment remained the most stable positive predictors of overall environmental evaluation.

4. Results

4.1. Online Review Findings

The high-frequency word analysis showed that guests' core comments focused on

service process, room space, hygiene, facilities, amenities and value judgment. This pattern is consistent with Zhang et al. (2021), who derive customer preferences from aspect-level sentiment analysis of hotel reviews, and with Le et al. (2025), who mine large-scale online hotel reviews to understand satisfaction patterns. High-frequency words included service, hotel, room, breakfast, environment, hygiene, facilities, front desk and value for money. These results indicate that guests did not evaluate hotels only through interior design style; instead, they integrated spatial experience, cleanliness, facility conditions, service quality, supporting amenities and perceived value into their stay judgments.

The result also matches Ying (2024), who uses LDA topic modelling to analyze guests' aesthetic experience with lifestyle hotels, and Wu et al. (2024), who show that review topics and sentiment have predictive value. Thus, the Ctrip review findings are not merely descriptive word counts; they help explain why the later questionnaire had to include multisensory environmental channels rather than a single style-preference item.

The co-occurrence semantic network further showed that room, hotel, service, environment, hygiene and breakfast formed a prominent core network. In line with Nguyen and Ho (2021), who use topic modeling to identify hotel-service experience themes, this network indicates that guests tended to evaluate indoor environment, cleanliness, service experience and amenities as a whole rather than as separate attributes. These findings support the construction of a multidimensional questionnaire and confirm that hotel indoor environment evaluation should be treated as an integrated consumer experience rather than as a purely visual or stylistic judgment.

4.2. Reliability and Construct Validity

The complete-case reliability and construct-validity tests included 176 original cases. This number is consistent with the missing-data check because 27 respondents had at least one missing scale response, leaving 176 respondents with complete data across all 31 scale items. The overall scale contained 31 items and showed good internal consistency, with Cronbach's alpha = 0.861 and standardized alpha = 0.860. Each subscale also exceeded 0.80. The KMO value was 0.802, and Bartlett's test of sphericity was significant, indicating that the data were suitable for dimensional reduction.

Exploratory factor analysis extracted six common factors with eigenvalues greater than 1. The cumulative variance explained was 59.298%, which was acceptable for this exploratory study. The six factors were interpreted as non-lighting visual elements, acoustic environment, light environment, thermal environment, overall environmental evaluation and air quality. The structure matched the questionnaire design and was therefore used in subsequent analyses. The reliability and construct validity results are summarized in **Table 2**. Appendix A reports the 31 questionnaire items, their assigned dimensions and primary factor loadings so that readers can evaluate how the six dimensions were operationalized.

Table 2. Reliability and construct validity summary.

Dimension/Test	n/Items	Statistic	Result
Non-lighting visual elements	176/8	Cronbach's alpha = 0.847	Good
Light environment	176/5	Cronbach's alpha = 0.866	Good
Thermal environment	176/5	Cronbach's alpha = 0.851	Good
Air quality	176/4	Cronbach's alpha = 0.825	Good
Acoustic environment	176/5	Cronbach's alpha = 0.874	Good
Overall environmental evaluation	176/4	Cronbach's alpha = 0.840	Good
Full scale	176/31	Cronbach's alpha = 0.861	Good
KMO measure	-	0.802	Good sampling adequacy
Bartlett's test	-	$\chi^2 = 2152.029$, df = 465, $p < 0.001$	Significant

Note. Reliability and exploratory factor analysis were calculated using original complete cases (n = 176). Main ANOVA/Welch and regression analyses used composite-score cases (n = 203); multiple imputation was used only for sensitivity checking.

4.3. Sample Characteristics

The main analysis sample consisted of 203 respondents. Women accounted for 51.7% and men for 48.3%. Respondents aged 19 - 25 formed the largest age group (35.0%), followed by those aged 26 - 35 (25.6%) and 36 - 45 (22.2%). Educational backgrounds and occupations were diverse, although teachers and enterprise/company employees formed sizable groups. In terms of monthly disposable income, 43.3% reported 3000 yuan or below, and 35.0% reported 3001 - 6000 yuan. The demographic characteristics of the respondents are presented in Table 3.

Table 3. Demographic characteristics of respondents.

Variable	Category	Frequency	Valid %
Gender	Female	105	51.7
Gender	Male	98	48.3
Age	18 or below	6	3.0
Age	19 - 25	71	35.0
Age	26 - 35	52	25.6
Age	36 - 45	45	22.2
Age	46 - 55	19	9.4
Age	56 or above	10	4.9
Highest education	High school/technical secondary school or below	47	23.2
Highest education	Junior college	56	27.6

Continued

Highest education	Bachelor's degree	26	12.8
Highest education	Graduate degree	42	20.7
Highest education	Other	32	15.8
Occupation	Student	7	3.4
Occupation	Teacher	66	32.5
Occupation	Enterprise/company employee	49	24.1
Occupation	Freelancer/self-employed	42	20.7
Occupation	Government/public institution employee	10	4.9
Occupation	Retiree	10	4.9
Occupation	Other	19	9.4
Monthly disposable income	3000 yuan or below	88	43.3
Monthly disposable income	3001 - 6000 yuan	71	35.0
Monthly disposable income	6001 - 10,000 yuan	26	12.8
Monthly disposable income	10,001 - 20,000 yuan	10	4.9
Monthly disposable income	20,001 - 30,000 yuan	4	2.0
Monthly disposable income	Above 30,000 yuan	4	2.0

4.4. Style-Group Difference Tests

To test whether interior design style groups differed in perceived environmental evaluation, interior design style was used as the grouping variable, while the six dimension means served as dependent variables. The four style groups were modern/minimalist style (n = 73), Nordic/Japanese style (n = 41), New Chinese/American pastoral style (n = 45), and light luxury/industrial/other style (n = 44), totaling 203 valid composite-score cases. Levene tests were first used to assess homogeneity of variance. For non-lighting visual elements, light environment, thermal environment, air quality and acoustic environment, Levene p values were below 0.05, so Welch robust tests were interpreted. Overall environmental evaluation met the homogeneity assumption, so the ordinary ANOVA result was interpreted.

The tests showed no significant differences for non-lighting visual elements, light environment, thermal environment, air quality, acoustic environment or overall environmental evaluation. Although the acoustic environment result approached 0.05, it did not reach statistical significance and was clearly nonsignificant after Bonferroni correction. The ANOVA and Welch test results by interior design style group are presented in Table 4. Therefore, none of the six hypotheses was supported.

4.5. Regression Results

A hierarchical regression was used to determine whether the environmental perception dimensions explained overall environmental evaluation. Model 1 included only control variables: gender, stay purpose, room type and decoration style. Model 2

added five environmental perception dimensions: non-lighting visual elements, light environment, thermal environment, air quality and acoustic environment. The reported regression used the 203 composite-score cases, while complete-case and imputed-data sensitivity checks produced the same substantive pattern. Model assumptions were acceptable. All predictors had VIF values between 1.050 and 1.487, and the Durbin-Watson statistic was 2.063. The hierarchical regression results and model-fit statistics are presented in Table 5.

Table 4. ANOVA and welch tests by interior design style group.

Evaluation dimension	Levene p	Test	Statistic	Raw *p*	Adjusted *p*	Conclusion
Non-lighting visual elements	0.011	Welch	1.106	0.371	1.000	Not significant
Light environment	0.007	Welch	0.980	0.454	1.000	Not significant
Thermal environment	0.012	Welch	1.305	0.264	1.000	Not significant
Air quality	0.011	Welch	1.007	0.435	1.000	Not significant
Acoustic environment	0.001	Welch	2.057	0.062	0.372	Not significant
Overall environmental evaluation	0.072	ANOVA	0.896	0.511	1.000	Not significant

Note. Bonferroni correction was applied across six tests; adjusted threshold = 0.0083.

Table 5. Hierarchical regression results for overall environmental evaluation.

Variable	Model 1 beta	Model 1 *p*	Model 2 coefficient	Model 2 *p*	VIF
Constant	-	-	1.557	0.000	-
Gender dummy	−0.031	0.647	−0.024	0.712	1.050
Stay purpose dummy: business	−0.042	0.521	−0.031	0.635	1.138
Stay purpose dummy: other	−0.028	0.689	−0.021	0.756	1.059
Deluxe king room and suite	0.051	0.421	0.039	0.532	1.066
Family room	0.037	0.568	0.028	0.654	1.064
New Chinese/American pastoral style	0.072	0.285	0.054	0.387	1.252
Light luxury/industrial/other style	0.061	0.352	0.045	0.451	1.153
Non-lighting visual elements	-	-	0.136	0.050	1.335
Light environment	-	-	0.102	0.135	1.249
Thermal environment	-	-	0.221	0.004**	1.391
Air quality	-	-	0.065	0.370	1.368
Acoustic environment	-	-	0.234	0.001**	1.487
R squared	0.034	-	0.313	-	-
Adjusted R squared	0.012	-	0.277	-	-
F	0.983	0.445	7.214	0.000**	-
Delta F for environmental block	-	-	15.428	0.000**	-

Note. Dependent variable = mean overall environmental evaluation. Model 2 F is the overall model F based on R squared = 0.313, N = 203 and 12 predictors; Delta F reports the block-change test after adding the five environmental perception predictors. **$p < 0.01$.

Table 6. Regression coefficients for environmental perception dimensions.

Predictor	B	Standardized beta	t	Sig.	VIF	Conclusion
Non-lighting visual elements	0.144	0.136	1.973	0.050	1.335	Marginal positive association
Light environment	0.102	0.100	1.502	0.135	1.249	Not significant
Thermal environment	0.221	0.207	2.932	0.004	1.391	Significant positive association
Air quality	0.065	0.063	0.898	0.370	1.368	Not significant
Acoustic environment	0.234	0.239	3.275	0.001	1.487	Significant positive association

The regression coefficients for the five environmental perception dimensions are presented in Table 6. Model 1 had weak explanatory power (R squared = 0.034, adjusted R squared = 0.012, F = 0.983, $p = 0.445$). After the environmental dimensions were added, Model 2 improved substantially (R squared = 0.313, adjusted R squared = 0.277, overall F = 7.214, $p < 0.001$). The environmental-perception block also produced a significant model improvement (Delta F = 15.428, $p < 0.001$). In Model 2, thermal environment evaluation had a significant positive coefficient (B = 0.221, $p = 0.004$), and acoustic environment evaluation also had a significant positive coefficient (B = 0.234, $p = 0.001$). Non-lighting visual elements were marginally related to overall evaluation (B = 0.144, standardized beta = 0.136, $p = 0.050$). Light environment and air quality were not significant in this sample.

5. Discussion

5.1. Interpretation of Main Findings

The study contributes to hotel management and consumer behavior research by shifting the empirical context from controlled experimental comparison to real consumption settings. Xu et al. (2022a) and Xu et al. (2022b) provide important controlled or comparative design evidence, but the present results show that style groups did not produce robust differences in non-lighting visual elements, lighting, thermal environment, air quality, acoustics or overall environmental evaluation after Bonferroni correction.

This interpretation is consistent with Xu et al. (2022b), who compared decoration-style effects on subjective hotel-environment evaluation, but the present study extends that logic by testing whether such style differences remain robust in a real consumption sample. The nonsignificant style-group findings also align with IEQ studies suggesting that concrete comfort factors, especially thermal and acoustic conditions, may be more decisive than broad style labels in post-stay evaluation.

The findings do not mean that design style is unimportant. Instead, they support the interpretation of style as a cue that operates through specific experience channels. This interpretation is consistent with Nanu et al. (2025), who connect room aesthetics with guest booking preference, and with Geng et al. (2023), who

show that visual factors can affect comfort. However, the stronger coefficients for thermal and acoustic environments indicate that bodily comfort channels may be more decisive than style labels in this data set.

In other words, the results refine rather than reject the design-style literature. Xu et al. (2022a), Nanu et al. (2025), Kim and Kang (2022) and Lu (2026) support the experiential value of color, aesthetics, artwork and environmental art, while Abdulaali et al. (2024), Kim et al. (2023), Shen et al. (2021) and Zhang et al. (2025) show that comfort-based IEQ factors are strongly connected with satisfaction, behavior, complaints and ratings. The present results suggest that these two lines of evidence should be integrated.

The online review results support a multisensory understanding of hotel experience. Spence (2022) explicitly conceptualizes the hotel stay as a multisensory experience, while Gavilan and Al-shboul (2025) use guest interior-design data to identify innovation opportunities in urban hotels. The frequent Ctrip references to room, environment, hygiene, facilities, service, breakfast and value for money therefore show that aesthetic experience is embedded within broader stay experience.

5.2. Theoretical and Practical Implications

Theoretically, the study integrates interior design style and IEQ within one framework of guest environmental perception. Abdulaali et al. (2024), Kim et al. (2023) and Zhang et al. (2023) show why IEQ matters for comfort, behavior and satisfaction, while Liu et al. (2025), Tan and Yan (2025) and Lu (2026) explain interior style, spatial narrative and visual comfort from a design perspective. Combining these streams allows the study to move beyond stylistic preference and to show that style operates within visual, thermal, acoustic, air-quality and overall experience dimensions.

Methodologically, the study demonstrates a review-mining-to-questionnaire pathway. It adapts the text-analysis logic of Bagherzadeh et al. (2021), Bi et al. (2024), Wen et al. (2023) and Le et al. (2025) by using online comments to identify natural post-stay expressions, then uses survey data to test dimensions and predictors. This mixed approach reduces the risk of relying exclusively on researcher-defined dimensions and improves contextual fit for hotel consumer behavior research.

Compared with studies that rely only on text mining or only on questionnaires, this design uses online reviews to generate context-sensitive dimensions and then uses survey data to test their relationships statistically. This is consistent with the methodological direction suggested by Bi et al. (2024), Bagherzadeh et al. (2021), Le et al. (2025) and Wen et al. (2023), but it adds a design-management focus by linking review themes to indoor environmental perception scales.

Practically, hotels should not rely solely on visually distinctive style labels when updating interior spaces. The findings align with Che Abdullah et al. (2024), who connect sustainable interior design components with hotel operational effectiveness, and with Nored et al. (2024), who show that air-quality issues such as VOC

contamination can create health-risk concerns. Hotels should therefore use review monitoring to identify recurring experience problems such as poor sound insulation, uncomfortable temperature, weak ventilation, odor and uncomfortable lighting, then translate them into design renovation and operational management actions.

This practical recommendation follows directly from prior evidence. Ma et al. (2023) and Shen et al. (2021) showed that review mining can identify IEQ complaints, Nored et al. (2024) highlighted indoor air-contamination risks in hotel rooms, Zhang et al. (2023, 2025) linked IEQ to satisfaction and ratings, and Geng et al. (2023) connected visual comfort with hotel-lobby experience. Therefore, renovation decisions should combine style positioning with measurable improvements in ventilation, odor control, lighting comfort, sound insulation and thermal stability.

5.3. Limitations and Future Research

Several limitations should be acknowledged. First, the questionnaire sample was collected online and was concentrated in one regional context, which limits generalizability. Future studies should expand to larger samples across different regions, hotel grades and cultural contexts. Second, subgroup sizes by interior design style may have been unbalanced. Future research should use larger and more balanced style groups to improve the stability of comparison tests. The revised sampling-frame description improves reproducibility, but the corpus should still be understood as a platform-based and purposive review sample rather than a probability sample of all hotels.

Third, the study relies primarily on subjective questionnaire responses and online reviews. Future work should integrate objective environmental measurements such as illuminance, color temperature, indoor temperature and humidity, carbon dioxide, PM2.5, VOCs, noise decibels and reverberation time. This recommendation follows Ma et al. (2023), who show the value of review-based IEQ complaint mining, and Nored et al. (2024), who demonstrate the importance of directly measuring VOC contamination in hotel rooms. Fourth, the online review data came from Ctrip; platform mechanisms and user expression habits may affect review content. Future research could compare multiple booking platforms to test cross-platform robustness.

Fifth, interior design style classification relied on respondents' recognition and self-report, which may include subjective inconsistency. Future work could combine expert evaluation, computer vision and field investigation to classify style more objectively and to capture the spatial narrative depth of hotel interiors.

6. Conclusion

This study investigated guest environmental perception of hotel indoor environments in real consumption settings by combining Ctrip online reviews and questionnaire survey data. The results show that guests focus on room, environment,

hygiene, facilities, service, breakfast and value for money. Indoor environmental evaluation is therefore not a single visual judgment but an integrated judgment involving spatial experience, facility condition, cleanliness, service process and amenities.

The questionnaire showed good reliability and structural validity. The overall Cronbach's alpha was 0.861, KMO was 0.802, and exploratory factor analysis extracted six factors explaining 59.298% of variance. Style-group difference tests showed no robust significant differences across the six dimensions after Bonferroni correction, and all six hypotheses were not supported. Regression analysis showed that thermal and acoustic environment evaluations were significant positive predictors of overall environmental evaluation, while non-lighting visual elements were marginal.

In summary, hotel interior design style is not only a matter of visual aesthetics but part of a multisensory environmental experience. For hotel design and management practice, style creation should be combined with comfort-oriented design. Interior renovations should strengthen style recognition while also improving sound insulation, temperature and humidity control, ventilation, lighting comfort, material quality and spatial layout. Such an approach can better support guest satisfaction, revisit intention and long-term hotel competitiveness.

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Data Availability Statement

The data used in this study are available from the corresponding author upon reasonable request, subject to privacy and research ethics considerations.

Ethical Statement

The questionnaire was anonymous and was used only for academic research. The online review texts were analyzed in aggregate and did not include identifiable personal information.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix. Questionnaire Items and Primary Factor Loadings

Item code	Dimension	Questionnaire item based on the final Wenjuanxing questionnaire	Primary loading
OE1	Overall environmental evaluation	I was very satisfied with the overall stay experience of this hotel.	0.721
OE2	Overall environmental evaluation	The indoor environment of this hotel generally met my expectations.	0.748
OE3	Overall environmental evaluation	The interior design style and environmental experience would make me willing to stay again.	0.733
OE4	Overall environmental evaluation	I would recommend the indoor environment and design style of this hotel to relatives or friends.	0.704
NV1	Non-lighting visual elements	The overall color matching of the room was harmonious and comfortable, and highly consistent with the design style.	0.724
NV2	Non-lighting visual elements	The texture and material quality of decorative materials matched the design style and showed good perceived quality.	0.692
NV3	Non-lighting visual elements	The room layout was reasonable, movement was smooth and the space did not feel cramped.	0.711
NV4	Non-lighting visual elements	Furniture forms and furnishings were unified with the design style, aesthetically pleasing and practical.	0.681
NV5	Non-lighting visual elements	Indoor plants, ornaments and other soft-decoration elements improved the beauty and atmosphere of the space.	0.637
NV6	Non-lighting visual elements	The overall decorative atmosphere was well created and fully reflected the characteristics of the corresponding design style.	0.708
NV7	Non-lighting visual elements	The visual presentation of this design style made me feel comfortable and pleased.	0.735
NV8R	Non-lighting visual elements	The room design style was messy and the visual experience was poor. (reverse-coded)	0.667
LE1	Light environment	The room had sufficient natural daylight and the illumination was even and comfortable.	0.752
LE2	Light environment	The brightness of artificial lighting could be adjusted and met the needs of different use scenarios.	0.781
LE3	Light environment	The color temperature and atmosphere of the lighting were highly consistent with the interior design style.	0.733
LE4	Light environment	There were no uncomfortable lighting problems such as glare or excessive light-dark contrast.	0.694
LE5	Light environment	The overall light environment made me feel comfortable and relaxed.	0.758
TE1	Thermal environment	The indoor temperature of the room was appropriate, with no overheating or overcooling problem.	0.771
TE2	Thermal environment	The room humidity was appropriate, without dryness or dampness discomfort.	0.742
TE3	Thermal environment	The air-conditioning or fresh-air system operated stably and had good temperature-control performance.	0.705
TE4	Thermal environment	Indoor ventilation was good and air circulation was smooth.	0.681

Continued

TE5	Thermal environment	The overall thermal and humidity environment made me feel comfortable.	0.766
AQ1	Air quality	There was no unpleasant odor in the room, such as mildew, decoration smell or smoke, and the air felt fresh.	0.746
AQ2	Air quality	The room ventilation and air exchange were good, without a stuffy feeling.	0.701
AQ3	Air quality	Bedding, fabrics and other textiles in the room had no unpleasant odor and were clean.	0.728
AQ4	Air quality	The overall indoor air quality made me feel satisfied.	0.759
AC1	Acoustic environment	The room had good isolation from outdoor traffic and environmental noise.	0.782
AC2	Acoustic environment	The room had good isolation from indoor noise such as adjacent rooms and corridors.	0.801
AC3	Acoustic environment	Noise from air conditioning, bathroom equipment and other facilities was low and did not affect rest.	0.764
AC4	Acoustic environment	The overall acoustic environment of the room was quiet and protected my rest and privacy.	0.716
AC5	Acoustic environment	The overall acoustic environment made me feel secure and comfortable.	0.788

Note. The item wording was checked against the uploaded Wenjuanxing/SPSS questionnaire file. Items are translated into English for reporting in the manuscript. Primary loadings are rounded to three decimals and are reported to show how the six dimensions were operationalized in the retained exploratory factor solution.