

Impact of Interior Colour Psychology on Patient Stress and Recovery on Healthcare Architecture

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Abstract

Interior environments significantly influence psychological and physiological well-being, particularly in healthcare settings where patients experience heightened stress and anxiety. This research investigates the role of interior colour psychology in reducing patient stress and enhancing recovery outcomes. The study examines how different colour palettes—cool, warm muted, and neutral tones—affect emotional responses within healthcare environments. A mixed-method approach was adopted, including questionnaire surveys, literature review, and comparative case studies of Maggie's Centres (United Kingdom) and Chelsea and Westminster Hospital. Findings indicate that cool nature-inspired colours such as blue and green promote calmness and reduce stress, while warm muted tones such as soft yellow and peach enhance optimism and emotional reassurance. Excessive neutrality without layering may lead to psychological detachment. The research further identifies that colour effectiveness is mediated by lighting, materiality, spatial configuration, and cultural perception. The study concludes that colour functions as a silent therapeutic infrastructure and should be strategically integrated into healthcare design to support holistic healing.

Key Words: Interior Colour Psychology, Healthcare Architecture, Patient Stress, Healing Environments, Spatial Psychology, Therapeutic Design.

1. INTRODUCTION

Healthcare architecture has traditionally focused on functional efficiency, sanitation, and technical performance. However, contemporary research emphasizes the psychological dimension of healing environments. Hospitals are often associated with fear, anxiety, and emotional vulnerability. Interior colour, though often underestimated, plays a critical role in shaping emotional perception and behavioural responses.

Colour influences human psychology through visual processing and neurological responses. In healthcare spaces, patients spend extended periods under stress. Therefore, the selection of interior colours becomes a therapeutic design decision rather than a decorative choice.

This research explores how interior colour psychology affects patient stress levels and recovery. It aims to bridge architecture, neuroscience, and environmental psychology to establish colour as a measurable healing parameter.

2. Body of Paper

2.1 Research Aim

To evaluate how interior colour schemes influence patient stress reduction and psychological comfort in healthcare environments.

2.2 Research Objectives

- To understand psychological effects of different colour palettes.
- To analyse calming and stressful colour perceptions.
- To examine healthcare professionals' perspectives on colour in recovery.
- To compare case studies of therapeutic and conventional healthcare spaces.
- To develop colour design recommendations for healthcare architecture.

2.3 Main Research Question

How does interior colour psychology influence patient stress levels and recovery outcomes in healthcare spaces?

Variables and Parameters of Study

The research examined both independent and dependent variables.

Independent Variables (Colour Properties)

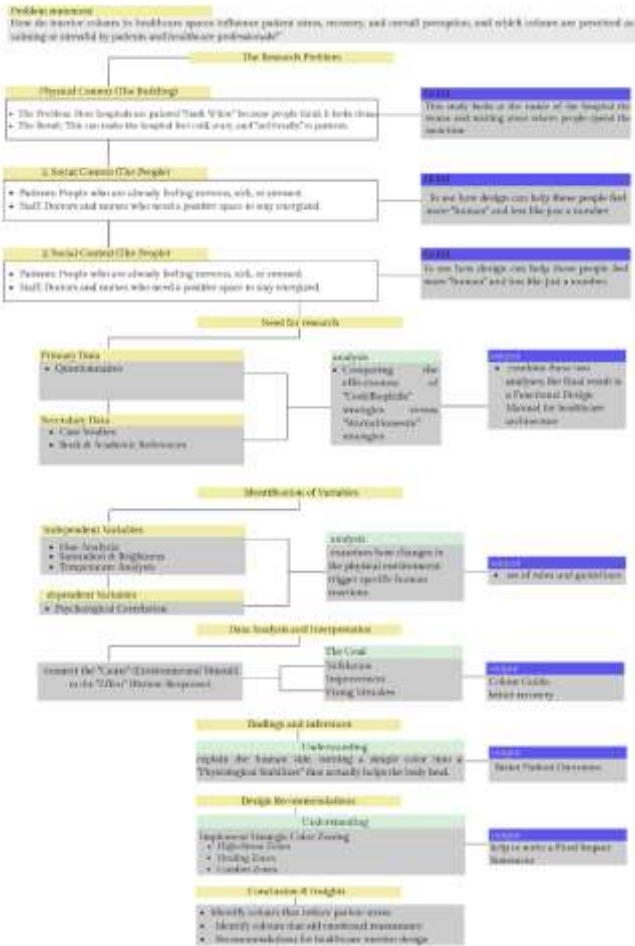
1. **Hue** – The name of the colour (blue, green, yellow, etc.).
2. **Saturation** – The intensity or vividness of colour.
3. **Brightness** – The lightness or darkness of the colour.
4. **Temperature** – Whether the colour feels warm or cool.



Dependent Variables (Patient Responses)

1. Perceived comfort
2. Anxiety level
3. Emotional stability
4. Mood state
5. Perceived safety

Research Methodology



The research adopts a mixed-method approach combining qualitative and quantitative components. This methodology is grounded in a pragmatic research philosophy that focuses on practical solutions and real-world applications.

LITERATURE REVIEW

Colour Psychology

Colour is processed in the visual cortex and linked to emotional centres of the brain. Different hues stimulate different neurological responses:

- Cool colours (blue, green) activate parasympathetic responses.

- Warm muted tones stimulate mild dopamine activity.
- High-saturation red increases heart rate and alertness.

Thus, colour selection impacts stress regulation.

Neuropsychological Understanding

From a neuroscientific perspective:

- Cool tones reduce blood pressure and calm the nervous system.
- Soft warm tones promote reassurance and optimism.
- Bright saturated tones increase stimulation and anxiety.

Recovery environments therefore benefit from low-arousal.

Questionnaire Survey

Questionnaires were distributed among:

- Patients
- Visitors
- Healthcare professionals

Participants were asked about:

- Feelings in differently coloured spaces
- Perceived calmness or stress
- Emotional comfort
- Professional observations on recovery

Case Study Analysis

Two healthcare environments were selected:

1. Maggie’s Centres, United Kingdom
2. Chelsea and Westminster Hospital, London

Selection criteria included:

- Clearly defined colour schemes
- Similar service categories
- Stable lighting conditions
- Accessibility for observation

Case Study 1: Maggie’s Centres

Maggie’s Centres focus on emotional support for cancer patients. Unlike traditional hospitals, these spaces resemble homes or retreat centres.

Architectural Colour Strategy:

- Soft sage greens
- Warm off-whites
- Timber finishes
- Earth-toned textiles
- Gentle daylight diffusion

There is a conscious rejection of stark white walls. The environment avoids overstimulation and promotes grounding.

Observed Outcomes:

- Visitors described spaces as safe and calming.



- Reduced anxiety was reported.
- Emotional reassurance was evident.



Case Study 2: Chelsea and Westminster Hospital

This hospital represents a conventional clinical setting with strategic colour integration.

Architectural Colour Strategy:

- Colour-coded corridors for navigation
- Pastel hues in maternity wards
- Muted blue-green tones in recovery units
- Controlled white in operation areas

Observed Outcomes:

- Improved wayfinding
- Reduced monotony in corridors
- Greater comfort in pediatric and maternity areas
- Emotional detachment reported in overly white zones

This case demonstrates balance between hygiene and emotional sensitivity.

Architectural Colour Strategy:

- Colour-coded corridors for navigation
- Soft pastel hues in maternity wards
- Muted blue-green tones in recovery areas
- Controlled white in operating zones

Observed Outcomes:

- Improved wayfinding due to colour-coded spatial transitions
- Greater comfort in pediatric and maternity departments
- Reduced monotony in long corridors

Author(s) / Architects	Profession	Theory / Concept	Core information & Application
Andrew J. Elliot & Mark A. Maier (2014)	Psychologists	Colour Psychology	Argue that colour influences human functioning through biological responses (evolutionary) and cultural learning. Notable associations include: Blue (calmness), Green (nature/restoration), Red (alertness), and Yellow (optimism).
Roger S. Ulrich (1984, 1991)	Environmental Psychologist	Stress Recovery Theory	Proposes that supportive environments reduce physiological stress. Calming visual stimuli, such as soothing colour palettes, activate the parasympathetic nervous system to help the body relax.
Rachel & Stephen Kaplan (1989)	Environmental Psychologists	Attention Restoration Theory	Suggests that environments reducing mental fatigue help restore cognitive balance. Natural colour tones inspired by landscapes contribute to this restorative effect.
Stephen Verderber & David Fine (2000)	Healthcare Architects / Planners	Healing Architecture	Contend that colour, materials, lighting, and spatial organization must work together as a sensory healing strategy to reduce "institutional harshness".
D. Kirk Hamilton & David Watkins (2009)	Healthcare Architects	Evidence-Based Design	Assert that design decisions should be based on measurable research rather than intuition. They note colour affects perception and patient satisfaction but call for more research linking it to medical outcomes.
N/A (General Principle)	N/A	Arousal Theory	Explains that highly saturated or intense colours may overstimulate vulnerable patients, whereas muted tones maintain balanced physiological arousal.

Theories

Comparative Analysis

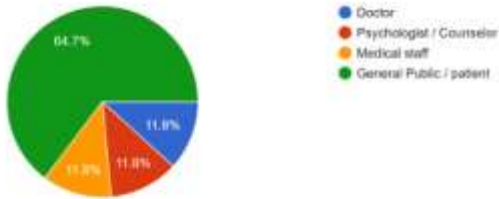
Both case studies reveal that colour influences:

- Perceived safety
- Emotional warmth
- Stress reduction
- Spatial clarity

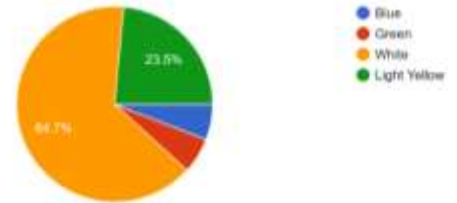
Maggie’s Centres prioritize emotional comfort over institutional identity. Chelsea and

CHARTS

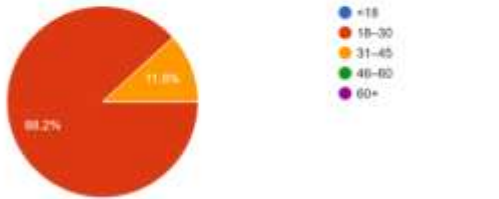
Profession / Role
17 responses



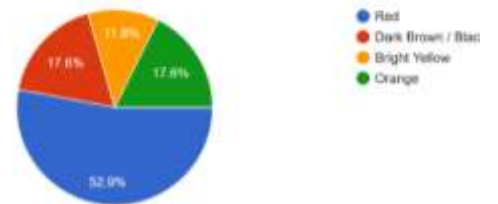
17 responses



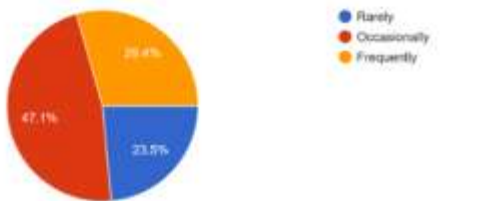
Age
17 responses



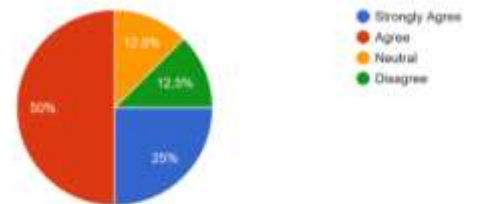
Which colours feel stressful or uncomfortable to you?
17 responses



How often do you visit healthcare facilities
17 responses



Do you think colours in hospitals can affect healing and recovery?
16 responses



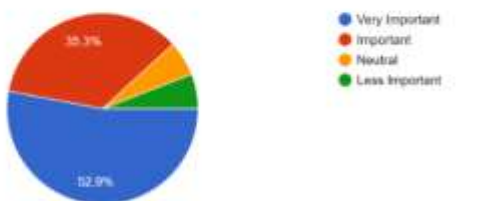
Have you noticed the colours of walls, furniture, or décor in hospitals or clinics?
17 responses



Would you prefer hospital spaces to have warm, neutral, or cool colours?
17 responses



How important do you think interior design (including colour) is in patient care and recovery?
17 responses



Synthesis with Theory

Stress Reduction Theory

Natural, cool colours reduce stress by lowering sympathetic nervous system activation.

Neuropsychological Understanding

- Cool tones slow heart rate.
- Warm muted tones support optimism.
- High-saturation red increases alertness.

Thus, recovery environments benefit from low-arousal palettes.

Spatial Psychology

Colour affects spatial perception:

- Light cool tones expand space visually.
- Dark tones compress space.
- Gradual transitions create continuity.

Discussion

The findings confirm that colour functions as an emotional regulator in healthcare settings. It influences stress levels subconsciously.

Excessive neutrality may create sterility and detachment. Over-saturation may increase agitation. Balanced palettes combined with lighting and material coordination create supportive environments.

Colour must be integrated holistically with:

- Natural light
- Artificial lighting temperature
- Material reflectivity
- Spatial proportions
- Cultural sensitivity

Interpretation

Colour as Emotional Regulator: The study shows that colour does not only decorate a room—it affects how people feel inside that room. Our brain constantly reacts to colours, even when we are not aware of it. Soft blues and greens slow down the body's stress response, helping reduce heart rate and muscle tension.

Vulnerability and Sensory Amplification: When a person is sick, injured, or waiting for medical results, their emotional state becomes more sensitive. This is called sensory amplification—the senses become more alert because the person is already stressed or anxious. In such situations, bright white walls may feel harsh, while layered colour schemes create "sensory cushioning."

Cultural Interpretation: Colour does not have the same meaning everywhere. In healthcare architecture, designers cannot apply a single universal colour formula. What works in one country may not emotionally resonate in another.



Fig : Modern healthcare interior showing balanced colour application



Fig : Modern healthcare interior showing balanced colour application

DESIGN IMPLICATIONS

Based on findings:

1. Use cool colours in patient rooms.
2. Introduce muted warm tones in waiting areas.
3. Avoid excessive white.
4. Integrate natural light.
5. Layer textures and materials.
6. Avoid high-saturation red in recovery zones.

ANALYSIS

Category	Finding	Application for Healthcare Design
Primary Base	White / Neutrals	Use for large surfaces (walls) to maintain a sense of cleanliness.
Accent Colors	Green / Soft Blues	Use in recovery rooms or waiting areas to promote lower heart rates.
Colors to Avoid	Red / Dark Brown	Avoid in high-stress areas like ERs or surgical prep rooms.
Target Audience	Young Adults (18-30)	Design should lean toward modern, clean, and minimalist aesthetics.

Implications

For Healthcare Architecture:

- Use biophilic colour strategies (leafy greens and sky blues)
- Coordinate colour with lighting
- Implement colour zoning for wayfinding

Key Findings:

- Cool colours (blues and greens) were most effective in reducing stress and promoting calmness, particularly in recovery wards and high-dependency units.
- Warm muted colours (soft yellows, peach, terracotta) promoted optimism and emotional reassurance, especially in pediatric and maternity spaces.
- Neutral colours (white, grey, beige) were perceived as sterile and emotionally distant when used excessively.
- Colour interacts with lighting, materiality, spatial volume, and cultural perception, creating a holistic environmental effect.

CONCLUSION

1. Colour significantly influences patient stress and emotional state. Patients respond subconsciously to colour. Cool tones promote parasympathetic relaxation responses, lowering heart rate and anxiety levels.
2. Colour supports recovery. Emotional calmness fosters rest and relaxation, which in turn supports physiological healing processes.
3. Colour interacts with environmental variables. Lighting, spatial proportions, material finishes, and cultural context all mediate the effect of colour.
4. Case studies provide practical evidence of effective design. Maggie's Centres exemplify human-centred, therapeutic architecture, while Chelsea and Westminster Hospital shows how colour can be strategically integrated into conventional clinical spaces.
5. Cultural and contextual sensitivity is essential. Colour perception is not universal. Designers must consider local cultural meanings and patient demographics.
6. Colour is not merely aesthetic but ethical. Interior colour choices have measurable effects on wellbeing and recovery.

Sl. No	Research Finding	Colour Type / Variable	Observed Psychological Impact	Design Implication
1	Cool colours reduce patient stress	Blue, Green (Low saturation)	Calmness, reduced anxiety, emotional stability	Use in patient rooms, recovery wards, counselling areas
2	Warm muted colours enhance reassurance	Soft yellow, peach, earthy tones	Emotional comfort, optimism, warmth	Suitable for waiting areas and family interaction spaces
3	Excessive white creates sterility	Pure white, high brightness	Emotional detachment, cold feeling	Avoid large monotone white surfaces; layer with texture
4	High saturation red increases arousal	Bright red, intense contrast	Alertness, agitation, increased heart rate	Avoid in recovery zones; restrict to emergency alerts only
5	Colour works with lighting	Natural daylight + colour interaction	Enhanced emotional response	Integrate colour planning with lighting design
6	Neutral colours require layering	Beige, grey, off-white	Balanced calmness when combined with natural materials	Add wood, plants, textures to prevent dullness
7	Spatial perception changes with colour	Light cool tones vs dark tones	Light colours expand space; dark compress space	Use light cool tones in small patient rooms
8	Colour zoning improves orientation	Differentiated colour coding	Reduced cognitive stress, better wayfinding	Apply colour coding in corridors and departments
9	Emotional healing supports physical recovery	Therapeutic palette	Lower stress leading to better recovery outcomes	Treat colour as part of healing strategy
10	Colour must be culturally sensitive	Context-based hues	Varied emotional response across users	Study local cultural associations before application

REFERENCES

Elliot, A. J., & Maier, M. A. (2014). Color psychology: Effects of perceiving color on psychological functioning in humans. *Annual Review of Psychology*, 65, 95-120.

Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *Science*, 224(4647), 420-421

Ulrich, R. S. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*, 11(3), 201-230.

Ulrich, R. S. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*, 11(3), 201-230.