Children's Preferences for the Styling of Consultation Room Furniture Based on Scenic Beauty Estimation and Kansei Engineering

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Children's preferences for the design of consultation room furniture were evaluated with a focus on the emotional and aesthetic factors influencing these preferences. An evaluation model for children's furniture in consultation rooms was developed using the Scenic Beauty Estimation (SBE) method and Kansei Engineering. Data were collected by gathering children's aesthetic ratings and emotional assessments of furniture sample images, followed by statistical analysis to identify design preferences on both visual and emotional levels. The SBE results revealed a negative correlation between straight-line desks, backrest-free designs, and square seat surfaces with scenic beauty, suggesting that children prefer furniture with soft, rounded shapes. The Kansei Engineering results identified two principal factors influencing children's preferences, further highlighting that soft, rounded forms, lightweight and comfortable experiences, and minimalist designs significantly enhance emotional engagement and attraction. The consistency between the two evaluation methods was high. In conclusion, furniture design for children's consultation rooms should prioritize safety, comfort, and playfulness, incorporating soft, simple, and child-friendly designs to enhance children's acceptance and comfort within the examination environment.

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INTRODUCTION

With increasing focus on children's physical and mental health in modern society, the design of children's healthcare environments has become an important topic in the field of furniture design. During medical visits, children often experience negative emotions, such as fear and anxiety, which not only affect their healthcare experience but may also influence treatment outcomes. Therefore, improving children's healthcare experiences through thoughtful design has become one of the key issues in public health and design disciplines. In this context, understanding children's preferences for consultation room furniture design has emerged as a significant research area.

Children in hospitals may face psychological challenges, such as fear, anxiety, and behavioral issues (Nourmusavi Nasab *et al*. 2020). In the field of furniture design in the healthcare environment, a substantial body of research has explored the impact of architectural design (Cartland *et al.* 2018; Pauli Bock *et al*. 2021), interior design (Qi *et al*.

2021), and medical equipment on children's psychology. Attractive environments are more likely to have restorative effects (Lipovac and Burnard 2023), and the design of healthcare environment plays a crucial role in patient recovery (Stichler 2009; Kotzer *et al*. 2011; Marques *et al*. 2021). Hospital environment design should take into account children's perceptual and cognitive development (Canakcioglu and Unlu 2024). Studies suggest that cartoon-style decorations in medical spaces can effectively capture children's attention, diverting their focus away from the fear associated with the medical environment (Zhu and Wei 2022). Additionally, the integration of technological designs, such as interactive gaming facilities, can help reduce children's anxiety in clinical settings (Li *et al*. 2016; Andries and Robertson 2019). Incorporating interactive design elements stimulates children's emotional responses, making them feel more comfortable in the hospital environment (Yin and Zhang 2022).

Currently, research on children's preferences for the design of consultation room furniture remains limited. As a fundamental component of consultation room spaces, the design of furniture—its shape, color (Skaggs 1981), materials—directly influences children's emotional responses and cognitive experiences within these environments. While previous studies have indicated that there are no significant differences in preferences between children and therapists regarding hospital landscapes (Allahyar and Kazemi 2021), no research has specifically focused on children's preferences and needs with respect to consultation room furniture. Existing children's furniture often faces several issues, including poor development quality, the downsizing of adult furniture, and the simplistic use of cartoon themes and colors (Xiang and Kang 2010). Therefore, capturing children's needs and incorporating them into the design process is a crucial step in the design of healthcare environments.

Children's aesthetic and emotional experiences are unique, particularly in functional spaces such as consultation rooms, where emotional responses and spatial perception are crucial design considerations. Therefore, research focused on children-centered design is essential in the context of furniture design. Consultation room furniture should simultaneously address both the psychological and physiological needs of children (Il and Ho 2017). In designs intended for children, emotional engagement is particularly important, as children's product preferences and behaviors are profoundly influenced by their emotional responses (Wang *et al*. 2024). Given this characteristic, furniture design should adopt a child-centric approach, emphasizing approachability and playfulness, while also balancing functionality and aesthetic value. Through studying children's preferences for consultation room furniture design, this research provides a scientific basis for the future design of children's healthcare environments, helping designers better meet children's needs and promoting their physical and mental well-being. Additionally, such design strategies contribute to enhancing children's comfort during medical visits and, through the integration of psychology and design, facilitate the evolution of healthcare spaces toward more humane and compassionate environments.

EXPERIMENTAL

Research Methodology

Scenic Beauty Estimation (SBE) method is a widely used approach for evaluating the aesthetic quality of landscapes, with applications in fields such as landscape architecture, urban parks (Ai-chu 2015), and forest environments (Deng *et al.* 2013). In the field of children's furniture, however, the use of the SBE method for design evaluation has not been widely adopted. Nonetheless, it offers clear, quantifiable data that can comprehensively assess the aesthetic value of consultation room furniture for children.

Kansei Engineering is a user-centered design methodology that focuses on translating users' emotional impressions of a product into design elements (Nagamachi 1995). This approach not only emphasizes the functional characteristics of a product but also stresses that the design should fulfill the users' emotional and aesthetic needs (Guo *et al*. 2014). Through quantifying users' preferences and emotional evaluations of design elements, it is possible to construct product spaces and conduct quantitative analyses of preferences and emotional responses (Clarke and Becker 1969; Bertheaux *et al*. 2018). Kansei Engineering has been widely applied in various fields, including industrial design (Wu *et al*. 2022; Ge *et al.* 2023), furniture design (Fu *et al*. 2024a,b), and electronic product design.

Overall, the SBE method does not require children to have an in-depth design background, as it is based on their intuitive perceptions, making it well-suited for children. It provides clear, quantifiable data and offers a direct reflection of children's preferences for furniture shapes. It primarily focuses on visual perception and may not fully capture children's emotional responses to furniture. In contrast, the Kansei Engineering method delves deeper into children's emotional reactions, such as comfort and approachability. When combined, these two methods can provide more comprehensive data support for the research, particularly in the multidimensional analysis of children's preferences. This combined approach allows for a more holistic evaluation of the strengths and weaknesses of existing children's consultation room furniture designs and helps to explore the aesthetic factors that influence children's furniture design in healthcare environments.

Acquisition of Experimental Samples

A comprehensive collection of images of consultation room furniture with various design styles was conducted through field research, online platforms, and design websites.

After an initial collection of 84 product samples, they were grouped and categorized using expert evaluation and card sorting methods. Ultimately, 15 sample images with the highest generalizability were retained for analysis.

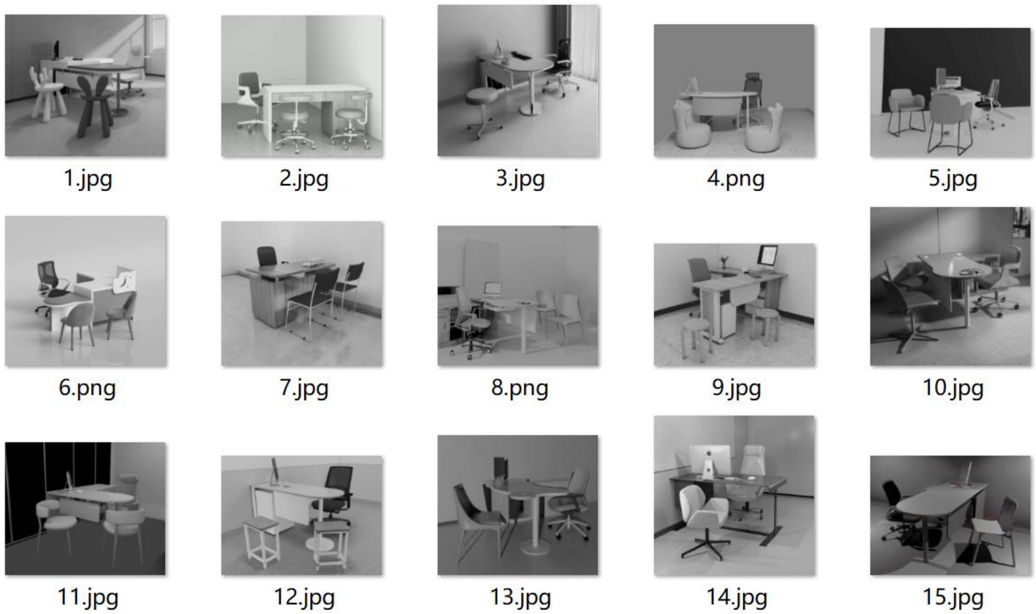

Fig. 1. All sample images of children's consultation room furniture

Considering children's limited attention spans and the need to ensure the smooth progress of subsequent experiments, the sample size was kept relatively small to avoid causing frustration or resistance in the children, which could potentially affect the results. As a result, 15 typical samples of children's consultation room furniture, each with distinct designs, were retained, as shown in Fig. 1. To minimize the influence of factors, such as color and material, on the observers' judgments, the samples were desaturated (Lin *et al.* 2024).

Participants

This study involved human participants (children) and was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and relevant national guidelines for research involving human subjects. The research protocol was designed to ensure the protection of participants' rights, safety, and well-being. Written informed consent was obtained from the parents or legal guardians of all participants prior to their inclusion in the study.

The medical profession uses up to 14 years of age as the age group for medical observation of children. According to Piaget (1962) and the theory of child development stages, children aged 2 to 7 years old are in the preoperational stage and begin to be able to perform some basic logical operations. To ensure the accuracy of the experimental data, participants were limited to children aged 3 and above. The age groups were divided into four stages: 3–6 years, 7–11 years, 12–14 years, and 15 years and above. The proportions of participants in each group were 16.9%, 34.4%, 31.2%, and 17.5%, respectively, reflecting the age distribution observed in the clinic. The participants in this study belong to the same ethnic and socio-cultural background, specifically Han Chinese individuals from mainland China, all of whom are currently undergoing the same nine-year compulsory education. This shared experience and set of values contribute to their similar perspectives and preferences regarding furniture design.

IMPLEMENTATION OF THE EXPERIMENT

Experimental Procedure

Due to the specific nature of the survey participants, the entire questionnaire process was conducted offline. Given the limited cognitive abilities of children, the steps and procedures were carefully explained to the participants beforehand. Additionally, a brief training session was provided to familiarize the participants with the tasks and operational guidelines, ensuring that each child understood the process. Before the formal experiment began, a scenario was presented to each child, simulating a hospital visit. The children were guided to assess the furniture samples from the perspective of a user, which helped them focus on the design of the specific furniture pieces while minimizing distractions from irrelevant features, such as the design of office chairs that they would not be using. This approach aimed to reduce experimental error and ensure more accurate results.

The experiment was conducted in a teacher's office at a primary school in Anqing City. The office featured simple furniture with a neutral color scheme and good lighting conditions. To ensure the rigor and validity of the experiment, no outsiders were allowed to enter during the session, ensuring that the participants could maintain their focus throughout.

Evaluation Procedures of the SBE Method

The experiment was conducted using an indoor slideshow format, in which 15 numbered sample images were displayed randomly. Each slide was shown for 15 s, during which the evaluators scored their preference for each image based on their aesthetic standards and first impressions. The evaluation scale used 7 levels, ranging from -3 to 3, with the following corresponding labels: -3 ("Strongly Dislike"), -2 ("Dislike Very Much"), -1 ("Dislike"), 0 ("Neutral"), 1 ("Like"), 2 ("Like Very Much"), and 3 ("Strongly Like"). A higher numerical value indicated a greater degree of preference.

A total of 154 valid questionnaires were collected. Given the inherent variability in aesthetic judgment, the scores were standardized using the SBE method's standardization formula. The standardized mean score for each photo, referred to as the standardized M score, was calculated as the average of the standardized values for each rating. The expression for this calculation is as follows:

$$Z_{ij} = \frac{(X_{ij} - \overline{X_j})}{S_j}, \quad \overline{\mathrm{X}_\mathrm{j}} = \frac{1}{\mathrm{m}} \sum_{i=0}^{m} X_{ij} \tag{1}$$

In the formula Z_{ij} represents the standardized score given by the j-th evaluator for the i-th image; X_{ij} represents the rating given by the j-th evaluator for the i-th image; X_j represents the average rating of all images by the j-th evaluator; and S_j represents the standard deviation of ratings for all images given by the j-th evaluator.

The average of all standardized scores for the same image was used to calculate X_j, which is denoted as M in the final score. The ranking of these scores is shown in Table 1.

Table 1. Evaluation Results of Each Sample in the SBE Method

Sample Number	*M*	Ranking	Sample Number	*M*	Ranking
Q1	0.295381323	4	Q9	-0.621899244	13
Q2	-0.109131694	11	Q10	0.468720921	2
Q3	-0.292178188	12	Q11	0.932651735	1
Q4	0.176007483	6	Q12	-0.745243901	14
Q5	0.079177928	8	Q13	0.076147427	9
Q6	0.318462504	3	Q14	0.263098767	5
Q7	-1.053657252	15	Q15	0.153392022	7
Q8	0.05907017	10			

In accordance with the research objectives, the selected sample products were subjected to a morphological deconstruction to extract key design elements (Miao *et al.* 2024). Through data analysis and research, it was found that a chair is composed of multiple components, such as the backrest, seat, armrests, and legs. These components may also vary in terms of decoration and materials. Additionally, structural variations, such as whether the backrest is integrated with the armrests, legs, or seat, were also considered. Thus, functional, aesthetic, and structural features were used as important references to categorize the design elements from multiple aspects, including form, structure, and material. Ultimately, 30 design elements were extracted from 15 sample images (Table 2), labeled from A1 to A30. Based on Table 2, the reaction matrix for the 15 samples was derived. Due to the large number of data points, only 5 matrices are displayed in Table 3.

Table 2. Styling Elements

Furniture Component	Design Element Assignment					
Backrest	A1 Line design	A2 Panel design	A3 Biomorphic design	A4 Combined lines, surfaces	A5 No backrest	
Armrest	A6 Line design	A7 Panel design	A8 No armrest			
Seat Shape	A9 Square	A10 Round	A11 Combined square, round			
Leg Design	A12 Rolling type	A13 Straight round legs	A14 Soft cushion support	A15 Line frame support		
Overall Material of Exam. Chair	A16 Soft cushion	A17 Fabric	A18 Metal	A19 Wood	A20 Plastic	A21 Leather
Examination Desk Surface	A22 Straight line design	A23 Curved design	A24 Combined straight and curved designs			
Examination Desk Structure	A25 Cabi-net style	A26 Desk-cabinet style				
Examination Desk Panel	A27 Straight panel	A28 Curved panel	A29 No panel			

Table 3. Modeling Response Matrix

No.	Q1	Q2	Q3	Q4	Q5
A1	0	1	0	0	0
A2	0	0	0	0	1
A3	1	0	0	1	0
A4	0	0	0	0	0
A5	0	0	1	0	0
A6	0	0	0	0	0
A7	0	0	0	0	1
A8	1	1	1	1	0
A9	0	0	0	0	1
A10	1	1	1	1	0
A11	0	0	0	0	0
A12	0	1	1	0	0
A13	1	0	0	0	0
A14	0	0	0	1	0
A15	0	0	0	0	1
A16	0	1	1	1	0
A17	0	0	0	1	1
A18	0	1	1	0	0
A19	1	0	0	0	0
A20	0	0	0	0	1
A21	0	1	1	0	0
A22	0	1	0	0	0
A23	0	0	0	1	0
A24	1	0	1	0	1
A25	0	0	0	0	0
A26	1	1	1	1	1
A27	1	0	1	0	0
A28	0	0	0	1	0
A29	0	1	0	0	1

Evaluation Procedures of the Kansei Engineering

Through online searches, evaluation data, and research literature, a wide range of sensory impression vocabulary was collected and screened. The goal was to gather as many descriptive terms as possible that capture children's perceptions of the appearance and design of consultation room furniture. The search focused on child-related furniture terms, such as children's desks and chairs, as well as hospital furniture, resulting in the collection of 196 sensory words. These sensory terms were then categorized into groups based on visual attributes, functional attributes, psychological attributes, and expansion attributes (Hao and Wen 2021). After eliminating terms that were either unrelated to the study or semantically similar, a preliminary selection yielded 40 sensory words. Considering children's cognitive and comprehension abilities, a panel of experts was consulted to further refine the list, ultimately selecting 10 representative sensory words, which were organized into 10 groups of sensory impression terms, as shown in Table 4.

Table 4. Sample Characteristics and Evaluation Categories

Evaluation Object	Evaluation Element	Evaluation Item	Evaluation Scale (-3 to 3)
Consultation Room Furniture Design	B1. Shape and Decoration	C1. Playfulness of Shape	Ordinary - Cute
		C2. Line Smoothness	Sharp - Smooth
		C3. Aesthetic Appeal	Unattractive - Attractive
	B2. Psychological Perception	C4. Psychological Novelty	Boring - Interesting
		C5. Perceived Affinity	Distant - Approachable
		C6. Psychological Safety	Dangerous - Safe
		C7. Psychological Comfort	Uncomfortable - Comfortable
	B3. Overall Perception	C8. Overall Interactivity	Isolated - Interactive
		C9. Spatial Richness	Complex - Simple
		C10. Furniture Flexibility	Bulky - Lightweight

The design of the sensory evaluation questionnaire should ensure that the questions are clear and concise, avoiding overly complex or abstract language to match the cognitive abilities of children. The questionnaire also used a Likert scale, with a 7-point rating system ranging from -3, -2, -1, 0, 1, 2, to 3.

The experiment followed a procedure similar to that of the aesthetic evaluation experiment, also using an indoor slideshow format. Children were invited to rate the images of the consultation room furniture based on their sensory impressions of the sample images. To help the participants better understand the features of the samples, each photo was displayed for 90 s. A total of 102 valid questionnaires were collected, and the data was subsequently processed and analyzed.

RESULTS

The SBE Method

Data processing and analysis were performed using SPSS (SPSS Statistics for Windows, Version 27.0.1., IBM Corp., Armonk, NY, USA.). Stepwise regression was applied, with the standardized scores of the children's consultation room furniture samples (SBE values) as the dependent variable (y) and the response matrix of the 30 design elements as the independent variables (x). This regression model was used to establish an evaluation framework for the design of children's consultation room furniture. The development of the furniture design and evaluation model can provide valuable guidance in the design and decision-making processes (Ren and Qu 2024).

During the partial correlation analysis, variables with insignificant partial correlation coefficients were sequentially removed, while factors with strong explanatory power were retained. Ultimately, three independent variables—A5, A9, and A22—were included in the model. The significance of these three variables was tested, with P-values all being less than 0.05, indicating that these variables significantly influenced children's preferences for consultation room furniture. The regression equation for the model was as follows: $P = -0.584A22 - 0.532A5 - 0.469A9$.

The tolerance values for all variables were greater than 0.7, and the Variance Inflation Factors (VIFs) were all less than 5, indicating no significant multicollinearity between the independent variables and good data independence. Specifically, the design elements—A22 (linear desk surface), A5 (no backrest), and A9 (square seat)—were found to be negatively correlated with the aesthetic quality of the furniture, with their influence on aesthetic preference decreasing in that order (see Table 5).

Table 5. Analysis of the Coefficients of the Independent Variables of the Evaluation Model

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	0.149	0.120	
	A22	-0.744	0.268	-0.610
2	(Constant)	0.246	0.107	
	A22	-0.646	0.227	-0.530
	A5	-0.584	0.227	-0.479
3	(Constant)	0.486	0.103	
	A22	-0.712	0.164	-0.584
	A5	-0.649	0.164	-0.532
	A9	-0.459	0.131	-0.469

The simplicity of furniture design may make the consultation room environment appear too formal or rigid, lacking in approachability, and failure to meet the psychological needs of children. This preference tendency is strongly related to children's need for a sense of safety and emotional connection in the consultation room. For children, furniture designs should incorporate elements of mimicry, biomimicry, or flexible use of points, lines, and planes, allowing children to engage their imagination and explore knowledge (Qi 2024).

Based on these findings, when designing children's consultation room furniture, it is important to avoid overly linear or harsh shapes. Instead, the design should focus on softer, more rounded elements, and avoid using designs such as linear desks, backless chairs, and square seats. This approach not only enhances the aesthetic appeal of the furniture but also better aligns with children's aesthetic preferences and psychological expectations.

The Kansei Engineering

After conducting reliability and validity tests on the questionnaire, the data was organized and imported into SPSS for analysis. The mean scores for each pair of sensory words corresponding to the sample images were calculated, as shown in Table 6.

Table 6. Mean Sensory Evaluation Scores for Representative Styles

No.	Ord. - Cte	Shp - Sth	Unat. - Attr.	Brng - Intr.	Dst - Appr.	Dngr - Safe	Uncmf-Cmfr	Isld - Intr	Cmplx - Smpl	Blky - Lgtwt.
Q1	0.81	0.89	0.37	0.62	0.64	0.86	0.58	0.11	0.30	0.22
Q2	-0.44	-0.44	0.04	0.00	0.21	0.27	0.70	0.40	0.39	0.36
Q3	-0.10	0.73	0.19	0.16	0.28	0.78	0.40	0.54	0.96	0.67
Q4	1.08	1.14	0.39	0.76	0.73	0.84	1.01	-0.30	0.24	-0.38
Q5	-0.31	0.33	0.30	0.16	0.38	0.89	0.89	0.16	0.32	-0.15
Q6	0.72	0.75	0.75	0.71	0.90	0.96	1.01	0.55	0.69	0.90
Q7	-0.75	-0.75	-1.04	-0.43	-0.85	0.57	-0.03	-0.29	0.09	-0.86
Q8	0.05	0.44	0.37	0.30	0.40	0.72	0.30	0.20	0.40	-0.10
Q9	-0.82	-0.67	-0.46	-0.88	-0.41	0.20	-0.75	0.18	0.82	0.21
Q10	-0.22	0.60	0.40	-0.20	0.23	0.22	0.48	0.59	0.57	0.64
Q11	1.07	1.26	0.83	0.51	1.15	1.40	1.31	0.06	0.61	-0.18
Q12	-1.14	-0.79	-0.89	-1.01	-0.75	0.30	-0.44	-0.11	0.96	-0.04
Q13	-0.11	0.88	0.31	-0.27	0.62	0.96	0.92	-0.17	0.38	-0.22
Q14	0.00	0.61	0.43	-0.08	0.51	0.72	0.98	0.47	0.24	0.41
Q15	-0.83	0.37	-0.24	-0.52	-0.06	0.48	0.02	0.25	0.82	0.21

* Ord.-Cte: Ordinary - Cute, Shp.-Sth: Sharp - Smooth, Unat.-Attr.: Unattractive - Attractive, Brng.-Intr.: Boring - Interesting, Dst.-Appr.: Distant - Approachable, Dngr.-Safe: Dangerous - Safe, Uncmf.-Cmfr.: Uncomfortable - Comfortable, Isld.-Intr.: Isolated - Interactive, Cmplx.-Smpl: Complex - Simple,Blky.-Lgtwt.: Bulky - Lightweight, the same as table 8.

Due to the potential correlations between the data, which could complicate the analysis, principal component analysis (PCA) and factor analysis were conducted on the mean values of the sensory impression word pairs to explore the underlying structural relationships. The mean sensory evaluation scores from Table 6 were imported into SPSS software for KMO and Bartlett's test of sphericity. The KMO value was found to be 0.738, with a P-value less than 0.01, indicating that the questionnaire has structural validity and that there are correlations between the variables, thus factor analysis is appropriate.

Principal component analysis extracted two principal components, and the initial factor loading matrix was rotated using the Varimax rotation method. After rotation, the cumulative variance explained was 84.691%, as shown in Table 7.

Table 7. Principal Component Extraction

Total Variance Explained						
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.027	60.274	60.274	6.020	60.195	60.195
2	2.413	24.133	84.407	2.421	24.212	84.407

The first factor primarily controls two aspects: decorative design (B1) and psychological perception (B2). It mainly focuses on children's sensory reactions to furniture design and decoration, as well as their perceptions of the furniture's approachability and safety. The second factor primarily reflects overall cognition (B3), capturing children's needs regarding the functionality, ease of use, and interactivity of the furniture. These results are shown in Table 8.

Table 8. Rotated Component Matrix

Rotated Component Matrix											
	No.	Ord. - Cte	Shp - Sth	Unat. - Attr.	Brng - Intr.	Dst - Appr.	Dngr - Safe	Uncmf-Cmfr	Isld - Intr	Cmplx - Smpl	Blky - Lgtwt.
Component	1	0.933	0.915	0.927	0.916	0.969	0.821	0.917	0.142	-0.339	0.160
	2	-0.089	0.086	0.302	-0.033	0.157	-0.281	-0.066	0.921	0.654	0.964

Factor scores for Principal Component 1 and Principal Component 2 in each sample, along with the overall factor scores, were calculated using SPSS software. The variance contribution rate of each common factor was then used as a weight to compute the weighted sum for each factor, yielding the overall score for each sample image, denoted as N, as shown in Table 9.

The samples with higher comprehensive evaluation scores are numbered Q6, Q11, Q1, and Q3. From a sensory evaluation perspective, the common design characteristics of the furniture (excluding office chairs) in these four images are as follows:

- The design is soft and rounded, with no sharp edges. The furniture predominantly features smooth, streamlined shapes, which enhance its approachability and create a sense of safety and warmth. This design caters to children's needs for security and comfort.
- The design style is minimalist, characterized by clear, simple shapes and the avoidance of excessive decoration and intricate details. The structure is straightforward, with smooth lines that reduce visual clutter, fostering a relaxed and pleasant atmosphere. This aligns with children's cognitive preferences while promoting spatial harmony.
- Playful elements are effectively incorporated, making the furniture visually engaging and stimulating children's curiosity and desire for exploration. This fosters emotional attachment and a sense of closeness to the furniture, which enhances their emotional involvement and encourages positive interactions within the space. In summary, these furniture designs contribute to creating a relaxed, safe, and enjoyable environment within the consultation room. They help children feel

comfortable and at ease, effectively reducing tension and improving the overall healthcare experience.

Table 9. Comprehensive Scores of Each Sample Image

	FAC1_1	FAC2_1	Score	N	Comprehensive Score Ranking
Q1	0.809	-0.262	0.500	0.424	3
Q2	-0.359	0.492	-0.120	-0.097	11
Q3	0.099	1.369	0.460	0.391	4
Q4	1.075	-1.396	0.370	0.309	6
Q5	0.299	-0.489	0.070	0.062	9
Q6	1.067	1.309	1.140	0.959	1
Q7	-1.275	-2.115	-1.520	-1.280	15
Q8	0.227	-0.227	0.100	0.081	8
Q9	-1.574	0.510	-0.980	-0.824	13
Q10	-0.134	1.285	0.270	0.230	7
Q11	1.517	-0.470	0.950	0.799	2
Q12	-1.844	-0.088	-1.340	-1.131	14
Q13	0.420	-0.880	0.050	0.040	10
Q14	0.437	0.407	0.430	0.361	5
Q15	-0.763	0.556	-0.380	-0.325	12

Correlation Analysis Between the Two Methods

The correlation between the evaluation results of the SBE method (M value) and the Sensory Evaluation method (N value) was analyzed. The results showed a correlation coefficient of 0.872, with $P < 0.01$, indicating a highly significant correlation. The evaluation results of the two methods were consistent and positively correlated.

This result indicates that, although the two evaluation methods focus on different aspects, they lead to similar conclusions when assessing children's preferences for the design of consultation room furniture. Specifically, children's evaluations of aesthetics and emotional experience are positively correlated, meaning that furniture designs that are visually more appealing also elicit stronger positive emotional responses. Furthermore, this finding supports the feasibility and effectiveness of using the Aesthetic Evaluation method in the design of children's furniture.

Table 10. Correlation Analysis

Correlations			
		M	N
M	Pearson Correlation	1	0.872**
	Sig. (2-tailed)		0.000
	N	15	15
N	Pearson Correlation	0.872**	1
	Sig. (2-tailed)	0.000	
	N	15	15
** Correlation is significant at the 0.01 level (2-tailed).			

Comprehensive Discussion

In current furniture design research, particularly in the field of children's furniture, the use of the SBE method for design evaluation has not been widely adopted. This is primarily because traditional furniture design assessment methods typically focus on functionality, comfort, and ergonomics, with limited use of quantitative analysis for aesthetic evaluation. However, with advancements in aesthetics and child psychology research, an increasing number of scholars are focusing on the impact of visual perception and emotional responses on design decisions. In this context, the SBE method, as a quantitative aesthetic evaluation tool, provides designers with intuitive data support, revealing children's design preferences on both visual and emotional levels. Although this method has no precedents in the furniture field, its successful application in this study demonstrates its feasibility and effectiveness in children's furniture design. Through a quantitative scoring system, this study fills a gap in the aesthetic evaluation of furniture design, showcasing the broad potential of the SBE method for future applications in furniture design.

The results from the Kansei Engineering evaluation method and the SBE method complement each other, further validating the multidimensional needs of children in furniture design. The Kansei Engineering evaluation method emphasizes the intuitive perception of shape and design structure, indicating that children tend to prefer furniture with soft contours and smooth lines. In contrast, the SBE method delves into children's emotional responses (Lin *et al.* 2024), revealing their preference for designs that are safe, comfortable, and engaging. The combination of these two methods suggests that, when designing furniture for children's consultation rooms, it is essential to incorporate rounded, simple, and playful design elements to meet both visual and emotional needs. Through carefully designing these elements, the aesthetic appeal of the furniture can be enhanced, while fostering a sense of familiarity and comfort, ultimately improving children's experience in the consultation room.

Therefore, based on the integration of these two evaluation results, furniture designers should prioritize safety, comfort, and playfulness, while considering children's aesthetic and emotional needs, to create design solutions that align with both their psychological and physiological requirements.

However, several limitations exist in the current study. It primarily focused on the aesthetic aspects of furniture design and emotional responses, neglecting the functional and usability factors that shape children's experiences with the furniture. Additionally, it did not consider potential differences in furniture preferences based on variables such as age and gender. Future research could further investigate children's preferences regarding the usability of furniture and explore how these preferences may vary across different age groups and genders.

CONCLUSIONS

This study, based on the Scenic Beauty Estimation (SBE) method and Kansei Engineering method, children's preference evaluation data on consultation room furniture were collected and their preferences were systematically analyzed regarding furniture design. The three main conclusions were as follows:

1. The top five samples based on the final aesthetic values calculated using the SBE were numbered 11, 10, 6, 1, and 14. The top five samples based on the Kansei Engineering evaluation scores were numbered 6, 11, 1, 14, and 3.
2. The aesthetic study found that features such as straight-edged desk surfaces, backless chairs, and square seats were negatively correlated with children's aesthetic preferences for consultation room furniture. Children's aesthetic evaluations were closely linked to their sense of safety, with a preference for soft, rounded shapes and an aversion to more rigid, linear designs, backless structures, and square seating.
3. The Kansei Engineering evaluation further revealed two principal component factors influencing children's preferences for consultation room furniture. These factors respectively reflect children's emotional responses to furniture design and decoration, as well as their needs for functionality, convenience, and interactivity.
4. The results from both evaluation methods were highly consistent, with a very significant correlation, indicating that they effectively complement each other from different dimensions to assess children's design preferences.

Children's preferences for consultation room furniture can be broadly summarized as follows: Soft, rounded design styles; playful decorative elements; and simple, lightweight furniture forms.

The significance of this study lies not only in providing data-driven support for furniture design but also in offering valuable insights for optimizing pediatric healthcare environments. Ultimately, the research aims to contribute to the overall improvement of children's medical spaces, enhancing their healthcare experience and elevating the quality of medical services.

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