Research Article

The Effect of Bedroom Wall Colours on Users' Perceptual Performance

Kemal Yıldırım[1], Menşure Kübra Müezzinoğlu[2], Seda Şahin[3], Beray İnan[4]

[1] Prof. Dr., Gazi University, Department of Woodworking Industrial Engineering, Ankara, Türkiye.
[2] Assoc. Prof. Dr., Fırat University, Faculty of Architecture, Department of Interior Architecture, Elazığ, Türkiye.
[3] Engineer, Gazi University, Department of Woodworking Industrial Engineering, Ankara, Türkiye.
[4] M.Sc. Student, Gazi University, Department of Woodworking Industrial Engineering, Ankara, Türkiye.

Abstract

In this study, the effects of colour types (neutral, warm, cool) selected based on single-colour harmony used on the walls of bedrooms, where individuals spend a significant part of their lives, on participants' perceptual evaluations were examined. Within the scope of the study, virtual bedroom spaces designed according to different colour types were used to investigate how perceptual evaluations of research participants could be influenced. The study formulated hypotheses based on the relationships between bedroom colour type and participant variables such as occupation, gender, and age. To test these hypotheses, participants evaluated virtual bedroom spaces online using Google Forms. Statistical analyses, including confidence tests conducted with SPSS, involved calculating percentage values, means, and standard deviations. Differences among variables were examined comparatively. The findings indicated that spaces utilizing neutral colours were generally perceived more positively compared to those employing warm and cool colours. Moreover, certain groups, namely engineers and other professionals, men, and participants aged 25-35, tended to provide more favourable perceptual evaluations than architects, interior designers, women, and participants aged 36-50. In conclusion, this study contributes to understanding how colour types in bedroom environments can influence perceptual evaluations, shedding light on preferences across various demographic groups.

Keywords: Bedroom, Design, Interior, Perception, Wall colour.

Corresponding Author: mkmuezzinoglu@firat.edu.tr
Received: 26.06.2024 - **Accepted:** 17.10.2024

Cite: Yıldırım, K., Müezzinoğlu, M. K., Şahin, S. & İnan, B. (2024). The Effect of bedroom wall colours on users' perceptual performance. DEPARCH Journal of Design Planning and Aesthetics Research, 3 (2), 189-208. https://doi.org/10.55755/DepArch.2024.34

Araştırma Makalesi

Yatak Odası Duvar Renklerinin Kullanıcıların Algısal Değerlendirmeleri Üzerindeki Etkisi

Kemal Yıldırım[1], Menşure Kübra Müezzinoğlu[2], Seda Şahin[3], Beray İnan[4]

[1] Prof. Dr., Gazi Universitesi, Ağaçişleri Endüstri Mühendisliği Bölümü, Ankara, Türkiye.
[2] Doç. Dr., Fırat University, Mimarlık Fakültesi, İç Mimarlık Bölümü, Elazığ, Türkiye.
[3] Mühendis, Gazi Universitesi, Ağaçişleri Endüstri Mühendisliği Bölümü, Ankara, Türkiye.
[4] Lisansüstü Öğrencisi, Gazi Universitesi, Ağaçişleri Endüstri Mühendisliği Bölümü, Ankara, Türkiye.

Özet

Bu araştırmada, bireylerin yaşamlarının önemli bir bölümünü geçirdikleri yatak odalarının duvarlarında kullanılan tek renk harmonisine dayalı olarak seçilen renk türlerinin (nötr, sıcak, soğuk) katılımcıların algısal değerlendirmeleri üzerindeki etkileri incelenmiştir. Çalışma kapsamında, farklı renk türlerine göre tasarlanan sanal yatak odası mekanları ile, araştırma katılımcılarına ait algısal değerlendirmelerin ne şekilde etkilenebileceği araştırılmıştır. Araştırmanın hipotezleri ile, yatak odalarında kullanılan renk türü ile meslek, cinsiyet ve yaş gibi değişkenler arasındaki ilişkilere dayanarak oluşturulmuştur. Araştırma hipotezlerini test etmek için, katılımcılardan sanal yatak odası mekanlarını çevrimiçi olarak değerlendirmeleri istenmiştir, bu değerlendirme Google Formlar aracılığıyla gerçekleştirilmiştir. Toplanan veriler SPSS programı kullanılarak güven testlerine tabi tutulmuş, yüzdelik dilimler, ortalamalar ve standart sapma gibi istatistiksel değerler hesaplanarak, değişkenlerin arasında tespit edilen farklılıklar karşılaştırmalı şekilde incelenmiştir. Bu çalışma sonucunda, nötr renklerin tercih edildiği mekanların genel olarak sıcak ve soğuk renklerin tercih edildiği mekanlara göre daha olumlu bir şekilde algılandığı saptanmıştır. Ayrıca, mühendislerin ve diğer meslek gruplarının, erkeklerin ve 25-35 yaş aralığındaki katılımcıların, mimarlar ve iç mimarlar, kadınlar ve 36-50 yaş grubundaki katılımcıların, daha olumlu değerlendirmelerde bulunduğu tespit edilmiştir.

Anahtar Kelimeler: Yatak odası, Tasarım, İç mekân, Algı, Duvar rengi.

Sorumlu Yazar: mkmuezzinoglu@firat.edu.tr
Alınma Tarihi: 26.06.2024 - **Kabul Tarihi:** 17.10.2024

Atıf: Yıldırım, K., Müezzinoğlu, M. K., Şahin, S. & İnan, B. (2024). The Effect of bedroom wall colours on users' perceptual performance. DEPARCH Journal of Design Planning and Aesthetics Research, 3 (2), 189-208. https://doi.org/10.55755/DepArch.2024.34

INTRODUCTION

Bedrooms are special places where people spend approximately 30% of their daily lives and perform activities such as sleeping, resting, reading, dressing, personal care and make-up. Sleep has a fundamental and indispensable role in human life for the physical and mental health of a person. For this reason, the optimal design of the spaces where sleep takes place is of critical importance (Bıçak et al., 2015). Designing the bedroom effectively and functionally can increase the comfort, tranquillity and comfort of the users in this space. In addition, it can have positive effects on people's health and well-being by improving their sleep quality. Therefore, bedroom design has become an important research topic in the field of architecture and interior design. Scientific studies consider the effective design of sleeping spaces an important factor in terms of the health, happiness and quality of life of users.

Designing the environmental factors of sleeping spaces to positively affect the users' perceptual and functional evaluations constitutes a fundamental focal point in space design. People's interaction with their environment is largely based on their perception and behaviour. The perceptual performance of users is moulded by the environmental elements present in spaces. In a study conducted by Baker (1986), environmental factors were categorized into three main groups: design, ambient, and social factors. Design factors encompass elements such as colour, texture, lighting, furniture layout, and architectural arrangement. Numerous previous studies have explored the impact of indoor physical environmental elements on individuals' spatial perceptions (Ertürk, 1983; Yıldırım et al., 2007a, 2015; Hidayetoğlu et al., 2012; Çagatay et al., 2017). These studies show that differences in demographic characteristics such as gender, age, education, profession and culture, as well as wall colours, among the physical characteristics of the interior can significantly affect the spatial perceptions of the users. In this context, this study will focus on the perceptual effects of the colour variable, which plays an important role and is used by designers as a main element in space design. Colour can significantly influence the ambiance of a space and the perceptions of its users. Therefore, the selection and application of colours are crucial as integral components of space design.

The design and application of colour in architectural spaces are important components of the physical environment and constitute indispensable elements of architectural design. Colour plays a significant role in shaping users' emotional, aesthetic, and perceptual experiences (Joshi & Rawat, 2020). Colours are used as a primary tool to clarify the character, function and atmosphere of architectural spaces. This strengthens the feel and purpose of the space, as well as providing visual appeal to enhance users' experiences (Chen et al., 2021). The colours used in interior design have significant effects on people's behaviour. Research clearly shows that the designed physical environment can cause different psycho-behavioural effects on people. In this context, it is important to determine colour arrangements that are thought to be more effective in a spatial sense because these arrangements can meet user needs at an optimum level and increase the performance expected from the user (Ergün et al., 2022).

Sources providing information on this subject clearly demonstrate that the colours preferred in interior spaces have significant effects on users' perceptual evaluations. Based on the reviewed literature, the research hypotheses formulated regarding wall colours and participants' demographic characteristics are discussed in detail in the following section. This study emphasizes the importance of colour use in interior design and aims to provide a framework for understanding how factors related to colour selection affect user perception.

Conceptual Framework and Hypotheses

Numerous studies in the literature investigate how colours impact people's perceptual and behavioural performance. For example, a study by Tantanatewin and Inkarojrit (2016) emphasizes that warm colours such as red, yellow, and orange have revitalizing and exciting effects, but can also create a tendency toward stress and anxiety. Similarly, in a study conducted by Yıldırım et al. (2011), it was observed that cold colours such as blue are calming, peaceful and serene. In another study by Hidayetoğlu et al. (2012), it was suggested that spaces where cold colours are preferred are more impressive than spaces where warm colours are preferred. On the other hand, achromatic colours were perceived as more uniform and simpler compared to chromatic colours; however, in another study, they were associated with concepts such as spaciousness, simplicity and order (Öztürk et al., 2012; Savavibool & Moorapun, 2017).

According to the results given above, the colours used in the interior can affect the perception of space. In this context, bedrooms were chosen as the research space because they appeal to a wide range of users, sample spaces can be examined more easily, and they allow the use of different materials. To achieve this goal, the aim was to ascertain how various wall colours in bedrooms affect users perceptually and to analyse the differences in these effects. In this context, neutral (gray), warm (orange) and cool (blue) colours were used on the walls of the bedrooms used as the experimental environment. Research spaces were modelled on the computer with the 3ds Max program and realistic visuals were created. These visuals were presented to the participants using a space evaluation survey. Participants evaluated the visuals using the semantic differentiation scale, and based on the evaluations, the hypothesis (H1) of the research, which was created based on colour variables, is explained below.

H1: Participants will perceive the environmental factors of a neutral-coloured bedroom more positively than cool and warm-coloured spaces.

Profession is an important independent variable that affects the perceptual evaluations of architectural spaces and is among the social factors. Recently, there has been a notable rise in the number of studies investigating how users' occupations influence their spatial perception. The initial investigations in this field were conducted by Hershberger (1969) and later by Mehrabian and Russell (1974). Subsequent research has examined the perceptual assessments of participants with design education (such as architects, interior designers, industrial designers, urban planners, and landscape architects) and those without design education (other professional groups), focusing on various parameters (Gifford et al., 2000; Malekinezhad et al., 2013; Boumová & Zdráhalová, 2016; Arslan et al., 2018; Müezzinoğlu et al., 2020). Many of these studies suggest that evaluations made by designers tend to be more discerning than those made by non-designers. Müezzinoğlu et al. (2021) discovered notable variances in how design-trained professionals perceive the physical environmental factors of architectural spaces compared to other professional cohorts. Likewise, Coşgun et al. (2022) and Yılmaz et al. (2022) indicated that users with design education perceived these physical environmental factors more negatively than those without such training. These studies highlight that individuals with design education tend to assess spatial elements with greater criticality and depth.

According to the above studies, it is evident that whether users have received design education or not affects their perception of space. These findings demonstrate that occupational distinctions can serve as a significant independent variable in spatial perception. Based on these assessments, the

research hypothesis (H2) formulated for the occupational variable is presented below.

H2: Architects and interior designers will perceive the environmental factors of their bedrooms more negatively than engineers and other professions.

One of the crucial social factors influencing the perceptual evaluations of environmental factors in architectural spaces is gender. Studies in this area have highlighted that gender can lead to variations in behaviour. Considering these studies, it is seen that men have lower risk aversion thresholds in natural environments (Eisler et al., 2003), perform better in spatial abilities (Voyer et al., 1995), and have a stronger environmental dominance in indoor spaces (Lindfors et al., 2006). On the other hand, women are seen to be more affected by internal events (Hunter et al., 2004), have less organizational and institutional commitment (Dodd-McCue & Wright, 1996), and have stronger ties to the places they adopt (Fraser & Hodge, 2000). Kim et al. (2013) noted in their research that women tend to have lower satisfaction levels with environmental factors in architectural spaces compared to men. Similarly, Akalın et al. (2010) and İmamoğlu (2000) reported comparable findings regarding women's perceptions of architectural facades with different forms. These studies indicate that women exhibit a more critical attitude than men. Furthermore, research conducted by Dube and Morgan (1996), Yıldırım et al. (2012, 2014, 2015), and Ayalp et al. (2016) suggests that women evaluate spaces from a more personal, emotional, and visually focused standpoint. Overall, these studies underscore the significant role of gender in shaping spatial perception. It is observed that women can generally exhibit a more critical approach than men in evaluations based on space perceptions and adjective pairs.

According to the above studies, it is clear that the gender difference of the users affects the perception of space. These studies reveal substantial variations in preferences based on gender. These findings suggest that gender could serve as a significant independent variable in spatial perception. Based on these assessments, the research hypothesis (H3) formulated for the gender variable is presented below.

H3: Men will perceive the environmental factors of their bedrooms more negatively than women.

Age differences among participants represent one of the critical social factors influencing the perceptual evaluations of environmental factors in architectural spaces. Several researchers have utilized age as a proxy for various factors, including life experience and the socialization process (Joyce & Lambert, 1996). When the literature is examined, there are few studies on the effects of users' age differences on perceptions of different physical environments. In some of these studies, it was stated that young people perceive indoor spaces more positively than older users (Yıldırım et al., 2007a, 2014, 2015). Therefore, it would be beneficial to ascertain whether the physical environmental factors of bedrooms arranged in different ways have a statistically significant impact on the perceptual evaluations of participants aged 25-35 and 36-45. According to these evaluations, the hypothesis (H4) of the research established for the age variable is given below.

H4: Participants aged 25-35 will perceive the environmental factors of their bedrooms more positively than participants aged 36-50.

METHOD

In this section, the study method used to determine the effects of three different wall colours (neutral, cool, warm) preferred in bedrooms on people's perceptual evaluations is explained in detail.

Selection of Subjects

A total of 197 participants living in Turkey were included in the research. 48.2% of these participants were architects or interior designers (95 people), 16.2% were engineers (32 people), and 35.5% were from other professions (70 people). 59.9% of the participants were women (118 people) and 40.1% were men (79 people). Looking at the age distribution, 85.8% were in the 20-35 age range (169 people) and 14.2% were in the 36-50 age range (28 people).

Survey Design

The survey forms designed to test the research hypotheses comprise two main sections. The initial section requests general demographic information from participants, while the second section contains questions crafted to assess the spatial quality of bedrooms featuring various wall colours. The design of the research questionnaire was found to be valid and reliable in previous studies conducted by İmamoğlu (1975), Yıldırım et al. (2005, 2007a; 2007b; 2007c; 2011, 2015), Yıldırım (1999), Yıldırım and Akalın (2009), Erdoğan et al. (2010) and Özkan and Yıldırım (2016). The semantic differentiation scale consisting of seven-point adjective pairs listed in positive-negative polarities (1: positive, 7: negative) was used. These adjective pairs are beautiful/ugly, warm/cool, light/dark, wide/narrow, attractive/unattractive, roomy/cramped, high/low, sincere/formal, tidy/untidy, well-planned/poorly planned, large/small, free space / restricted space, simple/complex, restful / disturbing and uncrowded / crowded.

Wall Colour Selection

In the research, neutral (grey), cool (blue) and warm (orange) colours, which have been frequently preferred recently, were used on the walls of the modelled virtual bedrooms. The RGB and NCS codes of these colours used in bedrooms are given in Table 1.

Colours	NCS and RGB Colour Codes	Image
Neutral Colour (Gray)	S 2000-N R:204 G:204 B:204	
Warm Colour (Orange)	S 0585-Y50R R:255 G:127 B:0	
Cool Colour (Blue)	S 1555- R80B R:69 G:151 B:214	
NCS: Natural Colour System, RGB: Red, Green, Blue Colour System.		

Table 1. Colours used in virtual bedroom spaces.

Links to places designed using the colours presented in Table 1 and which can be explored with a 360-degree virtual tour are presented in Figure 1.

Design of the Experimental Space

In this research, modelling of bedrooms containing three different wall colours was carried out with virtual reality (VR) technology. In the contemporary era characterized by extensive digital technology use, it is crucial to examine the similarities and disparities between information gathered from real-life and virtual environments. Research focuses on areas such as the transformation of information from digital platforms to physical reality, skill transfer and spatial knowledge transfer. Some studies claim that spatial data obtained from virtual

and physical environments are quite parallel and that skills and spatial knowledge can be effectively transferred from the virtual environment to the real world (Wolbers et al., 2010; Wallet et al., 2013). Some studies (Tsunetsugu et al., 2005; Yıldırım et al., 2007c; Yıldırım et al., 2014; Ayalp et al., 2016 and 2017), report that visual materials play a critical role in measuring perceptual behaviours and emphasize that digital images contribute to the visualization of information. Hidayetoğlu et al. (2012) asserted that virtual environments are effective for achieving precise outcomes and can be attained at lower costs compared to real-world scenarios. All this literature reveals that virtual environments can be used effectively in scientific research.

In this research, for the visualization of virtual bedrooms used as experimental spaces, Yıldırım et al. (2007c), Hidayetoğlu et al. (2012), Yıldırım et al. (2012, 2014, 2019, 2022) and Ayalp et al. (2017) were used. Bedrooms with three different wall colours were made compatible with virtual reality glasses using 360-degree virtual reality renderings. This process was carried out in the 3ds Max program.

Neutral Coloured Bedroom
http://bit.ly/4akzKsx

Cool Coloured Bedroom
https://bit.ly/3To4y5x

Warm Coloured Bedroom
https://bit.ly/46VhV0p

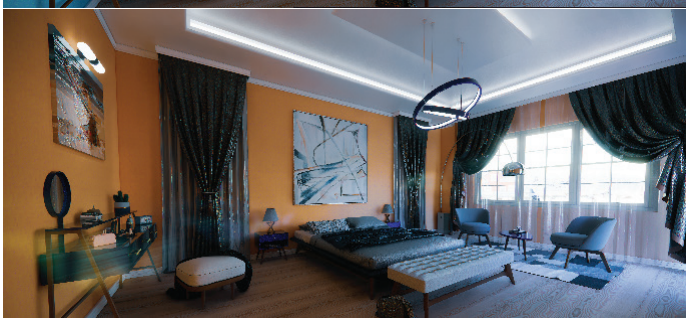


Figure 1. Images of virtual bedroom spaces.

Participants experienced colour variables in the bedroom space and evaluated their effects on spatial perception. All environmental factors were carefully controlled to ensure that the experiment was carried out correctly. Thus, all physical features except wall colours were kept constant in the 27 square meter rectangular planned bedroom spaces designed and modelled for the experiment. The bedroom spaces modelled as the experimental environment are shown in Figure 1.

Application and Procedure

A research survey was administered to 197 participants to evaluate the spatial quality of the modelled virtual bedrooms. The surveys were conducted over a two-week period in December 2023, using online survey forms designed with the Google Forms platform. In the initial segment of the survey, participants were provided with introductory information. Subsequently, they were tasked with evaluating three-dimensional videos of bedrooms created using augmented virtual reality technology, using a semantic differentiation scale comprising 15 pairs of adjectives. The collected data set was analysed and interpreted statistically using SPSS.

Data analysis

In the research, the effects of three different wall colours used on the virtual bedroom walls on the participants' perceptual evaluations were determined through a survey. In this context, the participants' evaluation of the environmental factors of their bedrooms was considered as "dependent variable", while the colour of the walls, occupation, gender and age differences were considered the "independent variables". The Cronbach's Alpha reliability test was conducted to assess the reliability of the research data. Then, statistical calculations such as percentage value, average value and standard deviation value were performed. Next, a one-way analysis of variance (ANOVA) was employed to determine if there were statistically significant differences between the dependent and independent variables at a significance level of $P < 0.05$. Variable means are presented comparatively with graphical representations.

FINDINGS

This study aims to provide important findings about bedroom wall colours that can help designers create high-quality and easily perceptible spaces. In line with this goal, the participants' reactions to different wall colours were examined. Participants evaluated virtual bedroom spaces created using augmented virtual reality technology with the 3ds Max program on the computer, through a survey. The resulting data set was analysed through statistical methods and the findings are presented comprehensively below.

Reliability Analysis

The reliability of the research data was assessed using the Cronbach's Alpha test method, yielding a scale reliability coefficient of 0.963. The reliability values for the dependent variables and the primary scale employed in the study are presented in Table 2.

Dependent Variables	Dependent Variable Reliability	Scale Reliability
Beautiful/Ugly	0.959	0.963
Warm/Cool	0.963	
Light/Dark	0.961	
Wide/Narrow	0.961	
Attractive/Unattractive	0.959	
Roomy/Cramped	0.959	
High/Low	0.961	
Sincere/Formal	0.961	
Tidy/Untidy	0.960	
Well-Planned/Poorly Planned	0.959	
Large/Small	0.961	
Free Space / Restricted Space	0.960	
Simple/Complex	0.960	
Restful / Disturbing	0.959	
Uncrowded / Crowded	0.961	

Table 2. Cronbach Alpha reliability analysis results.

In Table 2, the reliability coefficient of the main scale, comprising 15 adjective pairs, is reported as 0.963. According to Cronbach (1951), referenced in the literature, scale components are considered "reliable" when the alpha reliability coefficient exceeds 0.70. It is evident that all elements tested in this study have Cronbach Alpha coefficients exceeding 0.70. Hence, the research data can be characterized as demonstrating a high level of reliability.

Colour Findings

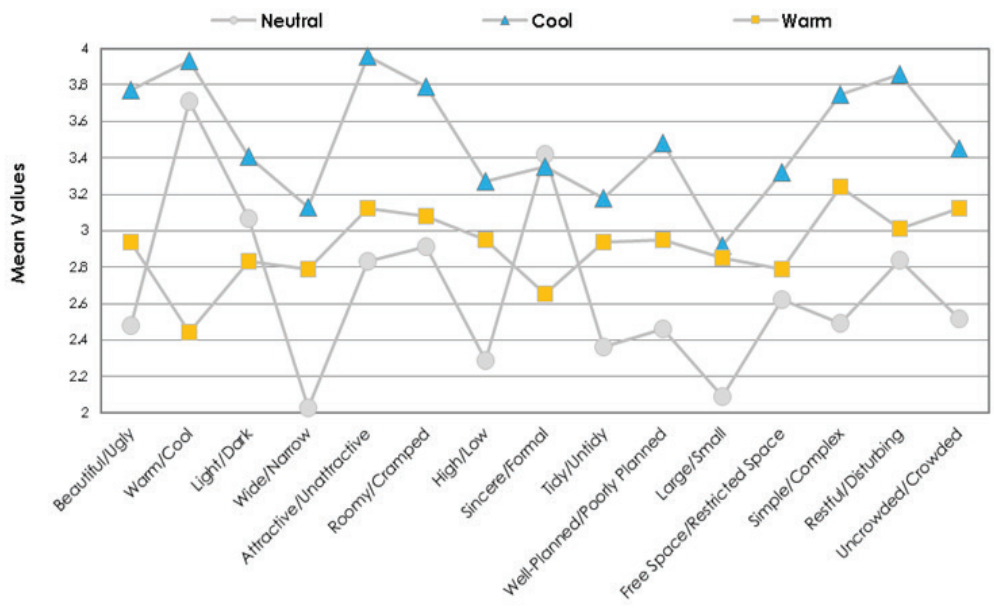
The analysis results of the data covering the participants' perceptual evaluations of the environmental factors of the bedrooms where three different wall colours were used (neutral, cool, warm) are given in Table 3.

Table 3. Analysis results of data regarding the colours used in bedroom spaces.

Dependent Variables	Bedroom Wall Colours									ANOVA Results		
	Neutral			Cool			Warm					
	M[a]	SD	HG	M	SD	HG	M	SD	HG	F	df	Sig.
Beautiful/Ugly	2.48	1.62	A	3.77	1.92	C	2.94	1.83	B	26.050	2	0.000*
Warm/Cool	3.71	1.95	B	3.93	1.87	B	2.44	1.70	A	37.356	2	0.000*
Light/Dark	3.07	1.83	AB	3.41	1.76	B	2.83	1.62	A	5.403	2	0.005*
Wide/Narrow	2.03	1.41	A	3.13	1.78	B	2.79	1.66	B	23.701	2	0.000*
Attractive/ Unattractive	2.83	1.63	A	3.96	1.99	B	3.12	1.77	A	20.836	2	0.000*
Roomy/ Cramped	2.91	1.80	A	3.79	1.92	B	3.08	1.70	A	13.046	2	0.000*
High/Low	2.29	1.48	A	3.27	1.83	B	2.95	1.67	B	17.773	2	0.000*
Sincere/ Formal	3.42	1.99	B	3.35	1.78	B	2.65	1.67	A	10.837	2	0.000*
Tidy/Untidy	2.36	1.66	A	3.18	1.81	B	2.94	1.76	B	11.606	2	0.000*
Well-Planned/ Poorly Planned	2.46	1.52	A	3.48	1.88	C	2.95	1.73	B	17.403	2	0.000*
Large/Small	2.09	1.41	A	2.92	1.63	B	2.85	1.62	B	17.052	2	0.000*
Free Space / Restricted Space	2.62	1.58	A	3.32	1.84	B	2.79	1.65	A	9.205	2	0.000*
Simple/ Complex	2.49	1.51	A	3.75	1.85	C	3.24	1.72	B	27.691	2	0.000*
Restful / Disturbing	2.84	1.75	A	3.86	1.96	B	3.01	1.71	A	18.108	2	0.000*
Uncrowded / Crowded	2.52	1.52	A	3.45	1.79	B	3.12	1.73	B	15.417	2	0.000*

Note: HG: Tukey HSD Homogeneity Group. * Significant at the level of p< 0.005.
M: Average value. SD: Standard deviation. F: F value. df: Degree of freedom.
a: They are the average values of the variables listed from 1 to 7. High values are negative responses.

According to the analysis results given in Table 3, it was determined that the colours used in the bedrooms had statistically significant effects on the participants' perceptual evaluations at the $p < 0.005$ level for all 15 adjective pairs. A visual representation of these findings is included in Figure 2.



Note: Higher variable means indicate more negative answers.

Figure 2. The effect of colours used in bedroom spaces on dependent variables.

Figure 2 illustrates that the environmental factors of bedrooms with neutral colours are generally evaluated more positively compared to those with warm and cool colours, except for three adjective pairs. These results indicate that the neutral-coloured bedrooms are perceived as more beautiful, spacious, attractive, roomy, high, tidy, well-planned, spacious, simple, restful, and uncrowded than the other spaces. It was observed that bedrooms with orange-coloured walls are perceived as warmer, brighter, and more sincere than the other spaces. In this context, it was found that the perceptual evaluations of participants were significantly influenced by the choice of three different wall colours in the bedrooms. This supports the hypothesis stated in H1: "Participants will perceive the environmental factors of a neutral-coloured bedroom more positively than those of cool and warm-coloured spaces." Overall, it was concluded that bedrooms with neutral colours left a more favourable impression across twelve adjective pairs compared to those with cool and warm colours.

Profession Findings

The analysis results of the data regarding participants' perceptions of the environmental factors in their bedrooms, categorized by their profession (architect/interior designer, engineer, other professions), are presented in Table 4.

In Table 4, participants' perceptual assessments of the environmental factors in their bedrooms based on their professions showed statistical significance at the levels of $p < 0.05$ and $p < 0.10$ for thirteen adjective pairs. A graphical depiction of these results is provided in Figure 3.

Table 4. Analysis results regarding participants' evaluations according to their professions.

Dependent Variables	Professions						ANOVA Results		
	Architect / Interior Designer		Engineer		Other Professions				
	M[a]	SD	M	SD	M	SD	F	df	Sig.
Beautiful/Ugly	3.30	1.88	2.75	1.83	2.89	1.85	4.600	2	0.010*
Warm/Cool	3.53	1.97	3.14	1.97	3.23	1.91	2.340	2	0.105**
Light/Dark	3.34	1.77	2.69	1.57	2.98	1.77	5.879	2	0.003*
Wide/Narrow	2.75	1.68	2.49	1.66	2.59	1.71	1.074	2	0.343[ns]
Attractive/ Unattractive	3.55	1.86	2.94	1.80	3.13	1.85	5.451	2	0.005*
Roomy/Cramped	3.45	1.85	2.85	1.61	3.18	1.91	4.113	2	0.017*
High/Low	3.00	1.71	2.53	1.62	2.77	1.74	3.026	2	0.049*
Sincere/Formal	3.29	1.84	2.84	1.81	3.07	1.86	2.409	2	0.091**
Tidy/Untidy	3.06	1.88	2.44	1.43	2.69	1.73	5.495	2	0.004*
Well-Planned/ Poorly Planned	3.21	1.83	2.63	1.55	2.78	1.72	5.925	2	0.003*
Large/Small	2.73	1.62	2.49	1.55	2.52	1.60	1.414	2	0.244[ns]
Free Space / Restricted Space	3.14	1.78	2.65	1.56	2.73	1.66	4.802	2	0.009*
Simple/Complex	3.44	1.80	2.74	1.55	2.98	1.77	7.520	2	0.001*
Restful / Disturbing	3.52	1.91	2.85	1.70	3.02	1.82	6.894	2	0.001*
Uncrowded / Crowded	3.27	1.79	2.78	1.56	2.80	1.66	5.728	2	0.003*

Note: * Significant at the level of p< 0.05, ** Significant at the level of p< 0.10.
M: Average value. SD: Standard deviation. F: F value. df: Degree of freedom.
a: They are the average values of the variables listed from 1 to 7. High values are negative responses.

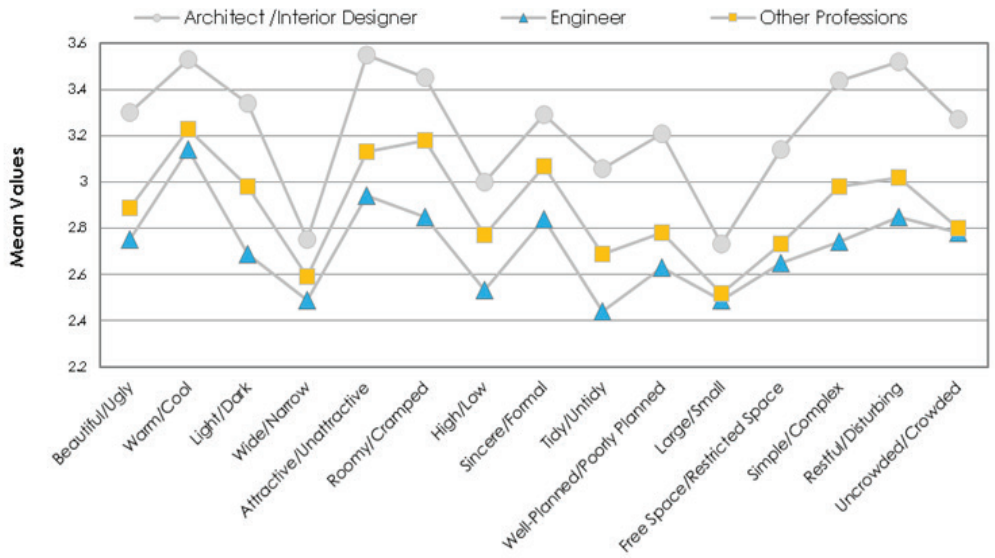


Figure 3. Effect of participants' profession on dependent variables.

Note: Higher variable means indicate more negative answers.

In Figure 3, it is observed that architects and interior designers evaluate the environmental factors of bedrooms more negatively for all pairs of adjectives compared to other professional groups. This finding shows that the hypothesis put forward in H2: "Architects and interior designers will perceive the environmental factors of their bedrooms more negatively than engineers and other professions."

Therefore, it can be stated that architects and interior designers exhibit a more critical approach in spatial evaluations compared to other professional groups.

Gender Findings

The analysis results of the data concerning participants' perceptual assessments of the environmental factors in their bedrooms, categorized by their gender (male and female), are presented in Table 5.

Table 5. Analysis results regarding participants' evaluations according to gender.

Dependent Variables	Gender						ANOVA Results		
	Men		Women		Total				
	M[a]	SD	M	SD	M	SD	F	df	Sig.
Beautiful/Ugly	3.22	1.94	2.82	1.74	3.06	1.87	6.571	1	0.011*
Warm/Cool	3.51	2.03	3.13	1.82	3.36	1.96	5.491	1	0.019*
Light/Dark	3.25	1.83	2.88	1.61	3.10	1.75	6.616	1	0.010*
Wide/Narrow	2.76	1.73	2.49	1.61	2.65	1.69	3.857	1	0.050*
Attractive/ Unattractive	3.50	1.94	3.00	1.69	3.30	1.86	10.344	1	0.001*
Roomy/Cramped	3.47	1.94	2.94	1.65	3.26	1.84	12.302	1	0.000*
High/Low	2.99	1.74	2.62	1.64	2.84	1.71	6.654	1	0.010*
Sincere/Formal	3.29	1.91	2.91	1.72	3.14	1.85	6.130	1	0.014*
Tidy/Untidy	2.93	1.87	2.67	1.63	2.83	1.78	3.014	1	0.083**
Well-Planned/ Poorly Planned	3.13	1.87	2.71	1.56	2.96	1.76	8.303	1	0.004*
Large/Small	2.66	1.62	2.56	1.58	2.62	1.60	0.600	1	0.439[is]
Free Space / Restricted Space	3.10	1.79	2.64	1.56	2.91	1.72	10.447	1	0.001*
Simple/Complex	3.40	1.84	2.80	1.60	3.16	1.77	17.091	1	0.000*
Restful / Disturbing	3.49	1.96	2.85	1.63	3.24	1.86	17.334	1	0.000*
Uncrowded / Crowded	3.14	1.76	2.87	1.66	3.03	1.72	3.513	1	0.061**

Note: * Significant at the level of p< 0.05, ** Significant at the level of p< 0.10, [is]: Insignificant at the level p< 0,05.
M: Average value. SD: Standard deviation. F: F value. df: Degree of freedom.
a: They are the average values of the variables listed from 1 to 7. High values are negative responses.

In Table 5, participants' perceptual assessments of the environmental factors in their bedrooms based on their gender were found to be statistically significant at the levels of $p < 0.05$ and $p < 0.10$ for all adjective pairs except one. Consequently, it was observed that men provided more favourable perceptual evaluations across all adjective pairs compared to women. A graphical representation of these results is included in Figure 4.

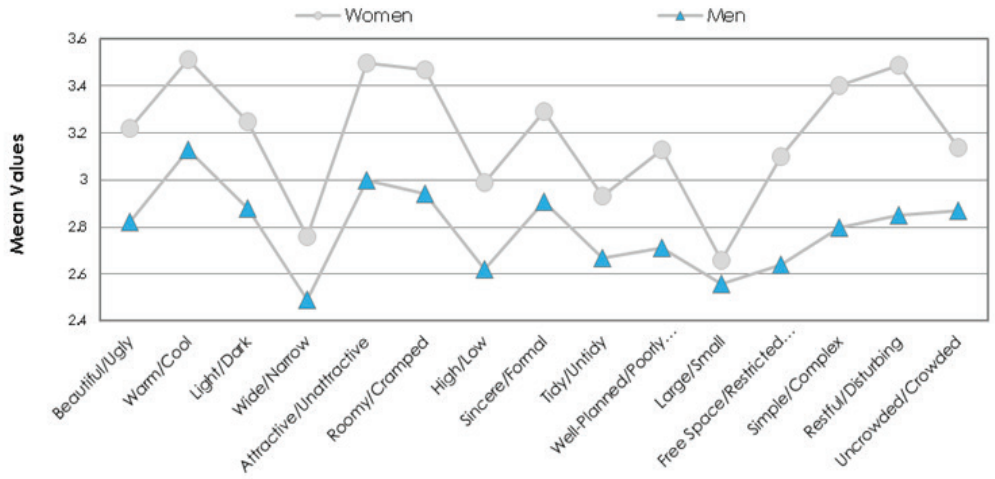


Figure 4. . Effect of participants' gender on dependent variables.

Note: Higher variable means indicate more negative answers.

According to these results, it is seen that men, compared to women, evaluate the environmental factors of their bedrooms statistically positively for all adjective pairs except one. This finding shows that the "Men will perceive the environmental factors of their bedrooms more negatively than women" and supports the hypothesis put forward in H3.

Age Findings

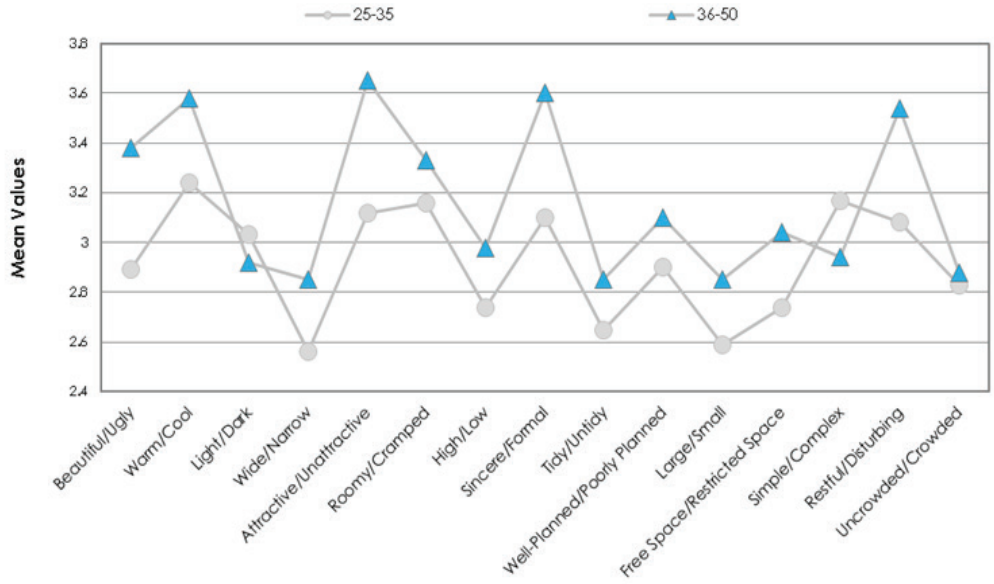
The analysis results of the data covering the perceptual evaluations of the research participants towards the environmental factors of their bedrooms, depending on their age groups (25-35, 36-40), are given in Table 6.

Table 6. Analysis results regarding participants' evaluations according to age.

Dependent Variables	Age						ANOVA Results		
	20-35		36-50		Total				
	M[a]	SD	M	SD	M	SD	F	df	Sig.
Beautiful/Ugly	2.89	1.72	3.38	1.82	3.04	1.76	2678	1	0.101**
Warm/Cool	3.24	1.90	3.58	1.91	3.35	1.90	1.084	1	0.299[is]
Light/Dark	3.03	1.70	2.92	1.54	2.99	1.64	0.152	1	0.697[is]
Wide/Narrow	2.56	1.48	2.85	1.65	2.65	1.54	1.194	1	0.276[is]
Attractive/ Unattractive	3.12	1.72	3.65	1.66	3.29	1.72	3.092	1	0.081**
Roomy/Cramped	3.16	1.73	3.33	1.77	3.22	1.74	0.320	1	0.572[is]
High/Low	2.74	1.54	2.98	1.62	2.82	1.57	0.749	1	0.688[is]
Sincere/Formal	3.10	1.78	3.60	1.82	3.25	1.80	2.648	1	0.105**
Tidy/Untidy	2.65	1.54	2.85	1.50	2.71	1.52	0.603	1	0.439[is]
Well-Planned/ Poorly Planned	2.90	1.59	3.10	1.43	2.96	1.54	0.606	1	0.438[is]
Large/Small	2.59	1.41	2.85	1.47	2.67	1.43	1.125	1	0.290[is]
Free Space / Restricted Space	2.74	1.62	3.04	1.50	2.84	1.59	1.169	1	0.281[is]
Simple/Complex	3.17	1.57	2.94	1.55	3.10	1.56	0.740	1	0.391[is]
Restful / Disturbing	3.08	1.61	3.54	1.70	3.22	1.65	2.659	1	0.104**
Uncrowded / Crowded	2.83	1.44	2.88	1.42	2.84	1.43	0.034	1	0.853[is]

Note: ** Significant at the level of p< 0.10, [is]: Insignificant at the level p< 0,05.
M: Average value. SD: Standard deviation. F: F value. df: Degree of freedom.
a: They are the average values of the variables listed from 1 to 7. High values are negative responses.

In Table 6, participants' perceptual assessments of the environmental factors in their bedrooms based on their age were found to be statistically significant at the levels of $p < 0.05$ and $p < 0.10$ for all adjective pairs except four. Consequently, it was observed that age significantly influenced participants' perceptual evaluations. A graphical representation of these findings is included in Figure 5.



Note: Higher variable means indicate more negative answers.

Figure 5. Effect of participants' age on dependent variables.

Figure 5 shows that participants aged 36-50 made more positive perceptual evaluations for the light/dark and simple/complex adjective pairs. On the other hand, participants aged 25-35 appear to have made more positive perceptual evaluations for adjective pairs for the other adjective pairs. This finding shows that the "Participants aged 25-35 will perceive the environmental factors of their bedrooms more positively than participants aged 36-50" and supports the hypothesis put forward in H4.

CONCLUSIONS AND RECOMMENDATIONS

In this study, the impact of bedroom environmental factors using three different colours (neutral, warm, cool) on the perceptual evaluations of participants varying in professions, genders, and ages was examined. The subsequent sections provide detailed results and recommendations concerning these evaluations.

Initially, it was found that three different colour types applied to bedroom walls based on single-colour harmony significantly influenced participants' perceptual evaluations. In this regard, environmental factors in bedrooms with neutral colours were generally perceived more favourably compared to those with warm and cool colours. It has been determined that the neutral-coloured bedroom space is perceived as more beautiful, large, attractive, roomy, high, tidy, well-planned, spacious, simple, restful and uncrowded compared to other spaces. It has been determined that the space where orange colour is used is perceived as warmer, brighter and more sincere compared to other spaces. These results confirm that, as stated in previous studies, orange colour tone creates a warm, bright and sincere atmosphere compared to others, while neutral colour tones are perceived as wider, more spacious, simple and uncrowded (Ergün et al., 2022). Likewise, in Savavibool and Moorapun's (2017) research, it was stated

that neutral colours are linked to concepts such as spaciousness, simplicity and order. These results clearly show that colour types play an important role in determining the users' preferences, especially depending on the function of the space and the emotional atmosphere desired to be created.

Based on their professions, it was found that architects and interior designers provided more critical perceptual assessments of the environmental factors in bedrooms with three different wall colours across all adjective pairs, compared to other participants. This may be because the architect and interior designer participants who received design training perceived the environmental factors of the bedroom space by abstracting from their meaning and benefits and evaluated them from a more critical perspective. These findings corroborate earlier conclusions reached by Müezzinoğlu et al. (2021), Coşgun and Yıldırım (2022), Yılmaz and Yıldırım (2022), and Yıldırım et al. (2012, 2015).

Based on the gender-related findings, it was observed that men evaluated the environmental factors of bedrooms with three different wall colours positively across all adjective pairs. This may be attributed to the generally more sensitive and critical perspective often exhibited by women. This result supports the conclusion suggested by Kim et al. (2013), Dube and Morgan (1996), Yıldırım et al. (2014, 2015, 2016, 2020), Ayalp et al. (2016) and Müezzinoğlu et al. (2021) studies that women's satisfaction levels with environmental factors are lower than men.

Based on the findings related to age, it was found that participants in the 36-50 age group tended to provide more favourable perceptual evaluations for adjective pairs related to light/dark and simple/complex aspects. Conversely, participants in the 25-35 age group showed more positive evaluations for adjective pairs other than these two categories. This finding generally supports the conclusion emphasized in the studies conducted by Yıldırım et al. (2007, 2014, 2015) that "young people's satisfaction levels with environmental factors are lower than the middle age group".

It is possible to conduct similar studies in the future to conduct experimental research on different colour types associated with various space functions. However, in addition to digitally designed and online data collection methods, which are more efficient in terms of time and cost, it can also be recommended to use face-to-face experiments in real locations. This diversified approach may allow research results to be more comprehensive and generally valid.

ACKNOWLEDGEMENTS

We would like to thank our valuable participants who contributed by filling out the survey.

Conflict of Interest

No conflict of interest was declared by the authors.

Authors' Contributions

The authors contributed equally to the study.

Financial Disclosure

The authors declared that this study has received no financial support.

Ethics Committee Approval

Ethics committee approval was not required for this article.

Legal Public/Private Permissions

In this research, the necessary permissions were obtained from the relevant participants.

REFERENCES

Akalın, A., Yıldırım, K., Wilson, C., & Saylan, A. (2010). Users' evaluations of house façades: preference, complexity and impressiveness. *Open House International, 35*(1), 57-65. https://doi.org/10.1108/OHI-01-2010-B0006

Arslan, H. D., Yıldırım, K., & Gülşeker, E. (2018). Investigation of architect and non-architect participants' perceptual evaluations on different period mosque facades. Iconar*p, 6*(2), 358-370. https://doi.org/10.15320/ICONARP.2018.58

Ayalp, N., Yildirim, K., Bozdayi, M., & Cagatay, K. (2016). Consumers' evaluations of fitting rooms in retail clothing stores. *International Journal of Retail & Distribution Management, 44*(5), 524-539. https://doi.org/10.1108/IJRDM-06-2015-0085

Ayalp, N., Yıldırım, K., & Çağatay, K. (2017). Effect on users of the seating element types in cafés / restaurants. *Gazi University Journal of Science, 30*(4), 15-28. https://dergipark.org.tr/en/pub/gujs/issue/32802/364459

Baker, J. (1986). The role of the environment in marketing services: The consumer perspective. *The services challenge: Integrating for competitive advantage, 1*(1), 79-84.

Bıçak, S., Akyıldız, M. H., Kesik, H. İ., & Karamanoğlu, M. (2015). Yatak odası tasarımlarının estetik, fonksiyonellik ve malzeme açısından incelenmesi. *Selçuk-Teknik Dergisi, 14*(2), 814-833. http://sutod.selcuk.edu.tr/sutod/article/view/274

Boumová, I., & Zdráhalová, J. (2016). The apartment with the best floor plan layout: Architects versus non-architects. *Critical Housing Anal., 3*(1), 30-41. https://doi.org/10.13060/23362839.2016.3.1.264

Çağatay, K., Hidayetoğlu, M. L., & Yıldırım, K. (2017). Lise koridor duvarlarında kullanılan renklerin öğrencilerin algısal değerlendirmeleri üzerindeki etkileri. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 32*(2), 466-479. doi: 10.16986/HUJE.2016016672

Chen, Y., Yu, L., Westland, S., & Cheung, V. (2021). Investigation of designers' colour selection process. *Colour Res. Appl., 46*(3), 557-565.

https://doi.org/10.1002/col.22631

Coşgun, B., Yıldırım, K., & Hidayetoğlu, M. L. (2022). Effect of wall covering materials on the perception of cafe environments. *Facilities, 40*(3/4), 214-232. https://doi.org/10.1108/F-07-2021-0060

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297-334. https://doi.org/10.1007/BF02310555

Dodd-McCue, D., & Wright, G. B. (1996). Men, women, and attitudinal commitment: The effects of workplace experiences and socialization. *Human Relations, 49*(8), 1065-1091. https://doi.org/10.1177/001872679604900803

Dubé, L., & Morgan, M. S. (1996). Trend effects and gender differences in retrospective judgments of consumption emotions. *Journal of Consumer Research, 23*(2), 156-162. https://doi.org/10.1086/209474

Eisler, A. D., Eisler, H., & Yoshida, M. (2003). Perception of human ecology:

Cross-cultural and gender comparisons. *Journal of Environmental Psychology, 23*(1), 89-101. https://doi.org/10.1016/S0272-4944(02)00083-X

Erdogan, E., Akalin, A., Yildirim, K., & Erdogan, H. A. (2010). Students' evaluations of different architectural styles. *Procedia-Social and Behavioral Sciences, 5,* 875-881. https://doi.org/10.1016/j.sbspro.2010.07.202

Ergün, B., Yıldırım, K., & Hidayetoğlu, M. L. (2022). The effects of colours used in wall and equipment elements of open offices on perceptual evaluations of users. *J. Fac. Eng. Archit. Gazi Univ., 38*(4), 2465-2476. 10.17341/gazimmfd.1113543

Ertürk, S. (1983). *Mimari mekânların algılanması üzerine deneysel bir çalışma* (Tez No. 378841) [Doctoral dissertation, Karadeniz Teknik Üniversitesi]. YÖK Ulusal Tez Merkezi.

Fraser, J., & Hodge, M. (2000). Job satisfaction in higher education: Examining gender in professional work settings. *Sociological Inquiry, 70*(2), 172-178.

https://doi.org/10.1111/j.1475-682X.2000.tb00904.x

Gifford, R., Hine, D. W., Muller-Clemm, W., Reynolds, D. A. J., & Shaw, K. T. (2000). Decoding modern architecture. *Environment and Behavior, 32*(2), 163-187. https://doi.org/10.1177/00139160021972487

Hershberger, R. G. (1969). A study of meaning and architecture. In J. L. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 175-194). Cambridge University Press. DOI:10.1017/CBO9780511571213.020

Hidayetoğlu, M. L., Yildirim, K., & Akalin, A. (2012). The effects of colour and light on indoor wayfinding and the evaluation of the perceived environment. *Journal of Environmental Psychology, 32*(1), 50-58. https://doi.org/10.1016/j.jenvp.2011.09.001

Hunter, L. M., Hatch, A., & Johnson, A. (2004). Cross□national gender variation in environmental behaviors. *Social Science Quarterly, 85*(3), 677-694.

https://doi.org/10.1111/j.0038-4941.2004.00239.x

Imamoglu, C. (2000). Complexity, preference and familiarity: Architecture and nonarchitecture Turkish students' assessments of traditional and modern house facades. *Journal of Environmental Psychology, 20*(1), 5-16. https://doi.org/10.1006/jevp.1999.0155

İmamoğlu, V. (1975). *Spaciousness of interiors* [Unpublished Doctoral dissertation]. University of Strathclyde.

Joshi, N. C., & Rawat, G. S. (2020). Why only blue in the traditional architecture of western Himalaya, India? *Colour Research and Application, 45*(1), 95-104.

https://doi.org/10.1002/col.22440

Joyce, M. L., & Lambert, D. R. (1996). Memories of the way stores were and retail store image. *International Journal of Retail and Distribution Management, 24*(1), 24-33. https://doi.org/10.1108/09590559610107094

Kim, J., Dear, R., Candido, C., Zhang, H., & Arens, E. (2013). Gender differences in office occupant perception of indoor environmental quality. *Build. Environ., 70*, 245-256. https://doi.org/10.1016/j.buildenv.2013.08.022

Lindfors, P., Berntsson, L., & Lundberg, U. (2006). Factor structure of Ryff's psychological well-being scales in Swedish female and male white-collar

workers. *Personality and Individual Differences, 40*(6), 1213-1222. https://doi.org/10.1016/j.paid.2005.10.016

Llinares, C., Montañana, A., & Astor, E. N. (2011). Differences in architects and non-architects' perception of urban design: An application of kansei engineering techniques. *Urban Studies Res.,* 1-13. https://doi.org/10.1155/2011/736307

Malekinezhad, F., Chizari, H., Lamit, H. B., & Bin M. S. F. R. (2013). A comparative study on designers and non-designers emotion of urban sculptures using affect grid. *Life Sci. J., 10*(3), 2056-2063.

Mehrabian, A., & Russell, J. (1974). *An approach to environmental psychology*. The MIT Press.

Müezzinoğlu, M. K., Hidayetoğlu, M. L., & Yıldırım, K. (2020). The effects of the wall colours used in educational spaces on the perceptual evaluations of students. *Megaron, 15*(1), 1-12. DOI: 10.14744/megaron.2020.87369

Müezzinoğlu, M. K., Hidayetoğlu, M. L., & Yıldırım, K. (2021). The effects of light colour temperatures on students' perceptual evaluations in design studios. *Colour Research and Application, 46*(5), 1006-1018. https://doi.org/10.1002/col.22654

Özkan, A., & Yıldırım, K. (2016). Comparison of conventional and computer-aided drafting methods from the view of time and drafting quality. *Eurasian Journal of Educational Research, 16*(62), 239-254. http://dx.doi.org/10.14689/ejer.2015.58.2

Öztürk, E., Yılmazer, S., & Ural, S. E. (2012). The effects of achromatic and chromatic colour schemes on participants' task performance in and appraisals of an office environment. *Colour Research & Application, 37*(5), 359-366.

https://doi.org/10.1002/col.20697

Savavibool, N., & Moorapun, C. (2017). Effects of colour, area, and height on space perception. *Environment-Behaviour Proceedings Journal, 2*(6), 351-359. https://doi.org/10.21834/e-bpj.v2i6.978

Tantanatewin, W., & Inkarojrit, V. (2016). Effects of colour and lighting on retail impression and identity. *Journal of Environmental Psychology, 46*, 197-205. https://doi.org/10.1016/j.jenvp.2016.04.015

Tsunetsugu, Y., Miyazaki, Y., & Sato, H. (2005). Visual effects of interior design in actual-size living rooms on physiological responses. *Building and Environment, 40*(10), 1341-1346. https://doi.org/10.1016/j.buildenv.2004.11.026

Voyer, D., Voyer, S., & Bryden, M. P. (1995). Magnitude of sex differences in spatial abilities: A meta-analysis and consideration of critical variables. *Psychological Bulletin, 117*(2), 250-270. https://doi.org/10.1037/0033-2909.117.2.250

Wallet, G., Sauzéon, H., Larrue, F., & N'Kaoua, B. (2013). Virtual/real transfer in a large-scale environment: Impact of active navigation as a function of the viewpoint displacement effect and recall tasks. *Advances in Human-Computer Interaction, 2013,* 1-7, Article ID 879563. https://doi.org/10.1155/2013/879563

Wolbers, T., & Hegarty, M. (2010). What determines our navigational abilities? *Trends in Cognitive Sciences, 14*(3), 138-146. https://doi.org/10.1016/j.tics.2010.01.001

Yildirim, K., Ayalp, N., Aktas, G. G., & Hidayetoglu, M. L. (2014). Consumer perceptions and functional evaluations of cash desk types in the clothing retail

context. *International Journal of Retail & Distribution Management, 42*(6), 542-552. https://doi.org/10.1108/IJRDM-03-2013-0056

Yildirim, K., Hidayetoglu, M. L., & Capanoglu, A. (2011). Effects of interior colours on mood and preference: Comparisons of two living rooms. *Perception and Motor Skills, 112*(2), 509-524. DOI: 10.2466/24.27.PMS.112.2.509-524

Yıldırım, K. (1999). Günümüz konut mutfağında donatı elemanları üzerine bir araştırma. *Politeknik Dergisi, 2*(4), 7-14.

Yıldırım, K., & Akalın, A. (2009). Problems related to the dimensions of curved areas in the main living rooms of apartment housing. *Journal of Architectural and Planning Research, 26*(1), 70-87. https://www.jstor.org/stable/43030853

Yıldırım, K., & Uzun, O. (2010). The effects of space quality of dormitory rooms on functional and perceptual performance of users: Zübeyde Hanım Sorority. *Gazi Üniversitesi Fen Bilimleri Enstitüsü Dergisi, 23*(4), 519-530. https://dergipark.org.tr/en/pub/gujs/issue/7417/97242

Yıldırım, K., Akalin-Baskaya, A., & Celebi, M. (2007b). The effects of window proximity, partition height, and gender on perceptions of open-plan offices. *Journal of Environmental Psychology, 27*(2), 154-165. https://doi.org/10.1016/j.jenvp.2007.01.004

Yıldırım, K., Akalin-Baskaya, A., & Hidayetoglu, M. L. (2007a). Effects of indoor colour on mood and cognitive performance. *Building and Environment, 42*(9), 3233-3240. https://doi.org/10.1016/j.buildenv.2006.07.037

Yıldırım, K., Başkaya, A., & Hidayetoğlu, M. L. (2005). Farklı sosyo ekonomik düzeye sahip blok-konut kullanıcılarının sabit iç donatım elemanlarından memnuniyeti. *Politeknik Dergisi, 8*(2), 189-197. https://dergipark.org.tr/tr/pub/politeknik/issue/33013/367017

Yıldırım, K., Çağatay, K., & Hidayetoğlu, M. L. (2015). The effect of age, gender and education level on customer evaluations of retail furniture store atmospheric attributes. *International Journal of Retail and Distribution Management, 43*(8), 712-726. https://doi.org/10.1108/IJRDM-01-2013-0034

Yıldırım, K., Capanoglu, A., Çağatay, K., & Hidayetoglu, M. L. (2012). Effect of wall colour on the perception of hairdressing salons. *JAIC-Journal of the International Colour Association, 7,* 51-63.

Yıldırım, K., Güneş, E., & Yılmaz, G. P. (2019). The effects of workstation partition heights on employees' perceptions in open-plan offices. *Journal of Corporate Real Estate, 21*(2), 148-166. https://doi.org/10.1108/JCRE-03-2018-0010

Yıldırım, K., Hidayetoğlu, M. L., & Şen, A. (2007c). Farklı mimari biçimlerdeki kafe/pastane mekânlarının kullanıcıların algı-davranışsal performansı üzerine etkisi. *Politeknik Dergisi, 10*(3), 295-301. https://dergipark.org.tr/tr/pub/politeknik/issue/33026/367179

Yıldırım, K., Yıldırım Kaya, N. N., & Olmus, F. (2020). The effects of indoor plants on customers' shopping decisions in a restaurant environment. *International Journal of Retail and Distribution Management, 48*(12), 1301-1314. https://doi.org/10.1108/IJRDM-02-2020-0053

Yılmaz, H., Yıldırım, K., & Hidayetoglu, M. L. (2022). The effect of carrier system materials used in an olympic swimming pool on the perceptual evaluations of respondents. *Facilities, 40*(9/10), 675-695. https://doi.org/10.1108/F-11-2021-0117

BIOGRAPHY OF AUTHORS

Kemal Yıldırım, PhD, is presently employed as a Professor at the Gazi University in Ankara, Türkiye. Prof. Yıldırım has written over 150 national and international scientific articles in the field of furniture and interior design. His research field consists of environmental psychology, design psychology, colour design, spatial planning, perception and interior space analysis. In addition, there are more than 20 national and international design awards in the field of furniture design.

Menşure Kübra Müezzinoğlu, PhD, is presently employed as a Associate Professor at Fırat University, Department of Interior Architecture in Elazığ, Turkey. She has published many academic articles / papers / book chapters on interior architecture, spatial perception, environmental psychology, use of colour and light in spaces, interior architecture education, accessibility, universal design and inclusive design.

Seda Şahin is currently an undergraduate student at Gazi University, Faculty of Technology, Department of Woodworking Industrial Engineering, and is working on colour research.

Beray İnan is currently a graduate student in the Department of Woodworking Industrial Engineering, Gazi University Institute of Science, researching human-object density and colour perceptions in architectural spaces.