Florida International University

IND 5937 Special Topics

Spring 2019

Group 2

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INTRODUCTION

Background

The development of the modern hospital has been thoroughly researched and documented by architects and healthcare practitioners (Topp, 2018). In 1863, Florence Nightingale published highly influential guidelines regarding patient healing based on the idea that hospitals themselves were one of the greatest impediments to good health. She believed that the gathering of sick individuals in an enclosed space did not improve health, but only made them sicker (Nightingale, 1863). Through the careful control of interior/exterior interactions and exposing patients to large amounts of natural light and fresh air, the hospital environment could better foster patient recovery. Nightingale also believed that the interior arrangement of spaces could further promote well-being by carefully controlling the size and placement of patient wards, as well as the placement of elements such as windows, beds and ventilation systems. Nightingale is also credited with the rise of the “white wall” which created a stark feeling as well as hard cleanable surfaces and minimal decoration to prevent the spread of germs. Around the same time, the germ theory was gaining acceptance (Topp, 2018, p.218). This theory explained that germs were spread through contact and not airborne as Nightingale believed. Under this theory, hospitals could be designed with little attention to the placement of interior elements as long as the surfaces could be disinfected. This would prevent the spread of hospital infections and therefore promote patient recovery.

Purpose of this study

Today, extensive research exists that seems to simultaneously support both Nightingales findings and those of the Germ Theory. The research, performed by numerous disciplines, demonstrates a link between the healthcare environment and patient well-being as related to interior/exterior relationships and that of furnishings and materials used to prevent the spread of disease. However, further evidence is emerging that shows Nightingale’s guidelines also promoted psychological well-being which could have further contributed to patient recovery. The aim of this literature review is to study published research in order to develop an understanding of the psychological and physical wants and needs of cancer patients when undergoing treatment. It also aims to shed light on the role interior design elements in the healthcare setting play in fostering healing through the psychological effects of color, implementing biophilia, the role of audio and visual privacy, access to entertainment options and furnishings/finishes for each patient.

Research Questions

Central Question

What role do interior design elements play in fostering well-being for cancer patients and do elements such as color, entertainment, biophilia, privacy and materiality further meet the psychological and physical wants and needs of these patients?

Sub-Questions

1. How does color affect the healing process?
2. How does entertainment help with time perception during treatment?
3. How will implementing biophilic elements in the built environment affect patients?
4. How do audio/visual elements affect the patients?
5. How do interior materials and finishes contribute to patient well-being?

Significance of this Study

Cancer patients experience psychological and physical changes during their treatment. Emerging research indicates that the relationship between indoor air quality and wellbeing is complicated. A range of indoor factors such as thermal, visual, acoustic, and chemical can impact the wellbeing of the occupants. (Apte et al., 2000; Jantunen et al., 1998, WHO, 2002) Preceding studies have proposed that negative beliefs about cancer may harm patients' psychological well-being, but only a scarce amount of these studies focused on detailed psychological symptoms that the environment and factors such as, biophilia, privacy, entertainment and material selections, impacts the overall well-being of patients (Cunha, 201, p. 278). These outcomes of the researches highlight the significance of taking into account the environmental design factors mentioned above to possibly rectify mistaken theories about psychological factors which affect healing and avoid the occurrence and perseverance of psychological harm of the well-being over time.(Cunha, 201, p. 278)

LITERATURE REVIEW

Color and its Role in the Healing Process

The choice of colors in the healthcare environment is very important. Color in the healthcare setting should consider the emotional and psychological factors which affect the well-being of the patients. The current trend in hospital interior design is to create an attractive, relaxing atmosphere in order to relieve patients' stress and anxiety, improve their emotions and hence encourage the healing process (Devlin & Arneill, 2003).

In the study (Hamid & Newport, 1989), it was demonstrated that children showed different physical strength in different colored rooms. The main purpose of this study was to inspect the effect of the warm color tone (pink) and cool color tone (blue) on the gross motor activity and the mood of the children. The study found that children who spent more time in the pink colored rooms demonstrated more positive mood as well as the increased physical strength. The researchers explained, "'Generally researchers posit that, if colour has an effect, it may be viewed as based on the performance and arousal curve (Hebb, 1955) with increases in performance related to increases in arousal up to some optimum for each individual. (Hamid & Newport, 1989, p.179). The article (Kwallek & Lewis , 1990) explained that the colors can evoke a feeling of pride, identity, and significance. The article explained that people adapt and look at things in order to relate them to various emotions as well as to define space and behavior. The males and females perceived the same color differently. The study stated that the universally accepted white color for the office design was found to reduce productivity. In contrast, the participants found the red color office buildings to be distracting but they made fewer errors compared to the people working in the white offices. The authors described their study as, "'Specifically, for subjects in either the red or white office, more males than females found the colour of the environment distracting, while more females than males who worked in the green office found the colour of that environment distracting." (Kwallek& Lewis, 1990, p.277).

In the research work by Saito, M. (1996), the preference of the color is found to differ by age, sex, and geography. He conducted the experiments to determine the preferences of the color by geographical similarities in Tokyo and Seoul. The author shows that people interested in the new trends of fashion are inclined towards the darker color tones. Males preferred bluish colors and vivid tones than females, and females were found to prefer pale colors, purplish colors and dark tone, and reddish colors. Light grayish and deep color tones were preferred by older people and achromatic colors were preferred by younger

people. Pale tones and vivid tones were preferred by the middle-aged population. White color was favored by the people in Tokyo and Seoul. The light and pale tone was favored in Tokyo, while the vivid tone was favored in Seoul. He explains the preference of the colors based on the geographical location as, “Among those similarities, the fact that white was commonly preferred highly not only in Tokyo but also to an even greater degree, in Seoul, made the author replicate the survey in Taipei (Fig. 2) (p.42), which is close to Japan both geographically and culturally, to test the hypothesis that the strong preference for white is based to some degree on geographical and cultural variables” (Saito, 1996, p. 43).

Stone & English, (1998) found the performance of people is affected by the wall color in a high demand task. People working within partitions with blue color perceived privacy and the people working within the partitions with red color found it to be simulating for performing monotonous and boring tasks. The red color red was found to be stimulating, whereas blue was found to be more depressing. She explains the influence of blue color as, “Therefore, the low perceived task demand affected by the blue environment may have countered the high level of hostility generated by the low demand task, leading to the fewest number of errors” (Stone & English, 1998, p. 182).

Naz and Epps, (2004) studied the emotional responses of various colors on people. The green color was found to have a positive emotional response, invoking the feeling of calm and relaxation. The green color also evoked the feeling of nature, comfort, and soothing. Yellow color evoked the feeling of positiveness and happiness. Blue color evoked the feeling of relaxation and calmness. Red color evoked mixed feelings- both positive as well as negative. Purple color evoked the feeling of relaxation and calmness as well as tiredness, fear, and boredom. Intermediate hues- blue-green showed highest emotional association in people. White color evoked the feeling of purity and cleanliness. She explains the influence of different colors in different people is different from a personal preference. She writes, “Therefore, it seems that a color related emotion is highly dependent on personal preference and one's past experience with that particular color” (Naz and Epps, 2004, p. 401).

Dalke, Little, Niemann, Camgoz, Steadmann, Hill &Stott, (2006) studied how the appropriate colors can act as powerful tools for coding, navigation as well as wayfinding. For children, the use of different colors can make the environment more interesting. Color can also work as the landmark and ease of wayfinding. For the visually impaired personnel, color and shadow details can be provided to let them know about the hierarchy of spaces. They write,” Ensuring optimal and appropriate color and lighting for healthcare environments is vital” (Dalke et al, 2006 p. 345).

Verhoeven, Pieterse & Pruyn, (2006) in their article discuss how the colors affect the emotional and cognitive appraisal of people under various levels of anxiety. Colors can enhance service evaluation by decreasing stress and increasing pleasure. Also, the finding of the article shows how the perception of the colors is independent of the time of the exposure to the colors. Color can also enhance service

evaluation by improving the customer's state of mind and increasing their evaluation of the physical environment. They write, “Blue walls (as compared to white walls) reduce anxiety and increase cognitive and affective appraisal and even perceived service quality” (Verhoeven et al., 2006 p. 292).

Codd and Codd, (2008) studied the preferences of children varies for different colors and thematic designs. This article provides insight into making an inclusive design that can create a soothing and calming environment for children in healthcare settings. Mid-blue colors were more preferred by children and some younger people above 11 years showed preferences for the dark blue colors. For the entrance of the hospitals, the children selected a single color, mild-warm blue, pastel green, and orange color. The participants preferred the warm inviting corridors with mid-orange color over the existing cream or white colors. The participants favored the single colors and the combination colors for the ward area. The single color being blue, accent and pastel orange and combinations being blue, pink and neutral yellow. The children and the young people preferred the mid and paler range of colors due to the calming effect of blue and warmth of green color.

Dijkstra, Pieterse, and Pruyn, (2008) studied the screening ability of the participants in the health care environment to figure out the individual differences in the health-related and the cognitive appraisals of the environment. The participants with the low screening ability encountered more arousal in the orange colored rooms than the white colored rooms. The participants found the orange colored rooms to be more attractive. The participants found the room with the orange color to be lower in terms of the professional quality than that of the white colored rooms. Green and orange colors were found to have the stress-reducing traits in the participants with the lower ability of screening. The authors state, “Wall color only appeared to have a small effect on health-related outcomes, but when stimulus screening ability is taken into account, these effects are fairly straightforward” (Dijkstra, Pieterse, and Pruyn, 2008, p. 276).

The Role of Entertainment in Patient Perception of Time During Treatment

The choice of entertainment in the healthcare environment may be one of the aspects that will make the space to feel comforting, welcoming and help patients with time perception when undergoing chemotherapy treatments (Boscherini, Giuseppe, 2017, p.108). Architects and Designers have been working in different projects and understanding how the architecture has tremendous power when it comes to psychological effects that it has in the users of the space (Peters, Terry, 2014, p.52).

One of the things that a cancer patient would fear the most is having the prognosis that his or her cancer had returned. Margaret Keswick (2016) a writer, and designer, unfortunately, was one of those patients and had to return to the hospital to proceed with treatment. Over the next two years, waiting for her death, she was observing her surroundings and thinking about solutions that could have been applied to the chemo center for the patients' experience to be smoother less painful. She describes the place she was put in as a neglected space, left to ‘wilt’ under the desiccating glare of fluorescent lights. Margaret had a mission with her husband: to provide free global care for cancer patients through great architecture. Terminal patients most of the time may feel hopeless and have no desire even to try to fight with the disease and rather die faster than suffering in a treatment that might never give them the complete cure (Medina, Samuel, 2014, p.30). Maggie states that the building could be used as a secondary therapy, feedback therapy (Medina, Samuel, 2014, p.30). ‘Maggie’s cancer center is defined by positive qualities: light, space, openness, intimacy, views, and connection to nature, not the same as a standard-issue hospital environment. In the words of the ‘Maggie's Architecture and Landscape Brief,' Maggie's Centers ‘must look and feel joyous; they must have zest as well as calm' (Boscherini, Giuseppe, 2017, p.10w5).

When patients have an architectural surrounding that is appealing to them and gives them comfort and faith to keep going and never give up, they are much more likely to risk living and have a second chance (Medina, Samuel, 2014, p.35). Those that don’t have a pleasant surrounding and the chemotherapy experience is always a struggle and a trauma for them; they lose all the hope and rather die faster. The hospital environment itself can be very daunting and lonely, and that’s not positive at all for the recovery. That is one of the reasons it is essential to make sure patients feel connected to the outside world.

Patients, when having a bad situation to deal with, would much rather have a private light-filled space to wait for the results and process the findings in silence and privately (Medina, Samuel, 2014, p.30). A series of interlocking rooms cloistered around tree-studded courtyards and landscape gardens is also another great solution to make their surroundings more enjoyable and pleasant for the patients, staff and the visitors (Medina, Samuel, 2014, p.30).

Each of the centers incorporates an open kitchenette where patients can gather for a cup of tea, game activities such as chess and cards, airy sitting rooms with access to gardens, landscape features, and beautiful views. There are also private rooms for one-to-one consultations with caregivers advising patients on dietary planning, psychological help and so forth. Church services in the hospital can serve as a great way to entertain patients and give them hope and faith to keep going strong and having the treatments completed successfully. Hairdresser and wig specialized professionals are essential for Cancer patients going through chemotherapy. Losing the hair most of the times is a very traumatic process for patients, and they need a lot of professional support to go through that phase.

The sense of being connected to the outside world may be resolved when the hospital provides to the patient television, video games, and laptops to help with time perception. An environment that balances a calming reassurance with constructive stimulation can help improve the positive mindset that people need to overcome illnesses such as cancer. Giuseppe Boscherini argues and proves that light, sound, texture, and color contributes to the health-living architecture. Implementing designs that are salutogenic, focusing on factors that keep us well such as environments that stimulate the mind to create pleasure, creativity, satisfaction, and enjoyment can speed up the recovery of health. (Boscherini, Giuseppe, 2017, p.108).

The psychosocially supportive design aims to encourage the brain to create and induce a sense of wellbeing. They are welcoming spaces for meetings and social exchanges, areas for the patients to spend time with their families and friends and quiet spaces for meditation and restoration (Boscherini, Giuseppe, 2017, p.108).

Rooms that have exposure to bright morning light may reduce agitation among elderly patients. Artificial lighting and natural daylight have a positive effect on older adults' abilities to see and focus on objects, distinguishing their colors. (Boscherini, Giuseppe, 2017, p.108).The sound is close sound insulation and absorption, inducing restorative sleep and better mood, while also music has been proven to be an analgesic and lower blood pressure and heart rate (Boscherini, Giuseppe, 2017, p.109). Another factor that might help the cancer patients to restore the pleasure associated with flowers and fresh fruits is implementing gardens and outdoor spaces with fresh air since the indoor environment sometimes might have a powerful smell due to all the chemicals that need to be used in the treatment for safety and hygiene purposes. Floral and fruity smells have been proven to lower blood pressure, slow down respiration, relax muscles and increase alertness (Boscherini, Giuseppe, 2017, p.113). Those ideas can be implemented in cancer facilities with workshops of bouquets for the patients – those might help with all the facts listed above, and it would be a great way of reducing anxiety and helping with the perception of the time. Space can also be used as a sustainable therapy, a therapeutic environment that is truly sustainable is informed by thinking about health in its broadest sense and understanding and caring about the community. Space, art, and gardens are essential in a well-conceived project, to help patients to feel comfortable and entertained during treatments. A good, well-balanced environment is beautiful and reflective, using color, texture, light, and sound to overcome cognitive dissonance.

The connection to the outdoors may positively impact the user’s circadian rhythms, blood pressure, attentiveness, verbal expression, restoration, and behavior; the outdoor space promotes communication, activity and positive mental health (Boscherini, Giuseppe, 2017, p.110). Providing interesting circulation routes, that would enhance the users' experience and social contact by locating

interactive areas within the circulation area and designing the bedrooms as sanctuaries to reinforce the patient's identity.

Art can be used as a form of expressing emotions and innermost feelings. These patients can use creativity to explore the meaning of previous conditions during art therapy. These methods can also help them to accept cancer as a long-term illness and learn how to control anxiety, during pre and post-chemotherapy treatment. The use of Art helps significantly in managing the depression and even pain (Alati, Danine, 2009, p.48). Creating a building that is welcoming and friendly without references to a hospital or healthcare center helps the patient to stay more comfortable in the environment and time perception of time goes faster.

Researchers found that simple touches such as murals with bright colors of the rainbows painted on the walls with colorful play toys may have a positive effect on human emotions and especially in kids. At the pediatric center, all the pictures and artistic crafts with playful tones make kids and adults feel special and also gives a soothing feeling to them. A proper visual effect and art have the power on fostering and enhancing the recovery in patients by as much as 10%. The visual impact can be related to optical elements and activities kids and adults can have while still in the hospital treating multiple diseases. The use of artwork thought space could elevate a decisive healing outcome on patients, nurses, doctors, and visitors. 'Art therapy is an approach which involves both psychological and therapeutic methods to manage various types of medical conditions.' (Immermann, C., Uhrenfeldt, L., and Birkelund, R., 2015, p.171).

The Art therapy may have benefits of the Therapy not only for the patients but also for all the users such as visitors, nurses, and doctors. Stress levels can be reduced with an art session and the results conclude that a test with a sample saliva would measure the cortisol levels on the people who did the test (Sextou, Persephone, 2015, p.80). Art serves as a natural form of expressing our innermost feelings. Individuals use Art to show the most difficult times. These patients learn how to use Art to explore the meaning of previous and current conditions creating a new impression and attitude towards the difficult time they are going through.

Danish Architecture shows that they have a culture that really cares for the users in the first place. Design brings people together and a well thought Architecture, landscape, and interior design, together can make that happen. In hospitals, patients need to feel well in the spaces they are getting their treatments and the entertainment, and social life play a significant role in this matter. The older population, most of the time is left behind. (John, Wiley, 2014, pg. 47). Design brings people together, cures and gives people the comfort they need in certain situations. Denmark leads the way internationally in its architectural provision for the older population. Designing for older people does not mean specific

and isolated facilities, integrating qualitative and inclusive design into treatment facilities will make the entire process easier (John, Wiley, 2014, pg. 49). The Danish Architectural Policy implies that Architects have an 'architectural duty' to provide access for the mobility impaired so that users can participate in all aspects of society. Another key concept has been creating spaces with domestic environments that remind the users of their own homes. The projects aim to integrate the landscape and gardens not only as a decoration but also as a critical programmatic aspect for healing and health. Private balconies for fresh air, cool breeze and natural light, communal green spaces where the users can use for gardening and walking are strategies designers are using to promote activities and health — a project in Copenhagen by architects Henning Larsen, Sound Retirement Community (John, Wiley, 2014, pg. 51). The central concept of the project was to create a facility that was both private and calm, and that would also integrate with the community so the users would not feel isolated from the city. The building has a mix of uses including facilities for rehabilitation and therapy, small scale grocery shopping, dining, gathering, club activities and so forth. The philosophy of the center was to bring a mix of local people and create a more natural and diverse community for the users and neighbors, feeling in this part of the city as another facility and not specifically an elderly-only zone. (John, Wiley, 2014, pg. 59)

Another great strategy used by the architects was to make sure the community also designed the building – that would increase visitors to the residents. The design is a building that is easy to access and navigate, interiors that are bright and varied, spaces that connect to the outdoors and landscaping that create places where people want to live. With all the points stated above, the architects have the responsibility and challenge of making the building secure and private.

NORD Architects' new healthcare center is another great example of a building that employs architectural strategies to break down barriers and thinking differently about designing for health facilities. Walking by the facility, it is difficult to guess what the building is used for -perhaps art studios or live/work facilities? The architects aimed to de-stigmatize those needing treatments and increasing the patient's comfort. The building is welcoming, recognizable and visually appealing. Care facilities also deserve high-quality statement architecture.

A cancer center can elevate the stress level of patients as dealing with the disease from its diagnosis through treatment and recovery - it is a trying and emotional process (John, Wiley, 2014, pg. 51). There have been many documented studies stating that the connection with the natural environment promotes healing. There are extreme stress and anxiety associated with cancer centers, and architects can manage that through the design (John, Wiley, 2014, pg. 64). A situation that is functional, comforting, tranquil and offers emotional support and optimism for its patients. EwinCole designed the AtlantiCare Cancer Center with the concept of creating a healthy building in mind. The company wanted to bring

nature into the design so that the structure would not impose on its surroundings. Upon building a 'healthy building,' the environmental strategies used ultimately earned the project a LEED Gold rating.

The entry has abundant glazing bringing natural lighting into the environment as well as the skylight of the lobby – meanwhile, it also nourishes the growth of the native plants that are being used indoors. The design team also implemented energy-efficient measures that include insulation, high-efficiency cooling., low VOC and recycling materials (John, Wiley, 2014, pg. 57).

Each patient would have ceiling panels over each patient chair in each chemotherapy bay emitting heat to warm up patients receiving treatments but not the staff. By using natural thematic elements such as wetlands, would help prevent the patients from having nausea (John, Wiley, 2014, pg. 57) – the hospital surroundings generally cause it.

The design influences the flow of the operations of healthcare facilities such as the time that meditation takes to arrive from point A to point B. That would be crucial for the patient's life and also for the other patients waiting in line. The more efficient the facility, the more people will benefit from it, therefore, generating more income for the facility. 'Technologic innovation, although very useful, will never replace the need for holistic care. Because cancer affects a person's mind, body, and spirit, the decision was made to educate all BIC nursing staff in the integrative therapies of Reiki, acupressure, and relaxation technique' (Gordon, J. and Gruber, M., 2012, p. 355).

Our perception rules out other possibilities when art therapy fits as the best solution. Providing evidence of the efficacy of the treatment choice is essential. There are many people invested in the outcome of the treatment. Client themselves need to know that the art therapy treatment they are `being offered has been shown to mitigate the challenges of their face.

Preliminary examination of the data may indicate that participants using art therapy make fewer phone calls to medical and mental health providers. Therefore, requiring fewer referrals to medical specialists. Consequently, it has a decreased number of somatic symptoms and complaints. That reduced the utilization of medical and mental health services. 'Although we believe that art therapists have the same challenges we have always had in art therapy research—to be more standardized and more precise, to do more fully experimental designs, and to replicate studies — there seems to be positive movement in the field of art therapy, and ultimately, toward the well-being of our clients and patients' (Sarah C. Slayton. 2010. p 115).

Theatre in hospitals have main barriers to be faced such as hospital routines, limited space on the wards, lack of privacy, emotionally charged atmosphere and the particular circumstances of its

participants – those would be illness, risk, isolation, stress, and vulnerability (Sarah C. Slayton. 2010. p 116).

Biophilic Elements in the Built Environment and its Effect on Patients

Oncology patients are more sensitive and experience environments in ways other patients do not. (Mazuch, 2017) It is vital for designers and architects to understand how biophilic elements within the built environments best assist in their wellbeing (Huelat, 2008). Biophilia is a concept that is becoming more prominent amongst healthcare facilities due to their benefits (Gonchar, 2012). Cancer patients also visit their medical facilities more often than most other patients (Wang, Pukszta, 2017). Hospitals aim to guide patients to see their disease as a journey (Huelat, 2008). They create a positive impact on patients, giving them hope and allowing them to connect to nature as they prepare to undergo medical procedures (Huelat, 2008). “Potomac Hospital’s art program portrays familiar landmarks of the region. The oncology floor embraces the “four-seasons” theme, which symbolically expresses transition, journey, and hope” (Huelat, 2008, p.30). Having views of nature and having biophilic elements at their disposal can ease their stress levels. Through this review of literature we intend to find out how biophilic elements impact cancer patients and in what ways it enhances their experience.

According to Huelet, biophilia is key in understanding our attraction to elements of nature. It seeks to explain components of biomimicry, biodiversity, biochemistry, and fractals. In ancient cultures it is stated that nature, spirituality and healing are inseparable. Huelet also found that some elements that attribute to biophilic design are light, spatial permeability, sensory engagement, organic shapes and forms, natural processes and fractal geometry.

The connection with nature does not need to be visual, it can be perceived through other senses. Actually, recent findings indicate that there are as many as twenty-one senses (Mazuch, 2017). Cancer patients will often become more sensitive to light and will acquire a stronger sensibility to smell, often leading to nausea (Wang, Pukszta, 2017). Another factor needed to consider is the medication that goes

into their bodies. Some of the medication is known to be ototoxic which impacts their hearing this can lead to dizziness and loss of balance (Mazuch, 2017). The exposure to real nature provides betters results. The visual connection with nature reduces stress, improves mood and self-esteem (Mazuch, 2017). Non-visual elements can still allow a connection to nature such as sounds. They lead to physiological, psychological restoration and can enhance individual's creative performance. "Gardens bring to healthcare facilities: Stress reduction for visitors and staff, reduction of depression especially when connected with physical activity, higher quality of life, reduction of pain, improved wayfinding, reduction in provider cost, less use of medication and shorter lengths of stay, increased patient mobility, increased patient satisfaction, increased staff job satisfaction" (Huelat, 2008, p.33).

When utilizing the presence of water, it must be perceived as clean. Because healthcare facilities aim to guide the patients experience as a journey it is best to make use of fluctuating water over predictable or stagnant water (Wang, Pukszta, 2017). "All color is light, light is energy, and energy affects every cell of the body. For centuries, scientists have known that people depend on sun for physical wellbeing. The sun catalyzes many metabolic processes, and when we lack exposure to sunlight, some metabolic pathways sit dormant, reducing our ability to burn fat and expel toxins." (Huelat, 2008, p. 32) Our senses do not work in isolation therefore in order to maximize the potential of positive health responses, designers should consider both visual and non-visual connections with nature to be experienced simultaneously.

Fractals are an organizational system based on geometry and mathematics of nature. They are an essential foundation of design and can sensitively create pleasing environments (Huelat, 2008). Thermal comfort in a healthcare facility is also a concern. Conditioning the individual rather than the space, may be more effective than conventional tactics. Designing the spaces in order to provide features that can be modified increases the range of acceptable temperatures.

Ensuring that the materials within the built environment are safe should take priority, especially when it comes to healthcare facilities. The exposure to materials that offgas dangerous chemicals and toxins can often be linked to the diagnosis of cancer (Huelat, 2008). "Improving the indoor environmental quality

improves the health of the patients, their families, and staff. Toxicity, dangerous materials, finishes, glues, adhesives, off gassing, PVCs, toxic cleaning agents, and people with sensitivities and allergies are just a few of the chemical challenges faced by healthcare facilities" (Huelat, 2008, p.26). Salutogenic design focuses on working towards health and patient wellbeing rather than the pathogenic approach (Mazuch, 2017). In order to better assist patients in their healing process salutogenic design should be embedded to all spaces and aspects of the communities. This establishes a balance between the mind, body and spirit

In order to successfully use art in healthcare facilities, they must be carefully selected and appropriate. Art pieces should be pleasant and consist of natural elements. When art is abstract or violent it can generate fear, which leads to additional stressors. (Huelat, 2008)

The General Hospital in Lunder Building, Boston was designed with an unconventional layout. The layout was designed to provide all rooms with views of either the city, the atrium, or the bamboo garden and create a diagonal circulation. The success of this project also lies in that when designing the space, the architects and designers considered both horizontal and vertical surfaces. In order to bring daylight into the interior of the diagnosis-and-treatment wing's vast volume Palomar Medical Center West in San Diego County provided sky wells (Gonchar, 2012). The courtyards were defined by ground-to-roof glazing. By designing these sky wells, it provides a link between the outdoor environment and surgery-prep areas, operating rooms, and recovery spaces. (Gonchar, 2012) The green roof benefits individuals occupying the space but also creates habitats, helping control stormwater runoff, and mitigating heat-island effect. "The arrangement yields the maximum number of beds within Lunder's tight footprint yet allows daylight to penetrate into the core of the building and serves to break the typical central nursing station into two pods, minimizing staff travel distances between rooms and support areas." (Gonchar, 2012)

Biophilic design can be implemented from materiality to actual three-dimensional spaces. "From a designer's perspective, biophilic design patterns have the potential to re-position the environmental quality conversation to give the individual's needs equal consideration alongside conventional parameters

for building performance that have historically excluded health and well-being." (Ryan, Browning, Clancy, Andrews,Kallianpurkar, 2014, p.62)

Patients value different elements dependent of several factors however natural flora and fauna in the décor create and window views of nature are aesthetically pleasing (Wang, Pukszta, 2017). Open spaces allow for different activities to occur without becoming crowded providing abundant storage. For children who undergo treatments playrooms are seen as the optimal healing environment. Both accessible and controlled playrooms are where children have positive emotions, build coping skills, and feel free to be themselves. "Natural views benefit both children and adults and should be considered a high priority when planning playroom design and location." (Weinberger, Butler,Mcgee, Schumacher, Brown, 2017, p.82)

Establishing a balance between complexity and order iterations of three will be more impactful than two iterations. A stimulus to one sense- modality may trigger a response in another. "Good biophilic design draws from nature in a manner that is equally inspirational and restorative without disturbing the functionality of the space to which it is integral." (Ryan, Browning,Clancy, Andrews, Kallianpurkar, 2014, p.63) Biophilic design can differ based on the needs of the targeted market. Based on the information found this will change for age groups within the oncology department.

The study of biophilia and incorporating these elements also will change based on the stage in which the patient finds themselves (Wang, Pukszta, 2017). Patients who selected private rooms, answered the question asking for reasons for their selection based on content analyses, their major reasons were related to the following keywords: privacy, nap or sleep, social interaction, sound or noise, and bathroom. Oncology patients who often prefer shared spaces can be because they want to avoid isolation (Wang, Pukszta, 2017) "Establishing distinct patterns is not an attempt to create cookie-cutter solutions for human-centric design, but rather to provide a framework through which any variable, with the appropriate care, could be adapted with locally appropriate and user-centered biophilic design." (Ryan, Browning, Clancy, Andrews,Kallianpurkar, 2014, p.71)

Patient Perceptions of Visual and Audio Elements

Treatment Centers are designated for people with illnesses to get treated. Most sessions can last several hours. These require individuals to stay long periods of time in one seating, in a big room with an open plan layout shared with other people who are also ill undergoing treatment. Their only option is to wait it out and find some kind of entertainment in hopes that time will go by fast. But as individuals who use their senses at all times, of which hearing and vision are dominant, some things will be perceived unavoidably. As Interior Architects, it is our duty to know what affects either positively or negatively patients in the healthcare world. What triggers certain unpleasant feeling and what can be done to avoid this. In this section of the literary review, factors such as visuals and audio in the surroundings of cancer patients undergoing chemotherapy in treatment centers will be explored and analyzed in order to understand their effects on physical and mental wellbeing (Brown, Rutherford, Crawford, 2005, p. 1). Also, some effective solutions will be included which aid the process of minimizing many of the negative effects in treatment facilities.

Many types of research have been conducted surrounding the topic of audio and visuals. They often do a thorough study on how the architecture and surrounding characteristics of a healing space positively or negatively affect the user's prompt healing (DuBose, MacAllister, Hadi, Sakallaris, 2016, p. 4). Although many factors are considered, noise and the effects it can have on patients in the treatment centers make it one of the main ones. There are pleasant sounds and visuals, however, in the healthcare world, functionality comes first. Currently treatment centers and all of healthcare, are only concerned with the medical part of the issue, however, there needs to be a balance between the physical well-being and the psychological/emotional well-being (Khan, 2016, p. 3). They have one purpose which is to cure the bodily illnesses, however, they ignore what they expose patients to, psychologically in the process. According to a research conducted on 2016, "…healthcare has primarily focused on fixing the body, however, there is a growing recognition that our healthcare system could do more by promoting overall wellness, and this requires expanding the focus to healing" (DuBose, MacAllister, Hadi, Sakallaris, 2016, p. 1). Sound is a crucial aspect which must be dealt with carefully. If adequate, it can be soothing and calming, if inadequate it can turn into noise. Noise can wear out a patient's mood and patience. Too much noise and their system will not heal or accept treatment as fast as it should. A study conducted by Dr. Huisman in 2016 found that patients who hear more noise are more stressed. It also suggested that high levels of noise cause mental and psychological distress, activate the pituitary glands which produces endocrine effects usually triggered during stressful times, it slows down the healing process of patients, affects mental health as well as the cardiovascular rhythm of the patient, raises blood levels, increases heart rate and cholesterol as well as reduce weight gain, disrupt sleep patterns and affect hormonal balances (Cunha, 201, p. 278). Aside from these effects, the study associated anxiety, headache, nervousness and discomfort with noise levels in treatment facilities. Most healthcare treatment center's noise can be easily avoided however some facilities still believe that noise is not bad for their patients and that it does not cause any of the symptoms stated above (Cunha, 201, p. 278).

So, what factors increase noise? There are many small noises in these cancer treatment centers and although they may seem minimal when they all combine, they can create distressing noise levels (Appold, 2018, pg. 34). One of them is technology. As technology advances, so does noise. More and more technology is helping cure or detects diseases so healthcare facilities need to be up to date with the latest technology, however, these tend to add more noise to the physical environment (Cunha, 201, p. 273). It is understandable that a treatment center's main purpose is to save lives and for that, there needs to be optimal technology which facilitates medical communication between patients and staffs (Appold, 2018, pg. 38). However, this does not mean that it cannot be done in a noise reduced and efficient way (Cunha, 201, p. 274). When noise levels arise so do people's voice. We respond to our surroundings and when engaging in conversations it is our main purpose for the other party to hear us, therefore, adjusting the voice level according to the surrounding environmental noise (Cunha, 201, p. 275). Most of the noise found in treatment centers comes from the family of the patients and the staff itself. Noise is not only annoying but also disrupts the tasks of the nurses offering treatment to patients (Cunha, 201, p. 275). Nurses reported that noise in their workplace has prevented them from concentrating on the task at hand. This creates a margin for error which cannot be allowed when dealing with lives. In these treatment facilities, the levels of noise in the reception area and halls during the day were compared to that of a boiler room (Cunha, 201, p. 275). It is important to understand that there are sick, grieving and weary people in these environments so noise levels should be kept down. Crowding is another big factor in noise levels. When an environment is crowded it tends to create more noise which in turn causes more stress to those present. Not everyone has the same tolerance to noise, some may put it off as background noise while for others it can be a persistent annoyance (Brown, et al., 2005, p. 2). Many of the cancer treatment centers are known for their open plan layout where the only separation between one patient and the other are very thin curtains which only aid visually, sometimes (Appold, 2018, pg. 35). Noise can be distressing to patients in recovery especially if they are staying with more than one person in the same room (Appold, 2018, pg. 38). In conclusion, noise creates a lack of privacy for the patients, unavoidably activating the visual and hearing senses (Brown, et al., 2005, p. 6).

According to the Oxford Dictionary privacy is the state or condition of being free from being observed or disturbed by other people. Helen Malcolm, a Sage writer who specializes in clinical trials, conducted a study in 2005 where she interviewed former treatment facilities' patients in order to gather their perception of privacy in a shared room through previous experience. The main focus of her research is whether privacy matters and the effects it has on patients of shared rooms. The first thing the research participants admitted to, was feeling their privacy taken away the moment they stepped in the open layout room full of small sections (Malcolm, 2005, p. 1). They showed concern for their information being heard by others next to them and that they would have preferred a different setting whenever they were going to receive information on their health. According to Malcolm, "The participants suggested that knowing they could be overheard constrained information disclosure. This withholding of information has implications

for health professionals' ability to diagnose and treat patients appropriately" (2005, p. 2). The study also found that although many people try to keep to their business when they heard bad news were given to their roommate, they felt compelled to offer consolation or express their condolences on the matter. Although the patients expressed appreciation for the support system these open layouts provide and of those next to them and their families, when they saw or heard someone on a bad state, the participants showed distress and had bad hopes for their own healing (Malcolm, 2005, p. 1). On the other hand, conversation noise can be distracting and most of the time unwanted. People do not always want to hear what others have to say and this might distract them from focusing on their activities (Malcolm, 2005, p. 3). One of the most common privacy tools used in healthcare settings are curtains and the study found that the patients felt uncomfortable knowing someone was next to them, behind a curtain. Even if they could not see them, knowing that they could hear them made much more uncomfortable (Malcolm, 2005, p. 4). The study also shoes, that even after going through privacy depriving experiences, the participants admitted that in order for there to be affordable healthcare, methods such as shared rooms were necessary. However, the participants still felt like the conditions could be improved in order to maintain everyone's privacy intact (Malcolm, 2005, p. 5). Finally, the research concluded that people should have an option to a controlled environment where they can choose whether to engage or not or whether to disclose their information or not (Malcolm, 2005, p. 6).

People become very aware of their surroundings especially in treatment centers where the wait is longer. Visuals play a key element. First impressions, assessments of multiple situations, judgments and much more are made through the eyes which are the first to engage in any situation. In treatment centers, a curtain is sometimes a barrier, but these are not always solid, and many factors could leave a space open from where the patient can see through openly. Starting with the reception area where seats are usually placed in a way where they face each other so looking around in order to avoid eye contact is unavoidable. A research conducted by Dr. Amir Khan showed that patients are already stressed due to their condition so many things such as cluttered informational walls with many diseases, overall clutter, noise, and views in reception areas can greatly increase the stress condition of the patient. Another negative factor about uncontrolled visual access to the surrounding in cancer treatment centers is that cancer is a stage disease. Some patients will look healthy, with hair and fair complexity for they are in the beginning stages, however, people with more advanced stages will also visit these facilities so when newly admitted patients see someone on a far, more debilitating stage they may gather low hopes for their own condition.

Treatment centers should not reflect the illness but the recovery so applying targeted and functional solutions which at the same time help with the overall look is where the job of an Interior Architect starts. For example, walking into a spa has that unique feeling which gets the user ready to be relaxed. So, what are some efficient proposed solutions in order to combat these issues? "There are six

groups of variables found in homelike environments: access to views or nature, light, noise control, barrier-free environments, and room layout— these directly affect or facilitate one or more dimensions of healing" (DuBose, MacAllister, Hadi, Sakallaris, 2016, p. 12).

There are many sources of noise in a healthcare setting so managing them is important so that noise levels do not get out of hand (Cunha, 201, p. 279). Most of the noise problems in these facilities can be easily diminished with simple methods. As mentioned before most of the noise in these facilities comes from its own staff but sometimes, they are not aware of it so informational meetings are advised to be held in order to educate and inform the staff member on how to create a more pleasing and tranquil space for the patients (Cunha, 201, p. 278). Reminding personnel that noise can affect patients could help improve the experience. A good recommendation is to avoid noisy communication where possible. Instead of having a sound alarm that alerts the nurse of the patients' needs help, a flashing light could be used (Cunha, 201, p. 278). Treatment Centers as wells as many healthcare facilities have started implementing quiet time from 1:00pm-3:00 pm in where all Tv and monitors have their volume lowered in order to provide quality rest for those hours (Cunha, 201, p. 277). Research has shown improvement in facilities who dedicate some hours of the day to a very quiet time. Even if the exterior noise levels are high, it still will not affect the patient for this is noise that our ears tend to filter. However, measurements should be implemented to add an extra layer of acoustics. "Rather than simply reducing noise, it may also be fruitful to consider how the soundscape may be made legible and intelligible…In other words, the noise, as we shall see, is often patterned and meaningful" (Brown, et al., 2005, p. 2). Too much silence is also unwanted, so adding soothing background noises could have a positive effect on the mind (Brown, et al., 2005, p. 4). For example, noises that will relax a person without them noticing. Music can be a good sound masking method however since people have different taste in music then it is recommended that neutral recordings are used such as nature sounds (Khan, 2016, p. 7). For example, waves breaking on the rocks or rain falling. These can improve patient's sleep which naturally helps the patient's mood speeds up the recovery process. Technical ways include, partition in between patients that are built all the way up as opposed to just the ceiling to pipes and cables do not help noise travel in between partitions (Khan, 2016, p. 7). Using noise proof glass in between patient's cubicles as opposed to curtains which can make a great difference in their overall stay as well as their recovery (Brown, et al., 2005, p. 6). Most of these noises can be fixed with very easy methods such as fixing a squeaky cart or using silent door locking devices (Appold, 2018, pg. 36). Maintaining the treatment center's equipment either physically or technologically allows for error noises or unoiled parts to be avoided. It was found that by reducing noise in places where people were healing it did the following: reduced medical error on the staff's part, reduced patient and families-stress, allowing for more positive communication among everyone, increased patients' satisfaction and energy, decreased staff stress allowing for better service and finally it increased staff effectiveness and satisfaction which also increases productivity (DuBose et al., 2016, p.

7). “Similarly, spaces with acoustic ceiling tiles, or that are removed from noise producing areas, reduce intrusive noises and therefore patients’ stress” (DuBose et al., 2016, p. 7).

Privacy can never be enough in these type of environments where the patient’s information is always being disclosed (Khan, 2016, p. 5). People do not like to be overheard by those next to them who are visually blocked but still very present. Hearing other people’s negative conversations can cause extra distress on patients so in single rooms they feel like they can rest more and report better moods (Khan, 2016, p. 4). Partitions which block noise are a great aid in protecting privacy as well as those which are solid (Khan, 2016, p. 4). Like this, all type of information and environment is controlled. People should have limited access to what they can reach visually in order to avoid stressful encounters (Khan, 2016, p. 4). Placing entertainment in these areas which engage each individual makes it easier for people to tune out noises which do not concern them hence increasing audiovisual privacy for everyone in the room (Khan, 2016, p. 5).

“There would also be gains from considering the visual aspects within the space ...” (Khan, 2016, p. 7). Better views help the healing process to be faster. People who have a nice view think of their experiences as less dragging than those with a view to the wall. Patients get better comments from nurses and need to take fewer pain medications. In the case that a window is not possible, it’s better for patients to see elements of nature in the interior space. Patients reported having a higher preference for nature art rather than an abstraction. A good way to make people react psychologically to the setting is by dimming the lights where possible (Khan, 2016, p. 6). This creates a feeling of intimacy and privacy which in consequence makes people adjust their voice and noise. Finally, hanging visuals on the wall to remind people to be mindful of their volume seems to be effective in many cases (Appold, 2018, p. 34).

One final solution that Interior Architects could implement is the use of restorative environments. Restorative environments are those who aim to achieve a level of peace and tranquility through the implementation of characteristics which have previously been proven to cause such effect (Khan, 2016, p. 1). These are “…tranquil spaces that are often natural environments where man-made sounds are not dominant. Research has shown that such environments improve treatment centers recovery rates, reduce stress, improve longevity, reduce pain and can affect how the brain processes auditory signals” (Khan, 2016, p. 1). Tranquility is usually associated with nature and spaces where no man-made structure has reached so bringing the characteristics that mimic these scenarios into an interior space, especially in healthcare, will add more tranquility to the space creating happier patients (Khan, 2016, p. 4). Tranquil spaces in treatment center settings have proven to reduce stress as well as rise comfort and recovery rates (Khan, 2016, p. 4).

The Effects of Interior Materials and Finishes on Patient Well-Being

Interior materials and finishes play a crucial role on how a building performs. The selection of materials can drastically affect a range of performance aspects including thermal, visual comfort, acoustical comfort, and indoor air quality (Al horr, Arif, Katafygiotou, Mazroei, Kaushik, Elsarrag, 2016, p. 8). Research suggests that indoor air quality may not only affect building performance, but may also have a direct impact on the comfort, health and well-being of a buildings occupants (De Giuli, Da Pos, De Carli, 2012). Furthermore, research (Senitkova, 2013) also demonstrates that those with compromised immune systems are much more likely to be affected by indoor air quality than those with healthy immune systems.

"Building materials can have a major impact on air quality and can affect occupants, especially sensitive ones including children and patients who are immunocompromised or have respiratory problems" (Senitkova, 2013, pp.1). Senitkova also found that the building materials with the biggest impact on indoor air quality include furniture, flooring, wallcoverings and the paints, varnishes and glues that are used to install them. In addition to the materials themselves, the chemicals used to clean the surfaces are also contributing factors to poor air quality. This review explores the published research thus far that affords a link between indoor air quality and occupant well-being as well as the published policies from large nationwide healthcare facilities that have banned specific cleaning agents and interior materials due to their contributions to poor air quality. In order to fully understand how these nationwide policies have come to be, this review will also explore the history of healthcare materials, how these materials affect indoor air quality and how interior designers can help aid patient well-being through careful selection of these materials.

History of healthcare materials and finishes

Joseph Lister and Robert Koch's germ theory of the late 1800's discovered that germs were spread through direct physical contact and not airborne as Florence Nightingale had believed (Topp, 2018). Proper hygiene became a major focus in promoting patient well-being and hospital surfaces therefore needed to be able to tolerate constant disinfection with harsh chemicals such as bleach. John Hopkins Hospital (1875-85) is a well-known example of architecture built under the germ theory. "The smooth washable surfaces were made even more so, with tiles and sealed plaster replacing wood, every effort made to avoid angular corners where particles could be trapped" (Topp, 2018, p. 218). Hospital-borne diseases could be prevented and patient well-being could be promoted through antiseptic products and procedures, such as rigidly consistent hand washing and disinfection rules that are still standard practice today (Topp, 2018).

However, furnishings and textiles were unable to stand up to the harsh chemicals and could not be cleaned to the same extent as non-porous surfaces. Because of their poor cleaning ability, hospital furnishings and textiles have long been blamed as the carriers of bacteria, thought of as the breeding grounds for infections (Rajapopal, 2018). Hospitals began eliminating decoration and implemented policies that required hard cleanable surfaces, which ultimately lead to the stark white walls people synonymously attribute to healthcare facilities (Topp, 2018). By the 1970's, the only allowable healthcare textiles were staff uniforms, bed linens, curtains and upholstery for furniture, but they were specifically called out as the biggest culprits of spreading infection. Jeff Layne, founder of Arc-Com, recalls reading a white paper during this time that claimed to have found that 63 percent of the drapery hanging in a hospital room was infected with both MRSA and *Klebsiella pneumoniae* (Rajapopal, 2018). The author stated that, following the report, textile manufacturers such as Arc-Com responded to these accusations. In the 1970's they began producing flame-retardant polyester or acrylic yarns like Rovana and Saran to address the fears that hospital textiles became kindling should there be a fire. By the 1990s, stain-resistant finishes for textiles emerged, the first was produced by Crypton. To ensure a sterile environment, healthcare facilities also began using harsher chemicals in conjunction with the new treated textiles to clean both the non-porous surfaces and the upholstery to control hospital-borne infections (Rajapopal, 2018). Some facilities even began using cleaners intended for pots and pans on polyurethane upholsteries.

By the new millennium, a wave of new technologies came onto the market, both for interior materials and the chemicals to clean them. For textiles, antimicrobial finishes such as Prefixx, MorCare, Crypton Green and Nanotex were emerging as replacements for the bleach-cleanable ones, requiring less cleaning and less chemicals (Rajapopal, 2018). Rajapopal (2018) also points out that in order to further reduce hospital-borne bacterial infections, healthcare textiles became more advanced and were offered in a range of contents from antimicrobial, polyester, nylon, cleanable with bleach or harsher chemicals and were most likely to be treated or chemically engineered to be flame retardant. By 2003, the government stepped in. The Centers for Disease Control and Prevention published guidelines stating that the Environmental Protection Agency had not approved the "health claims asserting protection against human pathogens" of antimicrobial-treated textiles (CDC, 2003). The agency urged hospitals to exercise caution when specifying any antimicrobial-treated textile. The guidelines caused researchers to pay more attention and studies began emerging shortly after "suggesting that many chemicals used in stain-resistant textile coatings or antimicrobial treatments – such as poly- or perfluorinated compounds, ionic silver, and zinc pyrithione – were either carcinogenic or likely to bio-accumulate to toxic levels in humans" (Rajapopal, 2018, p.128).

Aroused by the 2003 CDC guidelines and consequent reports, Healthier Hospitals Initiative (HHI) was formed in 2012 by major players in the healthcare system, including Kaiser Permanente, one of the United States largest healthcare systems (Who We Are, 2012). The intention of the new initiative was to begin reducing harmful chemicals in hospital interiors to promote both good indoor air quality and patient well-being. “Healthcare interiors can be beautiful spaces designed to inspire health and healing,” John Kouletsis, Kaiser’s vice president of facilities planning and design at the time, said in an October 2015 press release. “But lurking beneath the surface can be a surprising number of pollutants” (Rajapopal, 2018). Understanding the impact of these pollutants, members of HHI including Kaiser Permanente banned textile treatments that were intended as flame retardants in 2014. By 2015, another fifteen antimicrobial coatings and additives were also banned (Rajapopal, 2018).

Today, healthcare textiles are rather complicated. Amanda Eaton, vice president of design at textile manufacturer Arc-Com, laid out the general problem of healthcare textiles during her NeoCon presentation in 2018. “What our textiles are made of, where they are made, how they are made, and every chemical input down to the required parts per million – clients are requesting this information from distributors on a daily basis,” she said. While the new regulations focused on healthcare textiles are important contributors to patient well-being, it is important to recognize the other contributing factors to poor indoor air quality.

Indoor air quality

When Florence Nightingale published her influential 1863 guidelines, she advised that cross ventilation was of utmost importance in aiding patient recovery. Extensive research has since been published that backs her original finding, suggesting that ventilation systems aid in producing good indoor air quality which has a direct impact on the comfort and health of the occupants (Al horr et al., 2016). According to Al horr et al., the ventilation systems appear to reduce volatile organic compounds (VOC’s) that are present in the air.

The biggest contributors of VOC’s which reduce air quality are interior finishes and materials, released during the off-gassing process (Senitkova, 2013). The off-gassing of VOC’s affect people who have compromised immune systems are much more than those with healthy immune systems, which further hinders their recovery process. (De Giuli et al., 2012) “Building materials can have a major impact on air quality and can affect occupants, especially sensitive ones including children and patients who are immunocompromised or have respiratory problems” (Senitkova, 2013, p.1). Furthermore, VOC’s are a

major contributor to not only poor air quality, but Sick Building Syndrome as well (U.S. Environmental Protection Agency, 1989).

"Energy-efficient buildings that are filled with modern furnishings and high-tech equipment off-gas hundreds of volatile organics which possibly interact with each other." (Wolverton et al., 1989, pp.1) In a published report for NASA, Wolverton, Johnson and Bounds found that there are five common chemicals used in a variety of applications that off-gas into the environment, which have now been banned by the HHI. The first and possibly the most common chemical is formaldehyde often found in furniture, cabinets, countertops, insulation, wallpaper, paints and paneling. In 2006, the International Agency for Research on Cancer (IARC) classified formaldehyde as a human carcinogen because it grossly prevented patients from recovering in healthcare settings. *Wolverton et al.* believe the second chemical are flame retardants, which do not actually remain in the product but slowly offgas into the air, dust and water over time, eventually entering the food chain and building up in the human body. The third chemical *Wolverton et al.* found to be detrimental to patient well-being are perfluorinated compounds (PFCs) and are widely used to make everyday products more resistant to stains, grease and water. PFCs are bioaccumulative in the body and pose a threat of increased risk of cancer. For recovering cancer patients – they pose a threat of non-recovery. The fourth chemical is polyvinyl chloride (PVC) also known as PVC plastic or vinyl and is used in a variety of applications in the healthcare setting including flooring, medical devices, disposable gloves and other building materials. This is also bioaccumulative and without additives is not stable in the presence of heat or light (Wolverton et al., 1989, p.1). The last chemical are antimicrobials. While research is not yet available about antimicrobials ability to off gas VOCs, the issue with them is the risk of antimicrobial resistance for patients in a healthcare facility. The use of antimicrobial finishes allows bacteria to mutate and become resistance to antibiotics, posing a major threat to cancer patients who already have a compromised immune system (CDC, 2003).

Historically, the selection of interior finishes was based on cost, aesthetics, availability and durability with little thought on the VOC rating. Today, in order to ensure the well-being of patients and help promote recovery, many healthcare systems have adopted green building initiatives or the HHI, which require material selections to have a "reduced or non-toxic, low-VOC or PVC-free rating" (Senitkova, 2013, p.1). Senitkova believes the aim of these initiatives is to improve patient well-being and recovery by eliminating the use of products containing dangerous chemicals and therefore improving overall air quality. Dignity Health, the fifth largest health system in the nation, adopted these new standards and over a five-year period removed 1,896,509 pounds of PVC material from IV containers alone (Safer Chemicals, 2015).

More attention is also being paid to temperature and humidity, which research is suggesting as potentially the biggest influence on the emission of VOCs from building materials, especially on paint and varnish (U.S. EPA, 1989). Temperature and humidity are also root causes of Sick Building Syndrome (Al

horr et al., 2016). According to the U.S. EPA's 1989 report, sick building syndrome is a group of health problems related to the indoor environment of the built environment. The biggest contributors include the type of furniture, office equipment (printers, computers) and the closure of natural openings which would create ventilation (Al horr et al., 2016, p. 5). *Al horr et al.* (2016) also pointed to additional factors that cause SBS which include volatile organic compounds (VOC), dust, mold, mite, allergens, pesticides, indoor aldehydes and lighting. "Dr. Tony Pickering of Wythenshawe Hospital has studied sick building syndrome extensively and has learned that symptoms are minimal in naturally ventilated buildings" (Wolverton et al., 1989, p.1). *Seppanen and Fisk* (2002) indicated that occupants of naturally ventilated offices have fewer sick building syndrome symptoms than occupants of air-conditioned offices. This connection between natural ventilation and patient well-being is reminiscent of Florence Nightingales original hospital guidelines, a connection between the quality of air and the possibility that the natural ventilation removed any VOC's from the interior environment, which supported the patients wellbeing.

Selection of healthcare materials to aid patient well-being

"There are two common strategies in building design that are employed to deal with the indoor air quality in a building: increasing the ventilation rate, which in turn reduces air pollutants and reducing the source of pollution within the building" (Al horr et al., 2016, p. 4). *Senitkova* (2013) pointed out that while many studies are focused on materials that release VOCs, it is important to also consider that some porous materials act as sorbents, which can help reduce VOCs in the air. "The pollutants emitted from one material can be absorbed on the surfaces of other materials. That results in reducing the concentration of sensory pollutants and improving the perceived air quality" (Senitkova, 2013, p.2). When specifying materials and finishes in the healthcare setting, it is important to recognize that not all materials contribute to VOC contamination.

In addition to the two major strategies of careful selection of materials and natural ventilation, there are two additional ways to further reduce indoor air pollution. The first is to allow materials to completely off gas before installation. This process may not be the most effective as *Wolverton et al.* (1989) indicated in their research that materials continue to offgas over time, dependent on temperature and humidity in the air. The more effective strategy, according to *Wolverton et al.* (1989) is by providing potted plants (Wolverton et al., 1989). Their two-year NASA study indicated that when the same plants and potting soil are constantly exposed to contaminated air, the plants capacity to continuously clean the air improves. The plants are also able to use the toxic chemicals as a food source (Wolverton et al., 1989). Similar to other studies presented, the *Wolverton et al.* study also showed that indoor air pollution was further reduced when temperature and light levels were increased, allowing the plants to increase the toxin removal rates. Several plants species were further identified as having high toxin removal which

included: English ivy, marginata, janet craig, golden pothos and the peace lily (Wolverton et al., 1989). “This plant system is one of the most promising means of alleviating the sick building syndrome associated with many new, energy-efficient buildings” (Wolverton et al., 1989. p.18).

When designing healthcare spaces, careful selection of appropriate, third-party certified building materials along with proper ventilation operation and maintenance can improve air quality and reduce sick building syndrome (Senitkova, 2013, p.1). It is important that architects and designers pay close attention to the chemical make-up of the materials and finishes chosen, ensuring that the materials do not produce irritating odor or VOCs. “Since ASHRAE guidelines have stated that people spend about 80-90 percent of their time indoors and studies have indicated that a range of comfort and health-related effects are linked to characteristics of the building, there has been a growth in interest in both academic and practitioner literature on occupant health and building design” (Al horr et al., 2016, p.2). According to Blaschke, O’Callaghan and Schofield (2018), well-designed healthcare settings can make hospitals safer and further promote healing and well-being for patients, especially for those with compromised immune systems like cancer patients.

CONCLUSION

Interior design professionals play a significant role in shaping how the built environment impacts humans on both a psychological and a physical level. When designing healthcare facilities, it is crucial for the designing professional to further understand the needs and wants of those with compromised immune systems and how each aspect of design, such as color, biophilia, privacy, entertainment and material selections, impacts the overall well-being of patients. The research conducted on the different aspects of interior environments in cancer treatment facilities helps understand how the surroundings and what patients are exposed to affect their healing process.

The use of the colors in the healthcare environment is very important for the creation of the calming and soothing environment (Dalke et al.,2006). There have been numerous studies in the field of the color theory, showing that the color and the emotions of human beings are related. We found there have been very few studies that correlate color with the emotions and healing effect in the actual patients in the healthcare environmental settings. Thus, in order to proceed further, it should be understood how the color affects the emotional wellbeing of the people in the normal day to day life, and how does it translate when the same people get sick and have to spend their time in the healthcare environment.

The psychosocially supportive design aims to encourage the brain to create and induce a sense of wellbeing. They are welcoming spaces for meetings and social exchanges, areas for the patients to spend time with their families and friends and quiet spaces for meditation and restoration, entertaining and also connection with the outdoors. Those aspects may positively impact the user's circadian rhythms, blood pressure, attentiveness, verbal expression, restoration, and behavior; the outdoor space promotes communication, activity and positive mental health.

Noise branches out into many categories. Because of crowding in these treatment centers noise levels rise, negatively impacting the health of patients. Visuals are another matter which must be taken into consideration. Many people already feel weary from the illness that affects them so giving patients controlled access to what they can and cannot see is very important. Because of this privacy is important. Privacy can be achieved through sound attenuation which protects the patient's privacy. It is important to understand that these centers need to have the best environment for optimal healing. Restorative spaces are a new concept which is being used by many designers for it has all the capabilities of physical healing as a hospital would with the added touch of tranquility which heals the psychological aspect of patient's lives.

The final design aspect that can positively or negatively impact cancer patient well-being is the selection of materials and finishes for the healthcare setting. The research presented in this literature reviewed showed a correlation between VOC's and indoor air quality. The studies further described a possible link between poor indoor air quality and reduced well-being, both which further prevented cancer patients from fully healing. Designing professionals should carefully select appropriate materials that are third-party certified for reduced or no VOC's, paying special attention to the paints, varnishes that finish furniture and the glues used for material installation. Proper selection paired with natural ventilation can improve indoor air quality and contribute to patient well-being and recovery.

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Annotated Bibliography 1: (May Saeedi)

Dijkstra, K., Pieterse, M. E., & Pruyn, A. T. H. (2008). Individual differences in reactions towards color in simulated healthcare environments: The role of stimulus screening ability. *Journal of Environmental Psychology*, 28(3), 268-277.

1. Analysis of source

1.1 Authors' credentials

The authors are the faculty from the University of Twente in The Netherlands which could qualify them to present the individual differences in the reactions to colors in the healthcare environment setting.

K. Dijkstra is currently an assistant professor in the Department of Clinical Psychology at VU University, Amsterdam at The Netherlands. He published this work when he was working as an assistant professor in the Department of Psychology and Communication of Health and Risks from the University of Twente in The Netherlands. He has authored more than 20 papers. His expertise is in the field of environmental psychology, healing environment, and healthcare design

M.E. Pieterse is an assistant professor in the Department of Marketing Communication and Consumer Psychology, the University of Twente in The Netherlands. He has research expertise in the field of psychology and human behavior.

A.T. H. Pruyn is a professor of Behavioral Sciences, Department of Marketing and Communication from the University of Twente in The Netherlands. He has authored more than 100 publications in consumer psychology, marketing services.

1.2 Journal

The journal is a peer-reviewed journal published by Elsevier since 1980. The article is cited 101 times as of now, which explains its high impact in the research community. Some of the references used in the paper are old-the oldest article that was referred to was published in 1947 and the majority are new. So, the article can be considered as one of the papers that have done an in-depth research study of the articles produced and published from very old times to the recent ones. good

1.3 Intended Audience

The audiences for this journal are designers, psychologists, healthcare management, as well as laypersons. Individuals who seek to educate themselves and learn about the application of various color in the design of healthcare are the audience for this research paper.

1.4 Support – (opinion, evidence-based, propaganda)

The structure of the article begins with a short literature review of the findings from the previous research works and the gap of the evaluation of individual opinions towards the sensitivity of color. Experiments were carried out to measure the stimulus screening ability for assorted colors in a healthcare environment. So, results from the participants can be considered as evidence based for the purposes of this study. The feedback of the participants was collected for the imaginative condition of being hospitalized rather than from real conditions in terms of various scale points for measuring the stress-arousal, attractiveness and professional quality. good

1.5 Coverage

The coverage of the topic discussed by the authors is more focused. The authors have carried out experiments to see how the choice of colors in a healthcare environment affect the patients on an individual basis. The article provides case studies and observations regarding the stimulus screening ability of people based on the choice of the color. The article explores the effect of the colors on the arousal, attractiveness and professional quality.

2. Summary of information

2.1 Methodology and research methods

The study is based on qualitative research methods by different point scale measurement and regression analysis for obtaining data. 44 participants- 16 males and 28 females took part in this study. The “wall color” and “stimulus screening ability” was studied.

The participants were exposed to the photo of the hospital room with orange walls (experimental condition) and white walls (control condition). The participants’ screening ability was measured, by asking them to imagine being in a hospital room with the same wall colors as that of the photographs they were provided.

To measure the feeling of arousal, the participants were asked to evaluate the Stress Arousal Checklist on a 4-point scale ((Mehrabian, 1994).

To measure the cognitive appraisal of the room, the participants rated the room on attractiveness and professional quality on 7-scale points (MacKay, Cox, Burrows, & Lazzerini, 1978).

The regression analysis was done to test if the wall color affects arousal, attractiveness and professional quality and if this is affected by stimulus screening ability.

2.2 Findings

- Stimulus screening ability was measured in the healthcare environmental setting to figure out the individual differences in health-related effects and cognitive appraisals of the environment
- Low screening participants encountered more arousal in the orange room than in the white room
- The stimulus screening ability didn’t affect the ratings for attractiveness and professional quality
- The orange color was found to have significant effect-the participants felt more aroused in the rooms with orange color compared to white colored rooms and the participants found the orange colored rooms to be more attractive.
- The participants found the room with orange color to be lower in terms of professional quality than white colored rooms.

- Stress reducing traits of green and arousal inducing traits of orange color were found to have a significant impact on ill people who have less-screening ability
- The patients in the healthcare setting will have a lower ability of screening, which will affect their perception towards the color differently as compared to a healthy person with high-screening ability. Distinct colors affected the cognitive appraisal of the room, differently. So, this research is of utmost importance in designing a healthcare environment as it deals the effect of colors on an individual basis.

2.3 Relationship and potential application to typology decision

The effects of color on the healthcare environment may have a different effect on different people. In this study, the effect of the stimulus screening ability on arousal, attractiveness, professional quality based on color in the healthcare environment is studied. The finding of the paper shows that the people have the low ability of screening during illness, the influence of color have a significance role. So, the article is important for the typology decision of healthcare design.

2.4 List of quotations that are useful in the literature review

“These studies suggest that wall color may change the way people perceive and evaluate an environment.” (Dijkstra, Pieterse, and Pruyn, 2008, p. 269)

“Wall color only appeared to have a small effect on health-related outcomes, but when stimulus screening ability is taken into account, these effects are fairly straightforward.” (Dijkstra, Pieterse, and Pruyn, 2008, p. 276)

“Stimulus screening ability may be a construct that varies with people's wellness and might thus be of even greater importance in healthcare settings than in others.“ (Dijkstra, Pieterse, and Pruyn, 2008, p. 276)

“However, in healthcare environments where people's ability to screen out information may be reduced due to their current medical conditions, the influence of color could be of greater importance.” (Dijkstra, Pieterse, and Pruyn, 2008, p. 276)

Annotated Bibliography 2: (May Saeedi)

Dalke, H., Little, J., Niemann, E., Camgoz, N., Steadman, G., Hill, S., & Stott, L. (2006). Colour and lighting in hospital design. *Optics & Laser Technology, 38*(4-6), 343-365.1.

1. Analysis of source

The authors are from the Colour Design Research Centre, London South Bank University, Borough Road, London, UK and Colour Design Research Centre, Kingston University, Knights Park, Kingston, UK at the time of publication of article.

Hilary Dalke is a professor emeritus in the Faculty of Art, Design and Architecture in the University of Kingston, London, UK. She has authored more than 30 research papers. Her expertise lies in the design and colors, its effects of design.

Jenny little was an undergraduate research student in the Department of Arts and Architecture in the University of Kingston.

Elga Niemann currently works as a principle lightening designer. She was an undergraduate student in the Department of Arts and Architecture at the time of publication of research.

Nilgun Camgoz is an associate professor at Bilkent University. She has published more than 30 research articles. Her expertise is in the field of color perception, design, and lightening. She was a Ph.D. student in the Department of Arts and Architecture at the time of publication of this article.

Guillaume Steadman works in the Department of Information system and he aided in the statistical analysis in the paper. His expertise lies in statistical modeling, stochastic processes.

Sarah Hill was an undergraduate research student in the Department of Arts and Architecture at the University of Kingston.

Laura Stott is an academic advisor in the Department of Art and Architecture at the University of Kingston, UK. She has published a number of papers in the field of environmental psychology and is an expert in this field.

We can see that the authors come from a diverse background, but they are expert in their field.

1.2 Journal -date-edition

The Journal of Optics and Laser Technology is a peer-reviewed journal and it is published by Elsevier. The journal encompasses the articles related to the development and application of optics. The article is cited 159 times as of now, which explains the attention it has garnered from the research community.

1.3 Intended Audience

The audiences for this article are designers, psychologists, healthcare management, as well as laypersons. In this article, the authors have discussed how color design can be applied to benefit the users to create a soothing ambiance in the healthcare environment.

1.4 Support

The findings presented in the study are research-based. Findings from the previous research works were used discussed in this study. Some of the results from the previous research works are contradictory in nature and don't have enough resources to prove that the colors affect the mood of the people. Thus, the color must be observed, planned, or investigated in context to avoid generalizations about color perception and mood affects, as they vary individually.

1.5 Coverage

The authors have shown that distinct colors affect the mood and behaviors of people differently. Color has a key role in the boosting of the morale of the people as well as raising the interest; however, it may also affect the user's perception and sense of space and well-being adversely. Thus, the article can be considered as through as it covers the topic well.

2. Summary of information:

2.1 Methodology and research methods

The 20 general hospitals were audited for the collection of the data. The data was collected primarily from the information on sites, audits of the journey from entrance to ward, reviewing previous literature, conducting literature reviews, interviewing with management and estates and premises personnel, discussing with staff and patients and keeping a record of good and bad practice.

2.2 Findings

- Color affects the psychological and physiological phenomenon e.g.- color can cue certain behaviors (colored rooms with balanced tension created the greatest concentration) and enable differentiation between architectural elements of a room
- Color in the healthcare sector should take account of the emotional and psychological factors which can affect the well-being of patients – such as the age of the people, their geographical location, nature of their illness
- For the children, the color can make the environment more interesting
- Color can also work as a landmark and increases the ease if wayfinding
- For the visually impaired personnel, color and shadow details can be provided to let them know about the hierarchy of spaces.

2.3 Relationship and potential application to typology decision

The use of the colors in the healthcare environment is very important for the creation of a healing atmosphere. The authors present examples to an understanding of the broader subtle issues with color and environments and show results for how they affect the people. The paper describes how color can not only affect psychological and physiological processes, but also work as a landmark, reinforce the hierarchy of spaces.

The findings of the paper show how color affects people differently and how designers can implement the colors in their design for the creation of a healing environment in healthcare. This will be very important to our typology question, as we can implement the findings of this article for the better design of a healthcare environment.

2.4 List of quotations

"Colour and appropriate lighting are also powerful tools for coding, navigation, and wayfinding; color can also promote a sense of well-being and independence." (Dalke *et al*., 2006 p. 343)

"Ensuring optimal and appropriate color and lighting for healthcare environments is vital." (Dalke *et al*., 2006 p. 345)

"Colour can reinforce the hierarchy of spaces, landmarks, and prominent features, identifying destinations and differentiating between facilities." (Dalke *et al*., 2006 p. 349)

"In modern buildings, architects and designers need to provide an opportunity to increase the incidence of shadow detail to ensure cognitive and intuitive understanding of spaces." (Dalke *et al*., 2006 p. 351)

Annotated Bibliography 3: (May Saeedi)

Hamid, P. N., & Newport, A. G. (1989). Effect of colour on physical strength and mood in children. *Perceptual and Motor skills*, *69*(1), 179-185.

1. Analysis of source

1.1 Authors' credentials

The authors are from the University of Waikato, Hamilton, New Zealand. which qualify them to present the differences in the reactions of children to different colors.

P. Nicholas Hamid is from the Department of Psychology in the University of Waikato, New Zealand. His research interests lie in the field of health psychology, behavioral psychology and emotion.

Adrienne G. Newport is from the Department of Psychology at the University of Waikato, New Zealand. Her research interests lie in the field of mood, behavioral science, and psychology.

1.2 Journal

The Journal of Perceptual and Motor Skills is a bimonthly peer-reviewed academic journal and the publisher is Sage. The journal covers the articles on perception and behavioral skills. The article is cited 94 times as of now, which explains the attention it has garnered from the research community. The article

is published almost three decades back, which provides an insight into the research works carried out in the past.

1.3 Intended Audience

The audience for this article is designers, psychologists, healthcare management, as well as laypersons. In this article, the authors have discussed how children perceive the effect of different colors. It is very difficult to understand the feelings of children as they are unable to express and communicate their feelings in a more accurate verbal way as the adults do. So, this article will be of immense importance to the people who are interested in understanding how children feel about the different colors differently and how to design for the children's in healthcare settings.

1.4 Support – (opinion, evidence-based, propaganda)

The information presented in the article is evidence-based. The authors present how the children are affected by the color of the settings they are in. The structure of the article begins with a short literature review of the findings from the previous research works that have shown the increase in the arousal in the participants with the red spectrum and decrease in the arousal towards the blue spectrum. The findings in the paper are based on the tests as well as the activities performed by the children in the different colored rooms.

1.5 Coverage

The work presented in the paper is focused. Observations of the behavior of the children were carried out for a definite amount of time to generate the results. The authors have shown that distinct colors affect the mood and behaviors of children differently. This work is of immense importance as most of the research work carried out to study the effect of colors in the behavior of people is done mostly on the adult people. However, the sample size of the participants taken for this study is very small- i.e. only six participants were used for the collection which makes the generalization of the results susceptive. The study is also important to understand how to create a better environment for children to boost their creativity and productivity and the authors have managed to present the topic well.

2. Summary of information:

2.1 Methodology and research methods

Six kindergarten children from the age of 50 to 55 months were the participants in this study. The number of participants used in the study is small, making the results very susceptive. The children were placed into the room of different colors (following the pattern ABACAB (A- grey color, B-Pink color, and C-Blue color) and asked to perform several tasks. The participants were placed in the room of the same color for seven days and then moved into the room of other colors for the same duration of time. The physical

strength of the participants was measured using Ergometer and the children made 4 painting per session during all the experimental sessions. The paintings were then judged by two different judges. Regression analyses were done to understand the preference of the color and mood of the children.

2.2 Findings

- The participants showed high positive mood condition for the pink colored rooms and the negative mood condition for the blue colored room.
- The participants found the pink color room to be more arousing resulting in the increased physical strength than that for the blue room.
- The results of the physical strength and the mood condition for the grey colored room was in between the pink colored room and blue colored room.

2.3 Relationship and potential application to typology decision

The use of the colors in the healthcare environment is very important for the creation of healing environment for children. The authors present very interesting research work to show how the colors affect the physical strength and mood of the children. The authors present examples to an understanding of the broader issues with color and environments and show results for how they affect the mood of the children. The findings of the paper show how designers can implement the colors in their design for the creation of a positive and quality environment in healthcare for children.

2.4 List of quotations

“Generally researchers posit that, if colour has an effect, it may be viewed as based on the performance and arousal curve (Hebb, 1955) with increases in performance related to increases in arousal up to some optimum for each individual.” (Hamid and Newport, 1989, p. 179)

“It was the purpose of this study to examine the effect of a warm (pink) and cool (blue) coloured environment on a gross motor activity and mood.” (Hamid and Newport, 1989, p. 180)

“In fact a pink coloured room appeared to increase their physical strength and their positive mood.” (Hamid and Newport, 1989, p. 184)

“The pink/blue effect is consistent with the red/blue and red/green effects found in other studies suggesting that the warm-cool dimensionalization of colour is perhaps the most fruitful in studying the arousal-performance effects of colour.” (Hamid and Newport, 1989, p. 184

Annotated Bibliography 4: (May Saeedi)

Kwallek, N., & Lewis, C. M. (1990). Effects of environmental colour on males and females: A red or white or green office. *Applied Ergonomics*, 21(4), 275-278.

1. Analysis of source

1.1 Authors' credentials

The authors are the faculty from the University of Texas at Texas at Austin, Austin, Texas, USA. The authors share different background-one of them is from the Division of Interior Design and other is from the Department of Psychology which qualifies them to present the emotional responses of the people towards different colors and hue as well as achromatic colors.

Nancy Kwallek is a professor at the University of Texas School of Architecture (UTSOA). She is the Director of UTSOA's Interior Design Program. Her areas of interest include interior design and effect of color and design on the individuals and society. She has numerous publications in renowned journals.

Carol M. Lewis is an Adjunct Assistant Professor and Director of the Office of the Associate Dean for Research. Her research interests vary from the field of public health to research design. She has also authored several publications.

1.2 Journal -date-edition

The article is published in the Applied Ergonomics journal. The journal is peer-reviewed and the publisher is Elsevier. The article is cited 152 times as of now, which explains its high impact in the research community. The article is published more than 30 years back, but the paper presents an important topic in the field of color psychology explaining how different color affects work performance in office design.

1.3 Intended Audience

The audience for this article is designers, and psychologists. The office design environment is important in all the commercial as well as social buildings such as the hospitals, schools, as well as corporate buildings. So, the article is targeted mainly to the specific audience working in the field of the office designs.

1.4 Support – (opinion, evidence based, propaganda)

The support of the information presented in the paper is objective i.e. evidence based. The authors present how the performance of individuals differs with the color of their setting. The findings from the study can be considered as evidence based as the article presents the in-depth description of the methodology and presents the results based on the statistical analysis tests.

1.5 Coverage

The coverage of the article is focused. The article presents how the choice of colors in an office setting varies individually and how it affects the people psychologically. The authors have carried out experiments to see how the choice of colors in an office environment affect the performance of people. This work can be further applied to healthcare environment to help the healthcare people perform better in the healthcare environments as the article shows that the concentration of people varies differently in different colored environments.

2. Summary of information

2.1 Methodology and research methods

A total of 222 students were the participants in the experiment. An equal number of males and females were tested, and the average age of the people was 18.6 ~ 19 years. Each subject completed the Profile of Mood States developed by (McNair et al,1981) for the profile of six factors- tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. The participants were provided a test that had two parts- 200 number comparison and 200 name comparison. The three offices were painted either bright red, bright green or white. The furnishings in the office were of neutral colors did not create a contrast with any of the hues of the offices.

The POMS was used as a baseline for the participant's mood. The color of the pre-testing area was same as white office. The participants were asked to stay in the colored rooms for 20 minutes and asked to fill the POMS questionnaire again. Statistical Analysis System was used to study the variance of data.

2.2 Findings

- Although the participants expressed preference for the white office, more errors were made in the white environment.
- Although white color is suggested as the universally accepted color for the office, it was found that it is not suitable for the productivity.
- The participants found the red color office buildings to be distracting but they made fewer errors compared to the people working in the white offices.
- The people in the red color buildings chose to ignore the background resulting in the concentration of the participants.
- There was difference in the results for the effect of colors for females and males
- Male participants found the red and white color of the office to be distracting more than the female participants
- Female participants found the green color of the office to be more distracting than the male participants.

2.3 Relationship and potential application to typology decision

The use of the colors in the healthcare environment is very important for the creation of a productive environment. The authors present a very interesting research work to show how the colors in office affect the productivity differently for different genders. The authors present examples to an understanding of the broader issues with color and environments and show results for how they affect the productivity in the environment they must work in. The findings of the paper show how color affects people differently and how designers can implement the colors in their design for the creation of productive environment in healthcare. There are a large number of areas in healthcare design that utilizes similar design as that of offices, like the receptions, insurance department, record department and the proper care has to be taken in the design so as to increase the productivity of the people that work there. This will be very important to our typology question, as we can implement the findings of this article for the better design of a healthcare environment.

2.4 List of quotations

“From work with brain-damaged subjects, he hypothesised that red has an 'expansive' effect, which means that it causes an increased susceptibility to external stimuli and induces a state of excitation resulting in impairment of the efficiency of performance of intellectual tasks requiring accuracy and concentration.” (Kwallek and Lewis, 1990, p. 275)

“Nakshian (1964) attempted to replicate these findings using normal subjects and found that they were more efficient in their performance of motor inhibition and hand tasks in the green condition than in red.” (Kwallek and Lewis, 1990, p. 275)

“Also, the subjects who worked in the white environment thought that the colour had an effect on their work compared with the ratings of the subjects in the red and green offices.” (Kwallek and Lewis, 1990, p. 277)

“Specifically, for subjects in either the red or white office, more males than females found the colour of the environment distracting, while more females than males who worked in the green office found the colour of that environment distracting.” (Kwallek and Lewis, 1990, p. 277)

Annotated Bibliography 5: (May Saeedi)

Saito, M. (1996). Comparative studies on color preference in Japan and other Asian regions, with special emphasis on the preference for white. *Color Research & Application*, 21(1), 35-49.

1. Analysis of source

1.1 Authors' credentials

The author is from the University of Waseda University, Japan. The author is a professor in the School of Human Sciences in the Waseda University, Saitama, Japan. This qualifies the author to present the color preference of the people based on the cross-cultural differences. He has worked in different projects and understands how the color affects the psychology of people.

1.2 Journal -date-edition

The article is published in the Journal of Color Research and Application which is a peer reviewed journal published by Wiley Online Library. The journal covers the articles on color psychology. The article is cited 151 times as of now, which explains the attention it has garnered from the research community. The articles on the journal focuses on the application of colors in the design and color psychology. There are several other articles in the same volume related to the color research and application which can be used as a good source of information for our thesis study.

1.3 Intended Audience

The audience for this article is designers, psychologists, healthcare management, as well as laypersons. Color preference differs by age, sex and geography. So, this article will be of immense importance to understand how people feel about the different colors differently and how to create an inclusive design that can create a soothing and calming environment for all people in the healthcare settings.

1.4 Support – (opinion, evidence based, propaganda)

The information presented in the article is objective. The authors present how the people perceive the same color differently based on the survey results for the differences in their age, sex and geography. These differences might result from the age, sex or the culture. The results from the study show that the cultural, geographical and environmental preferences are responsible for the preference of colors. The results present on the paper is research based.

1.5 Coverage

The coverage of the article is focused and thorough. The authors have shown that same color affects the mood and behaviors of people differently. These differences result due to the differences in the color, age and sex. The study is also important to understand preferences of people based on the cultural and regional differences and to create a design to cater the requirements of people.

2. Summary of information:

2.1 Methodology and research methods

For survey 1, 1600 people (400 each) from four major cities of Japan: Tokyo, Osaka, Fukuoka and Toyama were the participants in this study. Approximately equal number of male (803) and female (797) participants were present in the study. 193 subjects were in the age range of 15-19 years, 364 in the age range of 20-29 years, 384 in the age range of 30-39 years, 367 in the age range of 40-49 years, and 292 in the age range of 50-59 years. The color chart with 65 colored chips: 62 chromatic colors and 3 achromatic colors were used as stimulus. Each chip was 3.5 x 2 cm arranged on the neutral gray cardboard panel of 29.7 x 41.8 cm size. The colors were chosen from the Practical Color Coordinate System (PCCS). The achromatic colors chosen were white, medium gray and black.

The participants were asked to evaluate the colors based on their preference and judge the colors on three different categories- like, dislike or neutral. The participants were asked to list the three most preferred and three least preferred colors based on their reasonings. The participants were asked about these questions orally and the results were analyzed by the factor analysis and cluster analysis.

For survey 2, 99 people and 100 people, with the average age of 22.3 years and 21.9 years from Seoul, South Korea and Tokyo, Japan respectively were taken as participants. The number of males was 28 and number of females was 71 for Seoul and number of males was 32 and number of females was 68 for Tokyo. Same stimulus as used for survey 1 was used in the survey 2. The results obtained from the study were analyzed by comparing the orders of preference, comparison of selected colors and tone using chi-square test and dual scaling.

For survey 3, 316 people- 160 (88 male and 72 females) from Tokyo and 156 (102 male and 54 female) from Taipei were used as participants. The average age of participants from Japan was 19.6 years and from Taipei was 24.1 years. The stimulus of colored chart with 77 colored chips: 70 chromatic colors, 5 achromatic colors, and silver and gold were used. The results obtained from the study were analyzed by comparing the orders of preference, comparison of selected colors and tone using chi-square test and dual scaling.

2.2 Findings

- Males preferred bluish colors with their active lifestyle and vivid tone colors more than females, whereas females preferred pale colors, purplish colors, deep and dark tone colors and reddish colors.
- Light grayish colors and deep and dark tone colors were generally preferred more by older people, while purplish colors and achromatic colors were preferred by younger age groups.
- Pale tone colors, bluish colors, and vivid tone colors were liked by middle-aged subjects
- White color was favored both in Tokyo as well as Seoul.
- Light and pale tone were favored in Tokyo whereas the vivid tone was favored in Seoul.

- The participants from Taipei disliked the colors of dark tone and from Tokyo disliked the colors in light, light-grayish, vivid and pale tones.

2.3 Relationship and potential application to typology decision

The use of the colors in the healthcare environment is very important for the creation of calming and soothing environment. The authors present a very interesting research work to show how the preferences in color differs with the age, sex and geographical regions. The authors present examples to the inclination towards the dark tones to the interest towards the new trends in fashion. Cultural differences were responsible for the preferences in the hues and tones. Geographical and cultural proximities result in the common preferences of the colors. The findings of the paper show how designers can understand the differences in the preferences of the colors by understanding the geographical and cultural preferences of the people to create a preferred design in the health care settings.

2.4 List of quotations

“Although each factor and cluster had distinct characteristics, they had one major point in common; the subjects who were quite interested in fashion and had confidence in what they wore preferred purplish colors and colors in deep and dark tones more often than the other subjects did.” (Saito, 1996, p. 40)

“Among those similarities, the fact that white was commonly preferred highly not only in Tokyo, but also to an even greater degree, in Seoul, made the author replicate the survey in Taipei" (Fig. 2), which is close to Japan both geographically and culturally, to test the hypothesis that the strong preference for white is based to some degree on geographical and cultural variables.” (Saito, 1996, p. 43)

“First, color preference tendency was influenced by the attributes of age, sex, and geographical region in Japan.” (Saito, 1996, p.48)

“Third, cross-cultural differences were found in the preference for both hues and tones.” (Saito, 1996, p. 49)

Annotated Bibliography 6: (May Saeedi)

Coad, J., & Coad, N. (2008). Children and young people's preference of thematic design and colour for their hospital environment. *Journal of Child Health Care*, *12*(1), 33-48.

1. Analysis of source

1.1 Authors’ credentials

The authors are from diverse background- one of them being the senior research fellow in academia and other being a pediatrician. This qualifies the author to present the design and color preference of the children and young people in a hospital.

Jane Coad was a senior research fellow at the University of the West of England in Bristol, UK during the time of the publication of article. She is currently a Professor in Children and Family Nursing at the Coventry University, UK. Her research interest lies in the children and family nursing, learning and participation.

Nigel Coad is a consultant Pediatrician in the University Hospitals Coventry and Warwickshire NHS Trust in Coventry, UK.

1.2 Journal -date-edition

The article is published in the Journal of Journal of Child Health Care, a peer reviewed journal and the publisher of the journal is Sage Publications in association with the Association of British Pediatric Nurses. The journal covers the articles on pediatrics. The article is cited 74 times as of now, which explains the attention it has garnered from the research community.

1.3 Intended Audience

The audience for this article is designers, psychologists, healthcare management personnel, pediatricians, as well as laypersons. In this article, the authors have discussed how the preference of the children varies for different colors and thematic designs. This article will be of immense importance to the designers to gain an insight for creating an inclusive design that can create a soothing and calming environment for children.

1.4 Support – (opinion, evidence based, propaganda)

The information presented in the article is both objective as well as subjective. The authors the results based on the data collection and data analysis of the results from the surveys they carried out. The questionnaire developed for the study also collects the opinions of the participants regarding the preexisting designs and colors in healthcare setting environments. The structure of the article begins with a short literature review of the findings from the previous research works that have shown the different attempts to use the colors and designs for children as well as young adults, but they are only applied in small clinical arenas and are not yet applied to the big regional hospitals. So, this study tries to take it further by trying to understand the preferences of children towards colors and to apply the décor ideas to the regional hospitals.

1.5 Coverage

The coverage of the article is focused and through. The authors have shown that children and young people showed strong preferences for color. They liked the simple designs and artwork. This article begins with the focus on finding the design and color preference of children and young people in a regional hospital design. And, the article addresses the major aspects of the topic.

2. Summary of information:

2.1 Methodology and research methods

The studies were carried out in two different phases.

In the phase 1, total of 40 children and young people- 30 children: 10 in each age group of 3-5 years, 6-10 years, and 11-18 years and 10-school-age children and young people with a range of learning needs and physical disabilities were interviewed. They were asked individually or in small groups about their preferences for the design and color. To understand the color preferences, paint color leaflet which included the range of more than 100 colors were provided to the participants and they were asked to choose the colors based on their preferences. The team allocated each color to a predetermined color group (e.g. reds, greens, creams/white, yellows, browns, blues) based on nine shades of that color from the palest to the darkest. Each shade of color in the predetermined group was scored as 1 to 9 (with 1 = the palest to 9 = the darkest). The participants were asked to select their preferences of colors and a pilot of five children was done to validate the scale for the same tool provided to the participants.

In phase 2, a questionnaire tool was developed for a descriptive survey, total of 275 participants were asked to answer the questionnaire relate to their preferences- 250 current and retrospective inpatients of children's wards, 25 (6-11 years old) children in a Junior school. Quantitative data obtained from the questionnaire was used for the descriptive statistical analysis.

Ethical considerations were followed for the collection of the data, maintaining the anonymity of the participants.

2.2 Findings

- Mid-blue green colors were the most preferred colors for the children, and some of the young people aged above 11 years showed preferences for the darkest range of blue colors.
- For the entrance region of the hospitals, the participants choose a single color mild-warm blue, pastel green and accent yellow, cream and orange color as their preference.
- The participants preferred warm, inviting corridors, but they preferred a single color or single-color zoned areas in mid-yellow mid-orange color.
- The participants didn't like the cream or the white colors of the corridors in the hospitals.

- The participants preferred both the single colors and the combinations of the colors for the ward arenas. The single color preferred were blue, accent and pastel orange and the combinations were shades of blue, orange, pink, neutral and yellows.
- The children and the young people choose the mid and paler range of the colors, with blue and green being the popular choice, due to the calming effect of the blue color and warmth of the green color.

2.3 Relationship and potential application to typology decision

The use of the colors in the healthcare environment is very important for the creation of the home like environment that provides calmness and soothing. The hospital areas for the children tend to be same as the one for the adults. The authors present a very interesting research work to show the preferences of the children for the colors in the hospital design. The authors present how the common conception that children like bright shade of the colors is very different from the findings from this study. The findings of the paper show how designers can understand the differences in the preferences of the colors of children in different regions of the hospitals like entrance, corridors and wards create a preferred design in the health care settings.

2.4 List of quotations

“Although each factor and cluster had distinct characteristics, they had one Thus, one issue not evident in the current literature is how the views of children and young people have been elicited in district hospitals and subsequently how those choices impacted on the planning of their hospital environment (Coad and Houston, 2007).” (Coad and Coad, 2008, p. 36)

“All of the colours chosen were not bright colours, as previous studies indicated (Redshaw and Smithell, 2000), but rather pale to mid-colour ranges.” (Coad and Coad, 2008, p. 41)

“Also, accent colours were used not only to supplement the colours of the areas but suggested as a way to add interest to the space, such as using a paint effect.” (Coad and Coad, 2008, p. 41)

“It was expected that the children and young people might choose the brighter colours on the selection colour and thematic charts offered, but without any prompts at the interviews and questionnaires the children and young people repeatedly choose the mid and paler range of colours, with blue–green colours being the most popular.” (Coad and Coad, 2008, p. 43)

“This may be because of the calming effect of blue, but green adds the warmth that they also preferred.” (Coad and Coad, 2008, p. 43)

Annotated Bibliography 7: (May Saeedi)

Stone, N. J., & English, A. J. (1998). Task type, posters, and workspace color on mood, satisfaction, and performance. *Journal of Environmental Psychology*, *18*(2), 175-185.

1. Analysis of source

1.1 Authors' credentials

The authors are the researchers from the Department of Psychology, Creighton University, Omaha, Nebraska, U.S.A.

Nancy Stone is currently a Professor in the Psychological Science at Texas Tech University. Her research interests lie in the psychology, behaviors.

Anthony J. English was a researcher in the Department of Psychology, Creighton University, Omaha, Nebraska, USA.

1.2 Journal -date-edition

The article is published in the Journal of Environmental Psychology which is a peer reviewed journal and the publisher is Elsevier. The journal incorporates the scientific studies on the transactions and interrelationships between people and their surroundings.

1.3 Intended Audience

The audience for this article is designers, psychologists, healthcare management personnel, as well as laypersons. In this article, the authors have discussed how the task type, posters, and workspace color affect the mood, posters, and performance. The environment of the healthcare is usually chaotic and stressful, so the care should be provided to allow the healthcare personnel to perform their best all the time.

1.4 Support – (opinion, evidence based, propaganda)

The information presented in the article is objective. The authors proposed the hypothesis that the personnel performing in a red colored environment have highest levels of positive mood, satisfaction and performance when working with a low demand task, and the lowest levels of positive mood, satisfaction, and performance in the blue environment. The authors carried out a survey to test the hypothesis. The results presented in the article are based on the research works.

1.5 Coverage

The coverage of the article is focused and thorough. The authors have shown that colors influence the mood, satisfaction and performance. The article begins with the intention of finding if the color affects the mood, satisfaction and performance in the workspace. And the article addresses this question. The article covers the topic well.

2. Summary of information:

2.1 Methodology and research methods

The studies were carried out on 112 participants (50 male and 62 female students) with the median age of 19 years. Six workstations- two rows of three work stations facing each other was created. One row of the partitions was painted dark red, other row was painted light blue, and the end partitions were painted white. Within each partition, a desk, computer and chair were placed.

Audio tapes was created which included the conversations between two individuals role-playing as telemarketer and customer. The first three sessions were used as the training sessions to determine the baseline performance for each participant. The low work demand tape consisted of the seven sessions identical to the baseline sessions. Each session for the low demand was 5 min 47 sec in length, with total time being 45 min 52 sec. Section 4-7 on the high demand work lasted for 6 min 5s, 6 min, 5 min 55 s, and 5 min 50 seconds respectively, totaling the time duration for 45 min 40 seconds. A scene of sunset which was rated as pleasant by Stone, 1993, was positioned above the computer.

The Multiple Affect Adjective Check List developed by Zuckerman and Lubin, 1985 was used to access mood. A six-item, five-point-Likert-type questionnaire was created to determine the participants' perception of the task. The participants were asked to enter the name and addresses of the participants based on the conversations in the audio tapes. After the tasks were completed, the participants were given the satisfaction questionnaire which accessed the perceptions of the task, feelings of privacy.

2.2 Findings

- The depression tended to be lower when no poster was present than when a poster was present, except during the high demand task in the blue partitions.
- The lowest level of depression for those performing the high demand task in the red partitioned area occurred when no poster was present whereas the highest level of depression occurred when a poster was present
- For the high demand task, task demand was rated highest for the blue partitioned area and lower in the red partitioned area
- Individuals performing in the blue partitions perceived the temperature to be cooler than those in the red partitioned workspaces

- Red is more stimulating and bluer is more depressing or calming. For a monotonous task, a red environment may contribute more stimulation, increasing performance.

2.3 Relationship and potential application to typology decision

The use of the colors in the healthcare environment is very important for the creation of the environment that soothes and calms the patients as well as the health providers. The authors present a very interesting research work to show the performance of the people are affected by the wall color in a high demand task. Also, the findings of the paper show that the performance of the people for a monotonous or boring task is affected by the wall colors. Red color was found to be more stimulating for the boring tasks. Privacy was perceived to be higher in the blue color partitions. This article helps designers can understand the differences the colors can bring in the performance in the healthcare settings.

2.4 List of quotations

"Individuals performing in the blue partitions perceived the temperature to be cooler (M=3·04, S.D.=0·57) than those in the red partitioned workspaces (M=3·25, S.D.=0·48)." (Stone and English, 1998, p. 181)

"Therefore, the low perceived task demand affected by the blue environment may have countered the high level of hostility generated by the low demand task, leading to the fewest number of errors." (Stone and English, 1998, p. 182)

"Furthermore, because students perceived the blue partitioned areas to be more private, they may have focused more on the task." (Stone and English, 1998, p. 183)

"These findings support the idea that the color red may in fact be stimulating, whereas the color blue is calming and/or depressing, creating a more private environment." (Stone and English, 1998, p. 184)

Annotated Bibliography 8: (May Saeedi)

Naz, K. A. Y. A., & Epps, H. (2004). Relationship between color and emotion: A study of college students. *College Student J*, 38(3), 396.

1. Analysis of source

1.1 Authors' credentials

The authors are the faculty from the University of Georgia, USA. The authors are the faculty members which qualify them to present the emotional responses of the people towards different colors and hues.

Naz Kaya, PhD is an Assistant Professor at the Department of Textiles, Merchandising and Interiors College of Family and Consumer Sciences in the University of Georgia. She has numerous publications in renowned journals. Her research interests lie in the field of color and design.

Helen H. Epps is a Professor at the Department of Textiles, Merchandising and Interiors College of Family and Consumer Sciences in the University of Georgia. The author has published numerous publications in the field of color psychology and design.

1.2 Journal -date-edition

The article is published in the College Student Journal which is published by Project Innovation which publishes scholarly articles from students containing innovative ideas. The article is cited 507 times as of now, which explains its high impact in the research community. The article is published a decade back and the paper presents an important topic in the field of color psychology explaining how different color evoke different emotions.

1.3 Intended Audience

The audience for this article is designers, psychologists, healthcare management, as well as laypersons. In this article, the authors are more focused on the evaluation of the individual differences towards color. Different colors evoke different emotions on people. In this study, the reaction of people towards principle hues, intermediate hues and achromatic colors. This study suggests how these findings can be used for creating a healing and calming environment in the healthcare design.

1.4 Support – (opinion, evidence based, propaganda)

The supporting information presented in the article are objective (evidence based). The authors present how the emotions of individuals differs with the color of their setting. The article begins with a short literature review, how different colors evoke different emotions on different people. The emotions depend on the feeling evoked by the colors-positive or negative. The results presented in the paper are based on the statistical analysis.

1.5 Coverage

The coverage of the research work is more focused. The authors have carried out experiments to see how the choice of different colors – affect the emotions of the people differently. This work can be further applied to healthcare environment to help the people feel relaxed and feel positive in the healthcare environment. This study is related to the investigation of the association between the colors and the emotions, which covers the topic well.

2. Summary of information

2.1 Methodology and research methods

A total of 98 students were the participants in the experiment. 44 men and 54 women were tested, and the average age of the people was 21 years. Ten fully-saturated chromatic colors from the Munsell Color System (five principle: red, yellow, green, blue, and purple and five intermediate hues: yellow-red, green-yellow, blue-green, purple-blue, and red-purple), and three achromatic colors were taken as stimulus for the test.

The participants were tested in an office space where they were shown a color sample in a computer screen with a neutral gray background. The participants were then asked about their responses towards the color which were adapted from the Boyatis and Varghese (1994) and Hemphill (1996). The participants responded with only one emotional response for each color they were provided.

The data collected was analyzed using SPSS program (Statistical Package for Social Sciences). 21 emotions were collected for the relationship between the color and emotion.

2.2 Findings

- Green color was found to have the most positive emotional responses, indicating the feeling of calm and relaxation. Green is also associated with the feeling of nature, comfort and soothing.
- Yellow color was found to be the evoking feeling of positiveness and happiness relating to the sun and warmth of summer time.
- Blue color provided the feelings if relaxation and calmness, happiness, comfort, peace and hope.
- Red color evoked both positive and negative emotional reactions. The positive emotions were associated with love and romance and negative emotions were associated with evil.
- Purple color evoked the feeling of relaxation and calmness as well as the feeling of tiredness, fear and boredom.
- Purple color was found to be not a favorite color with many people.
- Intermediate hues- blue-green, had highest positive emotional association, followed by yellow-red, and purple-blue
- Green-yellow hue evoked the negative emotional responses which evoked the feelings of sickness and disgust.
- For the achromatic colors, white gained the most positive responses, followed by black and gray as white was related to purity and innocence.

2.3 Relationship and potential application to typology decision

The use of the colors in the healthcare environment is very important for the creation of a calm and soothing environment. The authors present a very interesting research work to show how the colors

evoke different emotional responses in different people. The findings of the paper show how color evoke different emotions in different people, and how the designers can use these findings for creating a better design in healthcare environments. This will be very important to our typology question, as we can implement the findings of this article for the better design of a healthcare environment.

2.4 List of quotations

"The color green elicited mainly positive emotional responses, including the feelings of relaxation, calmness, and happiness as well as comfort, peace, and hope." (Naz and Epps, 2004, p. 400)

"Blue elicited a high number of positive emotional responses, including the feelings of relaxation and calmness, happiness, comfort, peace, and hope, with a low number of negative responses, including sadness and depression.." (Naz and Epps, 2004, p. 400)

"Therefore, it seems that a color related emotion is highly dependent on personal preference and one's past experience with that particular color." (Naz and Epps, 2004, p. 401)

"Moreover, color conventions differ from one society to another." (Naz and Epps, 2004, p. 401)

Annotated Bibliography 9:

Verhoeven, J. W., Pieterse, M. E., & Pruyn, A. T. (2006). Effects of Interior Color on Health Care Consumers: a 360 Degree Photo Simulation Experiment. *ACR North American Advances*.

1. Analysis of source

1.1 Authors' credentials

The authors are the researchers from The University of Twente in Enschede, Netherlands.

Joost W.M. Verhoeven and Marcel E. Pieterse were the graduate students who carried out the study.

Ad Pruyn is the Professor of Marketing Communication and Consumer Psychology in the Department of Communication Science at the University of Twente.

He was working in the Department of Geography at the University Delaware at Newark. His research interests lie in the consumer psychology and behavior, product design and persuasive advertising.

1.2 Journal -date-edition

The article is published in the conference proceedings of Association for Consumer Research in the Volume 33 in 2006. It is a scholarly forum article and the publisher is Association for Consumer Research.

1.3 Intended Audience

The audience for this article is designers, psychologists, healthcare management personnel, as well as laypersons. In this article, the authors have discussed how color of the interior walls affects the emotional and cognitive appraisal of people under varying levels of anxiety. This article reveals an invaluable information regarding the preferences of the choice of the wall colors in a healthcare design setting.

1.4 Support – (opinion, evidence based, propaganda)

The information presented in the article is objective. The authors the results based on the data collection and data analysis of the results from the methods they carried out. The questionnaire developed for the collected the anxiety and the emotions of the participants revealing the emotions they felt for a certain wall color. The structure of the article begins with a short literature review of the findings from the previous research works that have shown the different attempts to use the colors effectively. This study tries to take it further by trying to understand the effects of wall color on anxiety, pleasure, evaluation of the room and perceived service quality in a healthcare setting.

1.5 Coverage

The coverage of the article is focused and through. The authors have shown that wall colors influence the anxiety, pleasure and it also affects the perceived service quality. The article begins with the intention of finding if the interior colors affect the perceived service quality in healthcare setting, and the article address the question.

2. Summary of information:

2.1 Methodology and research methods

The studies were carried out on 90 participants exposing them to two different colors- blue and white using desktop computers. The participants were asked to imagine being hospitalized after with leg fracture, where they were first admitted to first aid room and then surgery was performed on them. The participants were exposed to the QuickTime 360 ° panorama of an examination room. The wall colors were taken using photoshop. The participants were assigned to white or blue colors randomly. Then the participants were asked to fill out a questionnaire. The participants were then asked to imagine being transferred to the ward rooms for 10 days as the same color of the examination room and again they were asked to fill out the same questionnaire.

Anxiety and emotion were measure using the ‘Profile of mood states’ anxiety subscale developed by Wald and Mellenbergh, 1992 and the 6-item from Mehrabian and Russel pleasure subscale developed in 1974. Cognitive appraisal was assessed using the 10-item environmental appraisal scale and perceived

service quality was measured using 13-item SERVQUAL questionnaire developed by Parasuraman, Zeithaml and Berry, 1988 and Parasuraman, Berry and Zeithaml, 1991.

2.2 Findings

- Blue walls were found to significantly decrease anxiety compared to white walls.
- Blue colored walls were found to improve the subject's pleasure
- The participants in the blue examination room condition perceived a higher service quality compared to the participants in the white colored room
- The relationship between color and perceived service quality was affected both by both pleasure and cognitive appraisal

2.3 Relationship and potential application to typology decision

The use of the colors in the healthcare environment is very important for the creation of the environment that soothes and calms the patients. The authors present a very interesting research work to show the perception of the quality of the service differs with the interior wall colors. Color can enhance service evaluation by decreasing stress and increasing the pleasure. Also, the findings of the paper show that the perception of the colors is independent on the time of the exposure. This article helps designers can understand the differences the colors can bring in the perception of the service quality, stress and pleasure in the healthcare settings.

2.4 List of quotations

"Blue walls (as compared to white walls) reduce anxiety and increase cognitive and affective appraisal and even perceived service quality." (Verhoeven, Pieterse and Pruyn, 2006, p. 292)

"The current trend in hospital interior design is to create an attractive, relaxing atmosphere in order to relieve patients' stress and anxiety, improve their emotions and hence encourage the healing process (Devlin & Arneill, 2003)." (Verhoeven, Pieterse and Pruyn, 2006, p. 292)

"Color can enhance service evaluation by improving customers' affective state and by increasing their evaluation of the physical environment." (Verhoeven, Pieterse and Pruyn, 2006, p. 293)

"First, this suggests that the beneficial effects of a blue wall color are not restricted to high-stress encounters but may also occur under moderately stressful conditions." (Verhoeven, Pieterse and Pruyn, 2006)

2. How does entertainment help with time perception during treatment?

Annotated Bibliography 1: (Luiza Mello)

Medina, S. (2014). Living with Cancer. *Metropolis: Architecture Design*, *33*(9), 30–32. Retrieved from http://ezproxy.fiu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=asu&AN=131527036&site=ehost-live&scope=site

1.1. Author's credentials.

Samuel Medina is a renewed editor on an architecture magazine, Metropolis Magazine. Through his career, he has been reviewing and observing how different architecture spaces reflect on peoples lives and the impacts of it. In this specific article that he studies, Samuel analyzes how thoughtful architecture can be beneficial when it comes to cancer patients healing.

He has worked in different projects and understands how the architecture has power when it comes to the psychological aspects of their users.

1.2. Journal – date, edition, title.

The relatively recently published 2014 article provides a relevant view of the impact interior architecture can have upon the wellbeing of the guests entering the given space. The Magazine focuses on the impact an excellent thought architecture has on people Also because the source is just one of multiple volumes, the journal is regarded as a standard reference. Lastly, the majority of the recommendations from the source was published within the last ten years except for one reference from 1990.

1.2. Intended Audience.

The intended audience is the design community that is concerned with new and innovative ways of designing a great environment as well as contributing for the speed of the healing process of patients with many diseases going through hard treatments. They stay in the hospital for a long time and need great design and activities that would influence positively in the cure of each one of them.

1.4. Support – (opinion, evidence-based, propaganda) See above comments

The authors present arguments that might help through the patient's journey of curing themselves of diseases and many other problems. The article indicates with an outline of how supporting the healing process of patients can be influenced by the design we design. Also, how the psychological aspects of people are highly influenced by what we see, hear, taste and touch.

The article gives many examples of how creating a building that is welcoming makes people feel good and want to stay even if the environment is not desired for many people, such as hospitals. People go there to get the cure not because they think it is a nice place to visit. The idea of designing it and making it feel and smell like a place they enjoy helps with the healing process of patients with many diseases.

The author relates that many healthcare environments are often determined by engineers focused on the structure rather than the health criteria of the situation. That is a significant issue happening especially in the USA, where the culture was to design for developers and not for the patient itself.

The author suggests the lecture of an article by Charles Jenks that states how Maggie's cancer center care is defined by positive qualities such as light, space, openness, views, and connection to nature. That would be the opposite of what is being offered by many hospitals around the world. Maggie's is being recognized as a place that has zest as well as calmness.

1.5. Coverage.

The article covers the primary concern our thesis group will be analyzing, which is the relationship of the Interior Architecture with the healing process of patients around the globe suffering for many diseases but focusing on the cancer treatment. The information given will improve a lot on the studies and also the final result of each project, changing the way people see chemotherapy centers for patients with cancer. Therefore, although the article did not provide much data, the research was exciting when thinking about the psychological side of the healing process of cancer treatment. The medicine and chemotherapy drugs are more and more advanced in order

2. Summary of information:

2.1. Overview of methodology and methods. The article uses a qualitative methodology of qualitative research methods, where the researcher used Maggie's cancer centers around the world studying the effects that

2.2. Study findings and significance of results to the research question.

- Floral and fruity fragrances help patients to lower blood pressure, slow down respiration, relax muscles and increase alertness.
- A varied choice of textures can turn the sense of touch into both stimulus and soothing comfort.

- The study found that buildings are not able to completely cure diseases, however, they act as therapy and can tremendously improve the cure having a psychological effect on the patients and helping with anxiety and depression.
-
- Creating a building that is welcoming and friendly without references to a hospital or healthcare center helps the patient to stay more comfortable in the environment and time perception of time goes faster.
- Patients with a light-filled space feel better when waiting for the results and they can process the findings privately and in silence.

2.3. Relationship and potential application to typology decision.

The article relates to the typology selected because the healthcare environment it is becoming a new architecture that has the main focus not only the architectural and engineer aspect, but it is becoming constructed to serve the user in the first place which in this case would be the patients. The patient well-being and satisfaction are the most critical part of the process.

The responsibility of interior architects and architects to sustain the environment and quality of the environment is related to the quality of a person's and a community's quality of life and experience for the users who undergo hard treatments in a very delicate period of their lives.

2.4. List of quotations that appear to be useful to include in the literature review.

"An environment which balances calming reassurance with constructive stimulation can help stimulate the positive mindset that people need to overcome illness." (Boscherini, Giuseppe, 2017, p.2)

"Smell and taste sensations go hand in their ability to awaken senses, helping to restore the pleasure associate with, flowers, or fresh fruit. Floral and fruity fragrances have helped to lower blood pressure, slow down respiration, relax muscles and increase alertness. Finally, and perhaps not so obviously, a varied choice of textures can turn the sense of touch into both stimulus and soothing comfort."(Boscherini, Giuseppe, 2017, p.3)

"Maggie's cancer center is defined by positive qualities: light, space, openness, intimacy, views, and connection to nature, not the same as a standard-issue hospital environment. In the words of the 'Maggie's Architecture and Landscape Brief,' Maggie's Centres 'must look and feel joyous; they must have zest as well as calm.'"(Boscherini, Giuseppe, 2017, p.5)

Annotated Bibliography 2: (Luiza Mello)

Boscherini, G. (2017). A Sense of Coherence: Supporting the Healing Process. *Architectural Design*, *87*(2), 108–113. https://doi-org.ezproxy.fiu.edu/10.1002/ad.2159

1.1. Author's credentials.

Guiuseppe Boscherini, a renowned interior designer, studies how a patient's recovery can be influenced by a well-designed environment.

He has worked for many projects showing how light, sound, color and activities can contribute through a health-giving architecture.

1.2. Journal – date, edition, title.

The relatively recently published 2017 journal provides a relevant view of the impact interior architecture can have upon the wellbeing of the guests entering the given space. Also because the source is just one of multiple volumes, the journal can be regarded as a standard reference. Lastly, the majority of the recommendations from the source was published within the last ten years except for one reference from 1990.

1.2. Intended Audience.

The intended audience is the design community that is concerned with new and innovative ways of designing a great environment as well as contributing for the speed of the healing process of patients with many diseases going through hard treatments. They stay in the hospital for an extended amount of time and need great design and activities that would influence positively in the cure of each one of them.

1.4. Support – (opinion, evidence-based, propaganda)

The authors present arguments that might help through the patient's journey of curing themselves of diseases and many other problems. The article begins supporting the healing process of patients can be influenced by the design we design. Also, how the psychological aspects of people are highly influenced by what we see, hear, taste and touch. (Boscherini, Giuseppe, 2017, p.5).

The article gives many examples of how creating a building that is welcoming makes people feel good and want to stay even if the environment is not desired for many people, such as hospitals.

1.5. Coverage.

The article covers the primary concern our thesis group will be analyzing, which is the relationship of the Interior Architecture with the healing process of patients around the globe suffering for many diseases but focusing on the cancer treatment. The information given will improve a lot on the studies and also the final result of each project, changing the way people see chemotherapy centers for patients with cancer. Therefore, although the article did not provide much data, the research was exciting when thinking about the psychological side of the healing process of cancer treatment. The medicine and chemotherapy drugs are more and more advanced in order

2. Summary of information:

2.1. Overview of methodology and methods.

The article uses a qualitative methods of the psychological effects the architecture has on patients undergoing chemotherapy treatment which can support the process of the healing process of cancer patients.

2.2. Study findings

- The study findings are significant to the question of how entertainment helps with time perception during treatment. The mind and the psychology have the power to control time perception.
- Creating a building that is welcoming and friendly without references to a hospital or healthcare center helps the patient to stay more comfortable in the environment and time perception of time goes faster.
- Light, sound, texture and color can all contribute to health-giving architecture.
- Implementing designs that are salutogenic, focusing on factors that keep us well such as environments that stimulates the mind in order to create pleasure, creativity, satisfaction and enjoyment can speed up the recovery of health.
- A variety range of textures and activities in the environment stimulates the patient and gives it comfort.
- The sensory design experience has to come from the inside out. It means designing for the individual knowing their needs and creating solutions to satisfy them.

2.3. Relationship and potential application to typology decision.

The article relates to the typology selected because the healthcare environment it's becoming a new architecture that has the main focus not only the architectural and engineer aspect, but it is becoming constructed to serve the user in the first place which in this case would be the patients. The patient well-being and satisfaction is the essential part of the process.

The responsibility of interior architects and architects to sustain the environment and quality of the situation is related to the quality of a person's and a community's quality of life and experience for the users who undergo hard treatments in a very delicate period of their lives.

2.4. List of quotations that appear to be useful to include in the literature review.

“An environment which balances calming reassurance with constructive stimulation can help simulate the positive mindset that people need to overcome illness." (Boscherini, Giuseppe, 2017, p.2)

"Maggie's cancer center is defined by positive qualities: light, space, openness, intimacy, views, and connection to nature. That would be the opposite of a standard-issue hospital environment. In the words of the ‘Maggie's Architecture and Landscape Brief,' Maggie's Centres ‘must look and feel joyous; they must have zest as well as calm.'"(Boscherini, Giuseppe, 2017, p.5)

Annotated Bibliography 3: (Luiza Mello)

Uwajeh, Patrick & Iyendo Jnr, Timothy. (2015)*. Visual art and art therapy for healing in hospital environments.*Academics World International Conference. Retrieved from: https://www.researchgate.net/publication/304396503_Visual_art_and_arts_therapy_for_ healing_in_hospital_environments

1.1.**Author’s credentials.**

Patrick Uwajeh and Timothy Iyendo focus their work on understanding therapeutic impacts of environmental design interventions on wellness in clinical settings. Their study is focused on how art can help and facilitate the healing process of patients and staff in healthcare facilities. Both authors have also been working on other projects such as: ‘Positive Soundscape Interventions in clinical environments' and ‘Proposing a conceptual framework for understanding and improving the hospital soundscapes.'

1.2. Journal – date, edition, title.

The article was published on February 2nd2016. A relatively new study that has been very qualitative when it comes to healthcare design. The study has been made in the Department of Architecture, Eastern Mediterranean University Famagusta North Cyprus, via Mersin 10, Turkey.

1.2.Intended Audience.

The intended audience is the design community that is concerned with new and innovative ways of designing a great environment as well as contributing for the speed of the healing process of patients with many diseases going through hard treatments. Patients and staff have the right to having the most productive and efficient workplace/healthcare facility. This article is intended for designers and architects that focus on the design that could heal patients and help tremendously with their recovery.

1.4. Support – (opinion, evidence-based, propaganda)

The authors present facts that will help patients to understand the positive impacts the design has in their lives. Art therapy programs and visual artworks to facilitate the healing process of patients and staff in a healthcare environment. The authors have highlighted a strong link between the content of the images and the impacts they have when patients see them. How they can help with the reactions of patients to pain, stress and also anxiety. There is even evidence that patients are choosing hospitals and healthcare facilities depending on the art that they have on the walls, the color pallet of the spaces. An exploration of the effective use of visual arts and art therapy programs in healthcare facilities.

1.5. Coverage.

The article covers the primary concern our thesis group will be analyzing, which is the relationship of the Interior Architecture with the healing process of patients around the globe suffering for many diseases but focusing on the cancer treatment.

The information given will improve a lot on the studies and also the final result of each project, changing the way people see chemotherapy centers for patients with cancer.

2. Summary of information:

2.1. Overview of methodology and methods.

The article uses a qualitative method of the use of art therapy, which can support the process of the healing process of cancer patients.

The whole idea of the healing is centered on the fact that the quality of the doctors and facility is not the only fact that influences if a hospital is good or not. There is a lot more involved, and the psychological side also affects how the patient feels in the hospital. The study investigates the use of artworks in the hospital and their impact on the wellbeing of the users.

A study on visual art in Near East Hospital. James Scot, an orthopedic consultant surgeon at the Chelsea & Westminster hospital, reveals that since he has added art in this hospital, it has changed the environment and has a positive effect on patients. The study was held on an investigation into the use of artwork in different areas of the hospital. The cancer treatment ward in the hospital was still under construction, so the experiment has not been held there as well. Admission wards, waiting areas, general circulation spaces and also the pediatric unit have been analyzed. The research method used was subjective, where a person in site documentation occurred and the variable, in that case, where the artwork on walls.

2.2. Study findings

- Art serves as a secure form of expressing emotions and innermost feelings, even the most difficult ones in life as the case of cancer patients. These patients can use art to explore the meaning of previous conditions during art therapy. These methods can also help them to accept cancer as a long-term illness and learn how to control anxiety, during pre and post-chemotherapy treatment. It has been shown that it has shown a significant reduction in depression and even pain.
- The study findings are significant to the question of how entertainment helps with time perception during treatment because it shows substantial results where they prove that the mind and the psychology have the power to control time perception. The architecture plays a significant role in that. Creating a building that is welcoming and friendly without references to a hospital or healthcare center helps the patient to stay more comfortable in the environment and time perception of time goes faster.
- Significant data was collected, and the researchers found that simple touches such as murals with bright colors of the rainbows painted on the walls with colorful play toys which have a positive effect on human emotions and especially in kids. At the pediatric center, all of the pictures and artistic crafts with playful tones make kids and adults feel special and also gives a soothing feeling to them.
- The author’s found (Be careful of using absolute terminology – I am sure that the article did not use the term “prove”) that a proper visual effect and art have the power on fostering and enhancing the recovery in patients by as much as 10%. This can be related to optical elements and activities kids and adults can have while still in the hospital being cured of many diseases.

- The use of artwork in the space could elevate a decisive healing pit come on occupants of the hospital. Art programs should be organized for therapies.

2.3. Relationship and potential application to typology decision.

Multiple pieces of evidence that have been explored in the study made by Uhernfeldt and Birkelund have shown how important is the application of Art and Art Therapy in healthcare environments. Art has the power to control serious diseases such as anxiety, depression and even cancer. The power architects had on making patients feel comfortable and welcomed it's enormous.

Patients that undergo very aggressive treatments need to have some distraction and comforting experiences, and the art can do that in a very efficient way as the study shows.

2.4. List of quotations that appear to be useful to include in the literature review.

“The studies on the impact of art and art therapy in cancer patients have shown ample positive results on their healing process. ” (Immermann, C., Uhrenfeldt, L., & Birkelund, R., 2015, p.171).

“The concept of art therapy is based on the theories that the experience gathered from the creative activities in which patients participate in, sparks up a great deal of energy that enables them to handle and positively manage their medical conditions." (Immermann, C., Uhrenfeldt, L., & Birkelund, R., 2015, p.171).

“Art therapy is an approach which involves both psychological and therapeutic methods to manage various types of medical conditions.” (Immermann, C., Uhrenfeldt, L., & Birkelund, R., 2015, p.171).

Annotated Bibliography 4: (Luiza Mello)

Peters, T. (2014). Socially Inclusive Design in Denmark: The Maturing Landscape.*Architectural Design*, *84*(2), 46–53. https://doi-org.ezproxy.fiu.edu/10.1002/ad.1727

1.1. Author’s credentials.

Terri Peters is a Danish architect, author, and researcher dedicated to employing nature and landscape to positive effect as a mean of promoting healing and health. Denmark leads the way architecture has been excellent in providing a high quality of life and comfort for older adults. He has worked in different projects and understands how the architecture has power when it comes to the psychological aspects of their users.

1.2. Journal – date, edition, title.

The article was published in 2014, providing research and studies about an inclusive design with innovative and modern approaches for all. Designers have an architectural duty to provide access to the mobility-impaired so all users can participate in all activities no matter what.

The study provides a relevant view of the impact interior architecture can have upon the wellbeing of the guest entering and living in the given space.

1.2. Intended Audience.

People who are concerned about a design that can fit all and also that heals. One of the projects called Sound Retirement community brings life to what was supposed to be an ordinary boring nursery home. The design can make the users feel better and complete.

1.4. Support

The author and architect care about how visitors could feel welcomed as well as users in the spaces designed by them. Buildings with easy access to navigate and will everything a patient would need to live. Connected to nature, residents could feel at home other than in a healthcare facility. Another project that it is built is a Herlev Hospital in Copenhagen. NORD Architects new healthcare center in Copenhagen is another example that breaks down barriers.

1.5. Coverage.

The article covers one of the main concerns of the group which is to make the patients and users feel comfortable and not feeling like they are in a healthcare facility. The building itself is an art piece and the physiological reaction that patients have as soon as they walk in the space they already feel the relieve and not feel the stress at all. Space has been designed to encourage physical and emotional rejuvenation. A place where you walk in and does not think it's made for curing patients that have such a severe disease such as Cancer.

2. Summary of information:

2.1. Overview of methodology and methods.

The article researches facilities and buildings that have a functional design and purpose to it.

2.2. Study findings and significance of results to the research question.

• The architects have adopted strategies that promote physical and emotional health and wellbeing through design. Designing for the aging population does not mean that it has to be something boring and also to create for a cancer care center doesn't either. Patients need to feel well in the space they are living and being cured.

2.3. Relationship and potential application to typology decision.

The article shows that the Danish architecture takes into consideration the user in first place. The elderly population is usually left behind. Design brings people together, cures and gives comfort to people who need it. This article was fascinating to add value to our research because it brought up something that needs attention: The elderly.

2.4. List of quotations that appear to be useful to include in the literature review.

“With a tradition of social inclusion and innovative contemporary design, Denmark leads the way internationally in its architectural provision for an older population. Architect, author, and researcher **Terri Peters** highlights some pioneering housing schemes in Denmark that use architecture to reduce the stigma of old age in the creation of environments that are overtly ‘homey' or domestic. Breaking away from the sanitized environment of the ‘nursing home’ – and that employ nature and landscape to positive effect, as a means of promoting healing and health.”(Peters, Terri, 2014, p.47).

"Design for an aging population does not mean specific and isolated facilities or initiatives tacked onto existing designs, but rather integrating quality and inclusive design into daily life and the urban fabric that will last over time.” (Peters, Terri, 2014, p.47)

Annotated Bibliography 5: (Luiza Mello)

Alati, D. (2009). **Healthy Building.**Contract, 51(10) 46-49, Retrieved from http://http://search.ebscohost.com/login.aspx?direct=true&db=asu&AN=505261504&site=eds-live

1.1.**Author’s credentials.**

Daniel Alati, born and raised in Toronto, attended the University of Toronto, graduating in 2009. He received his Honors B.A and M.A in Criminology. Daniel decided to pursue his dream and attend Law School in order to pursue the criminological and international law issues he had developed a passion on. Outside of academics, Daniel has many other passions in life such as travel, volunteer work and fine dining. Daniel has new challenges everyday with life experiences that Oxford has and will keep providing.

1.2. Journal – date, edition, title.

The article was published on 2001 on Contract Magazine.com which focuses on a new study incorporating nature into the healthcare design.

1.2.Intended Audience.

The intended audience of the magazine is the leader in publications for commercial interior design and architecture projects, connecting professionals and covering projects, products and practice issues. Contract values the commercial design and focuses on the power of designers in order to transform institutional environments.

1.4. Support – (opinion, evidence-based, propaganda)

Cancer center elevates the stress level of patients as they have to deal with a disease from its diagnosis through treatment and possible recovery. It is a very hard emotional process that is needed for the cure. Weing Cole, a healthcare architect made sure to create a “healthy” building that would benefit patients and create a comforting and tranquil environment. He explains that bringing nature into the design was one of the strategies so that the building would not impose on its surroundings.

1.5. Coverage.

The article covers the primary concern on designing healthcare spaces with plenty of natural lighting and elements in order for the patient to feel at home. The clients needs to the design of the hospital was a creation of an evidence based, unique building that would be a healing environment with efficient patient flow as well as a healthy environment for patients visitors and staff. Most of the hospitals focus primarily on the patient, with the best doctors and nursed to service them. Then it comes the staff, that are all the people that will make the service happen. The visitors are left behind and most of the times forgotten.

2. Summary of information:

2.1. Overview of methodology and methods.

The article uses a qualitative method of the use of art therapy, which can support the process of the healing process of cancer patients. The main goal of the project is to create a psychological uplifting environment.

The whole idea of the healing is centered on the fact that the quality of the doctors and facility is not the only fact that influences if a hospital is good or not. There is a lot more involved, and the psychological side also affects how the patient feels in the hospital. The study investigates the use of artworks in the hospital and their impact on the wellbeing of the users.

A study on visual art in Near East Hospital. James Scot, an orthopedic consultant surgeon at the Chelsea & Westminster hospital, reveals that since he has added art in this hospital, it has changed the environment and has a positive effect on patients. The study was held on an investigation into the use of artwork in different areas of the hospital. The cancer treatment ward in the hospital was still under construction, so the experiment has not been held there as well. Admission wards, waiting areas, general circulation spaces and also the pediatric unit have been analyzed. The research method used was subjective, where a person in site documentation occurred and the variable, in that case, where the artwork on walls.

2.2. Study findings and significance of results to a research question.

- The floorplan is delineated so that the entrance for the chemotherapy is different than the one for radiation. Both areas are situated in two different floors, with enough space for future expansion and physician time shared spaces which are important to have right next to the areas where the patients get the drugs.

2.3. Relationship and potential application to typology decision.

Patients that undergo very aggressive treatments such as chemotherapy stay connected to the medication for more than 4 hours, sometimes up to 8 hours. The patients deserve a well-designed space as well as the staff and all the patient visitors who will be there with them for the same amount of time. This article applies to our typology because it shows how important is a well thought out design and a healthy environment for all the users, not only for the patient.

2.4. List of quotations that appear to be useful to include in the literature review.

“Designers viewed the challenges of creating this green cancer center as an opportunity to help patients all the way through the process.: dealing with anticipatory fears and responding with non-institutional, non-clinical, non-frightening interiors that make patients feel as at ease as possible.” (Alati, D. ,2009 , p.49).

“As part of creating a healthy building, environmentally sustainable strategies ultimately earned the project a LEED Gold rating. Achieving LEED certification was not an initial goal of the project, but it quickly became apparent how important it is” (Alati, D. ,2009 , p.49).

Annotated Bibliography 6:(Luiza Mello)

Gordon, J. & Gruber, M. (2012). **An innovative Off-Campus Infusion Suite Designed to Improve experiences of Patients With Cancer.** *Clinical Journal of Oncology Nursing, 16*(4), 354-359. Retrieved from https://search.ebscohost.com/login.aspx?direct=true&db=rz&AN=104483407&site=eds-live

1.2. Journal – date, edition, title.

The article was published by the Oncology Nursing Society, in 2012.

1.3.Intended Audience.

The intended audience of the article is people who are worried about the efficiency of the healthcare facilities such as designers and also developers. The Brooklyn infusion center provides all that and is a great resource.

1.4. Support – (opinion, evidence-based, propaganda)

The technology as well as the design will illustrate how these processes have improved patient experiences by reducing wait times and making spaces more efficient for the users, staff and patients. The idea was to implement a patient-centered nursing care model.

1.5. Coverage.

2. Summary of information:

The Brooklyn Infusion Center of Memorial Sloan – Kettering Cancer Center was founded in 2010 in order to meet cancer patients needs living in the Brooklyn neighborhood and surrounding areas. A team with various disciplines such as clinical, administrative, planning and other representatives were responsible for identifying and developing a location that would provide cancer care for those who felt more comfortable being next to home.

2.1. Overview of methodology and methods.

The main objective was to provide patient care that accommodates that patients to receive the treatment next to their homes and to take advantage of technology in order to establishes processes that will provide a safe and highly qualified care in a cost-effective manner.

2.2. Study findings and significance of results to a research question.

- Circulation is set so that there is no backtracking and it's a straight path from entry to reception to treatment and out, maintaining a connection to nature the entire time.
- Chemotherapy patients are hooked up to machines for up to 6 hours, it is crucial for the designers to create spaces that keep patients warm yet keep staff comfortable. Usually for sanitary purposes, the temperatures in hospitals are a lot lower to prevent bacterial and viral contamination.
- A solution for the temperature being comfortable for all the users including staff and visitors is radiant heat panels in the ceiling that would target the patient in the treatment chair in such a specific way that it does not make the environment too hot for staff.
- Chemo bays reflect a beach motif, with dune grass pressed between the panels that separate each patient station.

2.3. Relationship and potential application to typology decision.

Patients that undergo very aggressive treatments cannot be waiting for a long time in a badly designed environment. The need of the healthcare facility to be highly efficient is very important for the patient, staff and visitors. That would be very important for us to know because the circulation and the paths for all the users and patients to walk around needs to be efficient and also dynamic. The staff will be walking around and picking up the drugs from the chemotherapy all the time so it needs to be strategic.

2.4. List of quotations that appear to be useful to include in the literature review.

"To decrease costs, on-site laboratory and pharmacy services were eliminated. This Chemo Ready Model was one of many innovative workflow processes used at the Manhattan outpatient location to reduce wait times for patients receiving chemotherapy."(Gordon, J. & Gruber, M., 2012, p355).

"Technologic innovation, although very useful, will never replace the need for holistic care. Because cancer affects a person's mind, body, and spirit, the decision was made to educate all BIC nursing staff in the integrative therapies of Reiki, acupressure, and relaxation techniques." Gordon, J. & Gruber, M., 2012, p355).

Annotated Bibliography 7: (Luiza Mello)

Sarah C. Slayton MA. (2010). **Outcome Studies on the Efficacy of Art Therapy: A Review of Findings:** Journal of the American Art Therapy Association, 27:3, 108-118. Retrieved from: https://www.raphaelstichting.nl/queeste/files/2012/11/efficacy-of-art-therapy_review-of-finfings-2010.pdf

1.1. **Author's credentials.**

Sarah of Marylhus University with expertise in Behavioral Science, Clinical Psychology and also developmental psychology. Sarah decided to pursue her dream an focus on psychological behavior of people suffering from many different diseases, such as cancer. She has published over three articles about the subject.

1.2. **Journal – date, edition, title.**

The article was published on *the Journal of the American Art Therapy Association, 27*(3) pp. 108-118 © AATA, Inc. 2010.

1.2.Intended Audience.

The intended audience of the magazine is the leader in publications for commercial interior design and architecture projects, doctors and psychiatrics that are passionate in the field on how the design can influence in the well-being of patients.

1.4. Support – (opinion, evidence-based, propaganda)

Our intuitive skills as people, art therapists clinicians and artists continue to prove that the art making process is capable of helping clients and patients. It acts as a treatment for major mental illnesses and serious symptoms of trauma. It provides a response to the consequences of social problems.

1.3. **Coverage.**

The author identified 17 different studies that met their inclusion criteria. Studies assessed the impact of treatment on sample or treatment group. He also attempted to identify any outcome trends that could me associated with various research studies in the design field and also discuss their implications into the psychological aspects of the patients.

2. Summary of information:

2.1. Overview of methodology and methods.

The art therapy treatment in the related fields of creativity, psychology, psychiatry, education, nursing and medicine. Qualitative studies were researched

2.2. Study findings and significance of results to a research question.

• It is essential to provide evidence of the efficacy of the treatment choice. There are many people invested in the outcome of the treatment. Client themselves need to know that the art therapy treatment they are being offered has been shown to mitigate the challenges of their face.

• Preliminary examination of the data indicates that participants using the art therapy make less phone calls to medical and mental health providers. Therefore, requiring fewer referrals to medical specialists. Therefore it has decreased number of somatic symptoms and complaints. That reduced the utilization of medical and mental health services.

2.3. Relationship and potential application to typology decision.

Art therapy is still a new discipline and study so there is a big controversy around it. Recent studies have shown that the therapy its influencing positively among the patients suffering from many different diseases. That would be a great to add into our research in order to make the design more efficient and pleasant for all patients, staff and visitors.

2.4. List of quotations that appear to be useful to include in the literature review.

“Given the complicated clinical dilemmas of the 21st century, at times it can feel discouraging to work in the art therapy field without a reminder that what we are doing not only has meaning but also makes tangible headway in the areas where our clients are suffering.” (Sarah C. Slayton. 2010. p 116).

‘’Although we believe that art therapists have the same challenges we have always had in art therapy research—to be more standardized and more precise, to do more fully experimental designs, and to replicate studies — there seems to be positive movement in the field of art therapy, and ultimately, toward the well-being of our clients and patients.’’ (Sarah C. Slayton. 2010. p 116).

Annotated Bibliography 8: (Luiza Mello)

Sextou, P., & Hall, S. (2015). Hospital theatre: Promoting child well-being in cardiac and cancer wards. *Applied Theatre Research*, *3*(1), 67–84. Retrieved from: https://doi-org.ezproxy.fiu.edu/10.1386/atr.3.1.67pass:[_]1

1. **Critical analysis of the source:**

The author examines the delivery of a theatre initiative with children audience in a hospital context.

1.1. Author’s credentials.

Persephone Sextou is a reader in applied theatre at Newman University – UK. She has been working on advanced Theatre in education, health and wellbeing. Sextou is the director of CAD/Lab and co-cheaf investigator in research with Griffith University Australia. Sharon Hall's professional experience was a dramatherapist. She have worked with Local Authority residential care and for the YouthOffending Service. She has research interests in working holistically and creatively and social pedagogy.

1.2. Journal – date, edition, title.

Applied Theatre Research Volume 3 Number 1 © 2015 Intellect Ltd Article. English language. doi: 10.1386/atr.3.1.67_1

1.3. Intended Audience.

The main audience for this journal can include architects, psychologists, researchers and professors.

1.5. Coverage.

The article examines the delivery of a theatre experience with children audience when it comes to a hospital and healthcare environment. The study examines the potential of supporting children during their stay in the hospital – when undertaking drugs or having any sort of therapy for serious diseases. The article discusses the experiences of those who participated in theater performances. The article also discusses the difficulties of having a hospital and healthcare environment with many challenges to be used as the main 'stage' of the show. Providing kids and children with both entertainment and relaxation as an important strategy for their wellbeing in the hospital.

2.1. Summary of methodology and methods.

The study is a research about a portable bedside theatre intervention that was toured at NHS Hospital in the UK. The intervention allowed wider access to the benefits of creative performance and offer equal to opportunities to the

2.2. Study findings and significance of findings to research question.

- Theatre in hospitals have main barriers to be faced such as: hospital routines, limited space on the wards, lack of privacy, emotionally charged atmosphere and the special circumstances of its participants – those would be illness, risk, isolation, stress and vulnerability.
- Primary research was essential to understand the needs of the hospital, therefore enabling the researchers to observe hospital life, develop and understanding the non-ideal conditions within which theatre operated and develop new ways to respond to these conditions.

- Considering lack of space between beds and monitors in high-risk wards, it was necessary to minimize the size of costumes and the number of props.
- Keeping in mind that medications are planned at certain times and it is crucial to respect the exact times of medications and performances would have to be interrupted by the nurse, encouraging artists to remain in the role and integrate possible interruptions on their performances.

2.3. Relationship and potential application to typology decision.

The article focuses on how the entertainment can be used in hospital environments. After the research and test children were clearly positive about the play. They responded with a range of emotional responses from feeling excited to feeling relaxed together. Before the presentations, many children have reported they were bored and missing friends to play.

2.4. List of quotations that appear to be useful to include in the literature review.

“Despite having fairly low expectations of their own enjoyment, many of the parents/guardians identified additional benefits for themselves.” (Sextou, P & Hall, S. 2010. p 78).

“It is evident that bedside theatre performance that incorporates relaxation techniques is perceived to be an intervention that can provide children entertainment, distraction from the experience of illness and relaxation as an important strategy of their well-being in hospital.” (Sextou, P & Hall, S. 2010. p 81).

“Devoting time and love to theatre in hospitals is a skill in itself, which can be developed through constant effort, passion, motivation and hard work. We learn that it is impossible to benefit ill children through theatre unless we accept their condition as a phase of change and pay attention to the individual not the ill person; we learn that more efforts for providing theatre for children in hospital are to be continued in order to provide evidence for including theatre on the agenda of health promotion with the highest level of dramatic experience and compassionate care.” (Sextou, P & Hall, S. 2010. p 81)

3.How will implementing biophilic elements in the built environment affect patients?

Annotated Bibliography 1: (Galdamez)

Huelat, B. J. (2008). The wisdom of biophilia: Nature in healing environments. *Journal of Green Building, 3*(3), 23-35. Retrieved from http://ezproxy.fiu.edu/login?url=https://search-proquest-com.ezproxy.fiu.edu/docview/55465541?accountid=10901

1. Analysis of Source:

1.1. Author's credentials

Barbara J. Huelat, completed her undergraduate education at Harrington Institute of Design. She continued her studies in the Divisional Master's Program at the University of Chicago. Huelat is evidence Based Design certified, licensed to practice Interior Design and certified with the Planetree Visionary Design Network. Huelat is recognized for work in evidence-based healthcare design. She is the design principal at Huelat Parimucha. Huelat has three decades of design experience and serves as a healing environment consultant to healthcare facilities, manufacturers, and institutions. Huelat is also the author of Healing Environments, Design for the Body Mind and Spirit and is a recognized lecturer on healthcare design topics.

1.2. Journal and publisher

Journal of Green Building's purpose is to present the best reviewed research in green building design, construction, engineering, architecture among all areas related to the built environment. It also offers applied articles of successful sustainable buildings and landscapes; Industry Corner. And teaching and research that offer guidance on incorporating innovative sustainable concepts; New Directions. This source is one of multiple volumes and can therefore be regarded as a standard reference.

1.3. Audience

The intended audience for this article is the Architecture, Interior Design, and Landscape Architecture communities. Individuals who seek to educate themselves and learn about the different aspects related to biophilia and its history.

1.4. Objectivity

The support for the findings is research and evidence based, Huelat references twenty-six articles regarding different studies performed. They all reinforce the concept of nature having a vital role in the healing process of patients. So this was a review of literature??

1.5. Coverage

The article elaborates on the diverse sciences of biology, chemistry, computer science, environmental psychology and evolutionary anthropology, and neuroscience to address the role of nature in the healing process. All of the sciences are discussed individually to better

2.0. Methodology and research methods used

The article uses a mixed methodology of research methods. It begins by introducing the concept of wisdom brought to us through nature and adequately reviews how each of the sciences introduced will play a role. Several of the hypothesis emerge from interpreted data and lead to new findings or reinforce their concepts. The article also includes studies conducted on specific patients and their responses to their environments when recovering from surgery.

2.1. Summary

2.2. Findings

- Cancer patients are guided by healthcare facilities to see their disease as a journey, giving them hope and allowing them to connect to nature through the built environment.
- Alternative products need to be engineered to prevent and reduce the exposure of individuals to chemicals and toxins that off gas in the built environment. They are often connected to the diagnosis of cancer.
- Fractals are the organizational systems of nature, based on geometry and mathematics. Fractal design reaches far beyond a design gimmick; it is an essential foundation of art and design. In healthcare design, fractals can be sensitively employed to create pleasing, elegant, lasting, and natural healing environments. (Huelat, 2008)
- The philosophy of Feng Shui seeks to balance the cycle of natural elements for a nourishing environment. Although we live in a man-made environment, cues taken from Feng Shui may successfully balance natural and man-made environments to create healing environments. When referring to Native Americans nature, spirituality, and healing are inseparable. The events of the natural world spoke to inner healing processes for the person. In both cultures the human experience is not in nature but recognized as nature. (Huelat, 2008)

- In order to successfully use art in healthcare facilities, it must be appropriate. It should be pleasant and consist of nature scenes. When art is abstract or violent it can generate fear, which leads to additional stressors.
- All color is light, light is energy, and energy affects every cell of the body. For centuries, scientists have known that people depend on sun for physical wellbeing. The sun catalyzes many metabolic processes, and when we lack exposure to sunlight, some metabolic pathways sit dormant, reducing our ability to burn fat and expel toxins. (Huelat, 2008)
- Gardens bring to healthcare facilities: Stress reduction for visitors and staff, reduction of depression especially when connected with physical activity, higher quality of life, reduction of pain, improved wayfinding, reduction in provider cost, i.e., less use of medication and shorter lengths of stay, increased patient mobility, increased patient satisfaction, increased staff job satisfaction. (Huelat, 2008)

2.3. Significance to question

The article directly addresses the question, it informs the reader of the benefits that biophilic elements have within the built environment. And presents examples of evidence-based design.

2.4. Relationship/significance to typology decision

The article is in direct relation to our thesis question. It elaborates on areas that not only involve biophilia, it elaborates on the overall well-being of cancer patients. It mentioned the impact of color, the materials individuals are drawn to, and the effect of physical entertainment for recovering patients.

2.5. Quotations

“Potomac Hospital’s art program portrays familiar landmarks of the region. The oncology floor embraces the “four-seasons” theme, which symbolically expresses transition, journey, and hope.” (Huelat, 2008, p.30)

> “Our design of High Point Regional Cancer Center captured the philosophy of biomimicry in many diverse ways. Early in the design process, we explored the cancer patient’s needs to connect with nature. The concept was called “Journeys and Pathways,” in that cancer treatment is journey, not

a dead-end road. Nature with her gentle curves, color palettes, forms, and details became our design inspiration." (Huelat, 2008, p.25)

"Improving the indoor environmental quality improves the health of the patients, their families, and staff. Toxicity, dangerous materials, finishes, glues, adhesives, off gassing, PVCs, toxic cleaning agents, and people with sensitivities and allergies are just a few of the chemical challenges faced by healthcare facilities." (Huelat, 2008, p.26)

Annotated Bibliography 2: (Galdamez)

Gonchar, J. (2012). Nature nurtures: Two hospitals in very different settings rely on similar strategies to create environments for healing. *Architectural Record, 200*(8), 114-116,118. Retrieved from http://ezproxy.fiu.edu/login?url=https://search.proquest.com/docview/1114694566?accountid=10901

1. Analysis of Source:

1.1. Author's credentials

Joann Gonchar obtained her Bachelor of Arts from Brown University and her Masters of Architecture degree from the University of Pennsylvania. She is a LEED accredited professional and is licensed to practice in New York State. Before she began her career as a journalist, she worked with several firms in the U.S. She worked for eight years with Engineering News Record and transitioned to Architectural Record and GreenSource in 2006. Gonchar is currently a senior editor at Architectural Record.

1.2. Journal and publisher

Architectural Record is an American magazine that focuses on architecture and interior design. It celebrates 128 years of publishing, founded in 1891 by Publisher and clothing manufacturer Clinton Sweet. Readers are able to locate essays, vintage covers, and archival articles.

1.3. Audience

This article was intended for individuals who are interested in obtaining examples of biophilia being incorporated. It is an article for those that are curious about the topic but have not seen the bigger picture. It also suggests some of the results the industry could see if the concept was adopted.

1.4. Objectivity

The supporting information for the findings is research based. The overarching goal of this analysis is to promote widespread adoption of biophilia in buildings of all types. (Gonchar, 2012) This article is meant to plant a seed and leave the readers wanting more. While elaborating on how two hospitals incorporate biophilia into their space, one at each end of the spectrum where Lunder Building creates an entire experience, Palomar Medical Center is more subtle. Either method creating an impact on all of the individuals occupying the space, thus creating a full cycle.

1.5. Coverage

The article covers how two healthcare facilities incorporate biophilia; how it benefits patients, families but also their employees. The two healthcare facilities incorporate a feature that work best for their structure, depicting that there are multiple ways in which nature can be introduced into the built environment and still have a positive impact. The article also briefly covers the financial value of productivity and industry saving. The intent with putting a monetary value on biophilia was to provide a better sense of scale. What could happen if biophilia was introduced to schools, offices, retail spaces, and hospitals? The article provides rough data of what Americans could save post-surgical hospital stay and the effect sky wells could have on staff productivity and the reduction in medical errors.

1.6. Methodology and research methods used

The article introduces a quantitative methodology to reinforce why the healthcare facilities incorporated biophilic elements to their interior environment. The first case study introduced was performed by Roger Ulrich where he completed a rigorous study of the relationship between health outcomes and physical surroundings. The second case study was published by Terrapin Bright Green, the Economics of Biophilia. This study refers to the financial value to productivity and human health benefits when incorporated to a variety of building types such as schools, offices, retail spaces, and hospitals.

2. Summary

2.1. Findings

- General Hospital's 535,000-square-foot Lunder Building, Boston.
    - By designing an unconventional layout, they were able to provide all rooms with views of either the city, the atrium, or the bamboo garden and create a diagonal circulation.
    - When designing the space, the architects and designers considered both horizontal and vertical surfaces.
- Palomar Medical Center West 736,000-square-foot, San Diego County.
    - To bring daylight into the interior of the diagnosis-and-treatment wing's vast volume, CO has provided "sky wells." These planted courtyards, defined by ground-to-roof glazing, provide a link between the outdoor environment and surgery-prep areas, operating rooms, and recovery spaces. (Gonchar, 2012)
    - Although it seems like a subtle gesture, the green roof provides on multiple levels, benefiting individuals occupying the space but also create habitats, helping control stormwater runoff, and mitigating heat-island effect.

2.2. Significance to question

The article provides two distinct examples in which biophilia was incorporated into the built environment. It encourages designers and architects to push the boundaries. Lunder Building although providing an overall experience through the architecture we cannot limit ourselves to that. Palomar Medical center takes the concept of biophilia a step further. While providing visual nature scenes, it satisfies other senses, it creates a habitat and it’s sustainable.

2.3. Relationship/significance to typology decision

The article is related to our typology because it provides examples of the benefits nature has on individuals healing. Biophilia has a direct impact on all the concerns being addressed. The openings created within the built environments will influence the materiality chosen for those spaces. The natural entertainment caused by the animals who inhabit the roof and the sounds they will create; simply by having access to a view the possible outcomes of what they will see or hear become extensive.

2.4. Quotations

In contrast, the goal for the bamboo garden at Mass General Lunder, which can be seen from adjacent patient rooms and circulation areas but is not accessible, was to create a composition that would provide visual interest in all seasons, explains Herb Sweeney, a senior associate at Michael Van Valkenburgh Associates (MVVA), the project's landscape architect. (Gonchar, 2012)

The design team staggered the floor plates to create double-height spaces tall enough for trees and provided planting beds with sufficient soil depth for the trees' root systems. The sensory stimulation--the sound of rustling leaves, the textures and aromas of the different plants, and changes in light levels. (Gonchar, 2012)

The arrangement yields the maximum number of beds within Lunder's tight footprint yet allows daylight to penetrate into the core of the building and serves to break the typical central nursing station into two pods, minimizing staff travel distances between rooms and support areas. (Gonchar, 2012)

Annotated Bibliography 3: (Galdamez)

Mazuch, R. (2017). Salutogenic and Biophilic Design as Therapeutic Approaches to Sustainable Architecture. Architectural Design, 87(2), 42-47. https://doi-org.ezproxy.fiu.edu/10.1002/ad.2151

1. Analysis of Source:

1.1. Author's credentials

Richard Mazuch is an architect and designer, who has extensive experience with healthcare projects around the world. Mazuch is an advocate for evidence-based design and has successfully pioneered several models such as Sense Sensitive Design, Emotional Mapping, the Design Prescription and hPod. Due to his innovative models, inventions to improve the healthcare industry and overall extensive work, Mazuch was authorized to create two new NHS guidelines for Evidence based design Healthcare Environments.

1.2. Journal and publisher

Architectural Design (AD) was founded in 1930, it is a prestigious and influential publication. Each volume presented by AD is edited by an invited guest-editor. This individual must be an international **expert** in

their field and recognized for their innovative designs. AD covers diverse topics such as architectural history and theory, the environment, interior design, landscape architecture and urban design.

1.3. Audience

This article was intended for educated individuals that are intrigued by the impact the architectural profession has on patient's well-being. Specifically individuals who are interested in furthering their knowledge about Salutogenic and Biophilic design.

1.4. Objectivity

The supporting information for the article was research based. The author initiates by stating that we are entering a new era of health. Mazuch states that the architectural profession has a real opportunity to deliver environments that support healing; within a home and but also the public realm. The author begins by using the research project; Salutogenic Home of Tomorrow by IBI Group. He follows with the Bristol City Control and Operations Centre in the UK also performed by the IBI Group. When introducing the term Biophilia, he refers to Harvard Biologist Edward Wilson. When stating findings, he refers to the articles where the information can be found such as Stress recovery during exposure to natural and urban environments by Roger S. Ulrich.

1.5. Coverage

This article reviews two key design movements; salutogenic and biophilic design. Mazuch identifies Salutogenic design from the origin to providing examples of how the concept is being incorporated. It originates from a theory by Aaron Antonovsky; Salutogenesis developed in 1979. The term translates into "health origins", focusing on the promotion of active health and wellbeing. The author elaborates on technology and communication networks as examples of real-time clinical telehealth. Biophilic design, describes the genetic predisposition we have towards nature. Mazuch provides examples where research shows measurable, positive outcomes of biophilic design on health.

1.6. Methodology and research methods used

This article uses a qualitative methodology, the author presents research projects in order to reinforce the concept. The design movements are in relation to current work by IBI Group. The first research project

was the Salutogenic Home of Tomorrow. Followed by the Bristol City Control and Operations Centre in UK. Once focusing on biophilic design he use the Kirkwood Hospice, Chalkhill Child and Adolescent Mental Health Unit, and NHS England “Healthy New Towns.” Lastly sense-sensitive design backed up by the Sir Robert Ogden Macmillan Cancer Centre.

2. Summary

2.1. Findings

- Salutogenic Design
    - Focuses on working towards health and wellbeing rather than the pathogenic approach.
    - Should be embedded in the blueprints of all spaces and aspects of the communities.
    - Establishes a balance between the mind, body and spirit this leads to the feeling of wellness.
    - Technology and communication networks allow 24/7 support, whether individuals are within a hospital or in the comfort of their homes.
- Biophilic Design
    - Design elements that attribute to biophilic design are light, spatial permeability, sensory engagement, liminal spaces, organic shapes and forms, natural processes and patterns such as fractal geometry
    - Viewing nature can rapidly reduce respiration rates, blood pressure and heart rate
- Sense-sensitive Design
    - Cancer patients often:
    - May become sensitive to light and acquire a heightened sense of olfaction which can lead to nausea.
    - Medication is known to be ototoxic, impacting on hearing ability and creating symptoms of dizziness and loss of balance.
    - Sensitivities addressed by Sir Robert Ogden Macmillan Cancer Centre in Harrogate, North Yorkshire (2013): sensory colour schemes; assistive support details; touch-sensitive fabrics/finishes; dimmable lighting; additional temperature controls; landscape specification; liminal spaces; long views; and odour neutralisers/emitters.
    - Recent findings have indicated that there are as many as 21 senses

2.2. Significance to question

Sense-sensitive design was introduced to me by this article. This is a concept that directly focuses on patients who are the most affected by their environments. It elaborates on cancer and their increase in sensitivity once undergoing treatment. They are exposed to medication and procedures that make them more vulnerable and aware of their senses.

2.3. Relationship/significance to typology decision

The article introduces the Salutogenic design movement. Salutogenic design in this article specifically addresses technology and communication. However, it gave us a new term by which all our concerns are addressed.

2.4. Quotations

“Cancer patients often experience environments very differently from other patients. Through treatment and medication, sensory receptors may become altered, hypersensitive or indeed muted.” (Mazuch, 2017 p.26)

“Sense-sensitive design’ is a rigorous, evidence-based design approach that identifies ways in which individual sensory receptors of varied patient groups experience built environments, thereby enabling the designer to deliver optimal healing healthcare settings.” (Mazuch, 2017)

> “Research into sense-sensitive healing environments has concentrated essentially on the five cardinal sensory receptors: sight (colour, natural light, art, views); hearing (pleasant or unpleasant sounds); touch (temperature, texture, humidity, pain); smell and taste (pleasant or unpleasant). However, recent findings have indicated that there are as many as 21 senses.” (Mazuch, 2017)

Annotated Bibliography 4: (Galdamez)

Ryan, C. O., Browning, W. D., Clancy, J. O., Andrews, S. L., & Kallianpurkar, N. B. (2014). Biophilic design patterns: Emerging nature-based parameters for health and well-being in the built environment. *ArchNet-IJAR : International Journal of Architectural Research, 8*(2), 62-75. Retrieved from http://ezproxy.fiu.edu/login?url=https://search.proquest.com/docview/1550724648?accountid=10901

1. Analysis of Source:

1.1. Author's credentials

Catherine O. Ryan

Ryan has a background in urban green infrastructure; She obtained her masters degree in sustainable international development. She also received a certificate of completion in Neuroergonomics and urban placemaking. Ryan is currently a senior project manager at Terrapin Bright Green. Terrapin was founded by William D. Browning and is a sustainability consulting firm that focuses on helping their clients set and meet their sustainable goals. Ryan is a leader in the biophilic design movement. Her interest deal with systems that address human health and the sustainability challenges at each scale of the built environment.

William D. Browning

Browning obtained his master's degree in real estate at the Massachusetts Institute of Technology. He earned his bachelor's degree from the University of Colorado. Browning specialized in energy-conscious architecture and resource management. Browning is a leader and spokesperson for sustainable building design. He had key roles in creating both the U.S. Green Building Council and it's LEED rating systems and is active on the USGBC Board and LEED committees. He is currently a Senior Fellow at Rocky Mountain Institute, a partner in a new green development consulting firm, Browning + Bannon LLC, and a principal in Haymount, a green new-town development in Virginia.

Joseph O. Clancy

Clancy obtained his bachelor's and master's degree in Landscape Architecture from the University of Gloucestershire. He is a senior landscape architect and biophilic consultant for WSP in Edinburgh, United Kingdom. In 2017, was named on Pro Landscapers 30 under 30: The Next Generation. In 2018 Clancy joined the Scotland Living Building Challenge Collaborative and is a Living Building Challenge Ambassador Presenter volunteer for the International Living Future Institute.

Scott Andrews

Andrews obtained his bachelor's degree in political science and master's degree in sustainable management from Columbia University, New York. He worked alongside Browning and Clancy at Terrapin Bright Green. He is now the Director of Partnership development & Sustainability in California. He has extensive experience in project management and development, sustainability consulting and applied research.

Namita B. Kallianpurkar

Kallianpurkar completed her master's in business analytics in UCLA Anderson School of Management. She also worked at Terrapin Bright Green with the other authors of the article. She was the research analyst at Terrapin. Kallianpurkar has 8 years of experience in analytics/research and consulting.

1.2. Journal and publisher

ArchNet-IJAR is an interdisciplinary scholarly open access journal of architecture, planning, and built environment studies. The journal aims at establishing a bridge between theory and practice in the fields of architectural and design research, and urban planning and built environment studies.

1.3. Audience

The intended audience for this article is educated individuals who wish to further discuss biophilic design. It's for readers who want to draw connections between the field of study, potential avenues for future research, further the understanding one has of biophilic design patterns, and lastly inform the reader about the positive psychophysiological and cognitive benefits afforded by biophilia.

1.4. Objectivity (supporting information)

The authors begin by defining what biophilia is, this leads to explain why humans have a need to connect to nature. They elaborate on the evidence regarding the relationships between nature, science and the built environment. Discussing three categories and fourteen patterns, they use research based data to support the pattern being described.

1.5. Coverage

The article identifies universal issues, rather than situational or sector-specific issues within health and the built environment. However, the article covers the patterns for which evidence has shown impact on our cognitive capacity to enhance and maintain a healthy, life experience through a connection with nature. It establishes that the relationships between nature, science and the built environment are becoming easier to understand. Lastly the article identifies that greater research is needed. While pointing out methods and tools that could account, measure and track efficacy. Leading designers onto a path that maximizes the benefits of biophilia through our design interventions.

1.6. Methodology and research methods used

The article uses both qualitative and quantitative methodologies as appropriate to the pattern being analyzed. The article provides information in terms of familiar precedents for patterns in the design community, three nature-health relationships, and three naturedesign relationships.

2. Summary

2.1. Findings

- Visual connection with nature
    - Reduces stress, improves mood and self-esteem
    - Real nature provides better results
- Non-visual connection with nature
    - Nature sounds lead to physiological and psychological restoration
    - Moderate ambient noise based on nature sounds enhance creative performance
    - To maximize potential positive health responses, design for visual and non-visual connections with nature to be experienced simultaneously
- Access To Thermal and Airflow Variability
    - Conditioning the individual rather than the space, may be more effective than conventional tactics
    - Providing features that can adapt and be modified increases the range of acceptable temperatures by two degrees Celsius above and below the conventional parameters for thermal comfort
- Presence of water
    - Must be perceived as clean
    - Aim for a multi-sensory water experience
    - Naturally fluctuating water movement over predictable or stagnancy
- Complexity and Order
    - Iterations of three will be more impactful than a two iterations
    - Use fractal geometries in artwork and building materials for exposed structure elements, interior finishes, or components of the façade
    - Establish a balance between complexity and order
- Prospect
    - Provide minimum focal lengths of ≥20 feet (6 meters), preferably 100 feet
    - Limit opaque partitions
- Mystery
    - Views are medium (≥20 ft) to high (≥100 ft) depth of field

- At least one edge of the focal object is obscured, preferably two edges

2.2. Significance to question

The article specifically singles out the patterns that address the concern at hand; The health benefits of implementing biophilic elements in the built environment. The authors provide the reader with three nature-health relationships, and three naturedesign relationships per pattern. This allows the reader to see multiple examples of the relationships and benefits biophilia provides individuals.

2.3. Relationship/significance to typology decision

Biophilic design is a movement that significantly affects the healthcare industry. The information gathered from this article is of importance to multiple concepts within the research; implementation of biophilic elements, and how audio/visual elements affects the patients. Cancer patients undergoing treatments are more sense-sensitive making their environments crucial to their wellbeing.

2.4. Quotations

"From a designer's perspective, biophilic design patterns have the potential to re-position the environmental quality conversation to give the individual's needs equal consideration alongside conventional parameters for building performance that have historically excluded health and well-being." (Ryan, Browning, Clancy, Andrews, Kallianpurkar, 2014, p.62)

"Good biophilic design draws from nature in a manner that is equally inspirational and restorative without disturbing the functionality of the space to which it is integral." (Ryan, Browning, Clancy, Andrews, Kallianpurkar, 2014, p.63)

"Establishing distinct patterns is not an attempt to create cookie-cutter solutions for human-centric design, but rather to provide a framework through which any variable, with the appropriate care, could be adapted with locally appropriate and user-centered biophilic design." (Ryan, Browning, Clancy, Andrews, Kallianpurkar, 2014, p.71)

Annotated Bibliography 5: (Galdamez)

Demers, C. M., & Potvin, A. (2017). Erosion in architecture: A tactile design process fostering biophilia. *Architectural Science Review,60*(4), 325-342. doi:10.1080/00038628.2017.1336982

1. Analysis of Source:

1.1. Author's credentials

Claude Demers

Demers obtained her Ph.D. in architecture from Cambridge University. She is co-founder of the Research Group; Groupe de recherche en ambiances physiques (GRAP) in Physical Environments. Demers is interested in the sustainable practices that are applied to design and architecture: from early design to building occupation and performance. Demers is a professor of architecture at Université Laval. She is actively teaching and researching natural light innovating on the integration of the qualitative and quantitative aspects of the light in architecture.

André Potvin

Potvin obtained his bachelor's degree in architecture from Orta Dogü Universitesi, Ankara, Turkey. He continued his studies and received his master's degree in architecture at Laval University, Canada. And finally receiving his PH.D. in architecture from the University of Cambridge.

1.2. Journal and publisher

Architectural Science Review (ASR) is an international peer-reviewed journal devoted to architectural science, technology and the built environment. This journal has been published continuously since 1958 from the United Kingdom.

1.3. Audience

This article was intended for educated individuals who are interested in learning about environmental fluxes and their relationship to design and architecture fostering biophilia.

1.4. Objectivity

The article is research based. The article begins by explaining what they intend to answer based on the research. It is followed by the theoretical background, the attributes of biophilia, and then elaborates on the methodology.

1.5. Coverage

This article covers the potential of erosion leading to a connection between environmental forces of nature. How the structure of spaces can regulate environmental forces, and how matter changes in response to environmental flows.

1.6. Methodology and research methods used

The concept of physical ambiences uniquely describes the importance of a combined quantitative and qualitative approach in the design process, linking performative goals of architecture with experiential intentions.

2. Summary

2.1. Findings

- The severity of cold climate can
    - Possess extreme biophilic challenges
- High rise building
    - Undesirable shadows
    - Solar reflections
    - Limit solar access
- Four design phases
    - Equisse
    - Urban landscape
    - Architectural
    - Materials
- Organic erosion and growth
    - Architecture that nurtures plant growth is a tangible proof of biophilia connecting Nature to inhabitants

2.2. Significance to question

The article explores several ideas of erosions carving nature, architecture integrating biomimicry, and architecture that nurtures plants. I think this article takes the research a step further. While we have

evidence of the benefits cancer patients receive from incorporating biophilia, the environment is not limited to biophilia.

2.3. Relationship/significance to typology decision

In this article, biophilic design is being connected with other concepts that benefit individuals as well as the environment. In the United State buildings consume a very high percentage of the energy produced. As the healthcare industry begins to adapt and incorporate biophilic design elements, I think it will also incorporate concepts like biomimicry and more energy saving processes. This article presents architecture that nurtures plant growth as evidence of biophilia. The concepts begin to work together towards the same goal, the well being of patients.

2.4. Quotations

“It proposes that the expression of biophilia and belonging to Nature could emerge from the actual experience of natural forces through the creative process.” (Demers, Potvin, 2017)

“Four design phases range from more inductive to more deductive cognitive processes and scales: esquisse, urban landscape, architectural and materiality.” (Demers, Potvin, 2017)

Annotated Bibliography 6: (Galdamez)

Weinberger, N., Butler, A. G., Mcgee, B., Schumacher, P. A., & Brown, R. L. (2017). Child Life Specialists Evaluation of Hospital Playroom Design: A Mixed Method Inquiry. *Journal of Interior Design,42*(2), 71-91. doi:10.1111/joid.12097

1. Analysis of Source:

1.1. Author’s credentials

Nanci Weinberger

Weinberger obtained her Masters and Ph D at Tufts University. She is currently a professor of applied psychology at Bryant University. Most of her courses relate to developmental and environmental psychology. Weinberger is also interested in research, most of it focused on the role the physical environments play in children's experience.

Allison G. Butler

Butler obtained her masters from the university of Virginia and her Ph D from Boston College. She is also a current professor of applied psychology at Bryant University. Butlers teaching interests fall under educational psychology child and adolescent development. Butlers research focuses on environmental influences on child development and behavior.

Beth McGee

McGee received her masters of science in interior architecture from the University of North Carolina. She is also a LEED AP. McGee is currently a professor at Georgia Southern University

Phyllis A. Schumacher

Schumacher received her masters from the University of Rhode Island and her Ph D from the University of Connecticut. Her teaching interests are probability, statistics and design of experiments. Her research focus is on application of statistics to psychology and issues in mathematics education and distance education.

Ryan Linn Brown

Brown received her bachelor's degree in applied psychology from Bryant University and is currently working on her Ph D at Rice University. Since she began her Ph D her research has evolved and is now focused on psychoneuroimmunology.

1.2. Journal and publisher

The Journal of Interior Design is a scholarly publication dedicated to submissions related to the design of the interior environment. They encourage and accept submissions from educators, designers, architects or others interested in interior design.

1.3. Audience

This article was intended for educated individuals who are interested in learning about the impact the built physical environment has on children. Specifically for those interested in the optimal design of hospital playrooms.

1.4. Objectivity

This article is research based, the authors present a survey done on ninety child life specialists who were asked to rate playrooms on fourteen dimensions.

1.5. Coverage

The purpose of this study was to identify and apply the expertise of child life specialists to reveal their perspectives. The study specifically focuses on the important life features of hospital playrooms. The survey included five parts, the participants were asked to provide their background information in regards to their professional experience and education. The second part required for the participants to familiarize themselves with six photographs for each playroom. In the following step the participants needed to review the playrooms and were now presented with a fourteen playroom rating system. In step four participants were asked open response questions about each playroom. Lastly the set of photographs were shown again and the participants rated the playrooms in accordance to the ability to support child life goals.

1.6. Methodology and research methods used

The article uses a qualitative methodology. It surveys child specialists in order to obtain the information based on their opinions, what they believe is successful and what is not in a child's physical environment.

2. Summary

2.1. Findings

- Valued
    - Natural flora and fauna in the decor
    - Aesthetically pleasing window views of nature
    - Open spaces because they of the circulation and they allow activities to occur without crowding
    - Abundant storage, both accessible and controlled
    - Playrooms are where children have positive emotions, build coping skills, and feel free to be themselves
    - Playrooms are seen as the optimal healing environment

2.2. Significance to question

The article relates to my question because it addresses the importance biophilic elements play in the built environment.

2.3. Relationship/significance to typology decision

The article does not only focus on biophilic elements, and that's why it relates to several of our concerns. They address materials, and lighting as well.

2.4. Quotations

"Our results indicate that if a playroom is a place where children can have positive emotions, build coping skills, and feel free to be themselves, then the playroom is seen as an optimal healing environment." (Weinberger, Butler, Mcgee, Schumacher, Brown, 2017)

"The top valued design features include biophilic elements, appealing color and décor, and open space." (Weinberger, Butler, Mcgee, Schumacher, Brown, 2017)

"Natural views benefit both children and adults and should be considered a high priority when planning playroom design and location." (Weinberger, Butler, Mcgee, Schumacher, Brown, 2017)

Annotated Bibliography 7: (Galdamez)

Nanda, U. (2017). A Sensthetic Approach to Designing for Health. *Journal of Interior Design*, *42*(2), 7–12. https://doi-org.ezproxy.fiu.edu/10.1111/joid.12098

1. Analysis of Source:

1.1. Author's credentials

Upali Nanda

Nanda is principal and director of research for HKS. She is responsible for guiding and implementing research projects globally. She has been recognized as one of the top ten most influential people in

healthcare design. Last year Nanda was also awarded by the Architectural Record with the 2018 Women in Architecture Innovator Award.

1.2. Journal and publisher

The Journal of Interior Design is a scholarly publication dedicated to submissions related to the design of the interior environment. They encourage and accept submissions from educators, designers, architects or others interested in interior design.

1.3. Audience

This article was intended for educated individuals who are interested in learning about the importance of the our senses sensitivity.

1.4. Objectivity

The article is research based.

1.5. Coverage

The article briefly introduces that the special needs need to be acknowledged and addressed. That is then followed by defining sensory sensitivity, the stressors, interactions, and an approach.

1.6. Methodology and research methods used

The article uses a qualitative methodology. It surveys child specialists in order to obtain the information based on their opinions, what they believe is successful and what is not in a child's physical environment.

2. Summary

2.1. Findings

- All of our senses do not work in isolation
- A stimulus to one sense- modality may trigger a response in another
- Concurrence

- Simultaneous/sequential occurrence of the sensory stimuli

- Correspondence:
  - Different stimuli co- relate and correspond to each other

- Coherence
  - Whether this correspondence is meaningful and contributes to the intended experience of a place.
  - So the above should be used?? How would this affect care?? When should they be applied??

2.2. Significance to question

The article addresses our senses and how the different stimulus interacts with them. It directly relates with my concern of biophilic elements because that means that those elements will cause different reactions for the patients.

2.3. Relationship/significance to typology decision

As mentioned above, our senses all work together, none are isolated therefore it involves our concerns relating with materials, lighting, and entertainment.

2.4. Quotations

“The interaction between senses is fundamental to how we function in the world around us.” (Nanda, 2017)

Annotated Bibliography 8: (Galdamez)

Wang, Z., & Pukszta, M. (2017). Patient Needs and Environments for Cancer Infusion Treatment. *Journal of Interior Design*, *42*(2), 13–25. https://doi-org.ezproxy.fiu.edu/10.1111/joid.12096

1. Analysis of Source:

1.1. Author's credentials

Zhe Wang

Wang received her Ph D in architecture from Texas A&M university. She is the founder of of International Green, which aims to impart knowledge of design research to design professionals, with an emphasis on healthy and green architecture. Wang is currently a professor at Henan University.

Michael Pukszta

Pukszta obtained his bachelor's and master's degrees from the University of Michigan. He has worked in the healthcare industry for twenty-four years now with Cannon Design.

1.2. Journal and publisher

The Journal of Interior Design is a scholarly publication dedicated to submissions related to the design of the interior environment. They encourage and accept submissions from educators, designers, architects or others interested in interior design.

1.3. Audience

This article was intended for educated individuals who are interested in learning about the importance of the what cancer patients need.

1.4. Objectivity

The article is research based, based on surveys and observational research performed.

1.5. Coverage

The article provides background information, provides a brief literature review and proceed onto the researched based results.

1.6. Methodology and research methods used

The article uses both qualitative and quantitative methodologies. They show data analysis to support their findings.

2. Summary

2.1. Findings

- Double occupancy
    - more than half of the participants chose double- patient rooms as their preferred hospital room configuration
    - inpatients described their wish to avoid isolation and preferred shared occupancy in healthcare settings
- Single occupancy
    - Patients who selected private rooms, answered the question asking for reasons for their selection. Based on content analyses, their major reasons were related to the following keywords: privacy, nap or sleep, social interaction, sound or noise, and bathroom

2.2. Significance to question

In previous findings it was not mentioned what patients wanted in regards to privacy, in order to accommodate and have successful designs I wanted to know more about privacy and the impact biophilic elements made in both scenarios.

2.3. Relationship/significance to typology decision

The article does not specifically focus on my topic is address the needs of cancer patients in general which is relatable to all of our topics.

2.4. Quotations

“Healthcare designers should understand that they can influence cancer patients' well- being, sense of hope, and quality of care through design decisions.” (Wang, Pukszta, 2017)

4.How do audio/visual elements affect the patients?

Annotated Bibliography 1: (Marice Guerra)

Malcolm, H. A. (2005). Does privacy matter? Former patients discuss their perceptions of privacy in shared hospital rooms. *Nursing Ethics*, 12 (2), 156-166.

1. The Process:

1.1 Author's Credentials:
Helen A Malcom has completed her Bachelors and Masters of Nursing (with Honors) degrees. She focused her Master's Thesis in the privacy issues people experience in the hospital setting. She spent two years researching the topic which is a generous amount of time for information gathering & fact checks. She is now working towards her PhD which grants her enough credibility. She now has 12 literary works which all focus in the healthcare field demonstrating her aptitude in the topic.

1.2 Journal – Date, edition & Tittle.
Edward Arnold Publishers Ltd was founded in 1890. With over 120 years the firm has published countless of articles, books & literary works. They also specialize in publishing journals for students, academics & professionals. With so many years in the business the firm has gained its reputation by publishing some of the best seller books of London. The article's publishing date is March 1st, 2005. The article is still pretty relevant. Most hospital environment haven't change therefore even after 14 years of its publication, its content still applies to today's privacy issues in any healthcare setting.

1.3 Intended Audience:
The intended audience of this journal is people who are interested in making a change on the healthcare system & how it treats its patients, for example Interior Designers. Also, for the big Hospital corporation. It is important for them to analyze the concerns their everyday patients have on their premises.

1.4 Objective Reasoning:
Because of its qualitative research the information is evidence based. The study aimed to understand privacy and other factors through the real-life experiences of former patients who have previously been

placed in a shared hospital room. Even though no data was collected they backed their study with real life surveys.

1.5 Coverage of Topic:

The journal covers the issues of privacy in shared hospital rooms. It gathers information from real life experiences of people who shared a room with other patients on a given hospital stay. Even though the events on the journal take place on a different setting the topic of privacy is very general therefore making it possible to apply it to any setting such as cancer treatment centers.

2. Summary

2.1 Summary of Methodology & Methods:

The Qualitative Methodology used in this journal allows the research to be subjective & free of bias. The results were based on experiences that were not amenable to numerical measurements or statistical analysis. The results aimed more to understanding or exploring the common human problem of privacy & ascertain their perceptions on the matter. The information that developed as the interviews went on was subjective to each individual & interpretive which is another characteristic of qualitative research methods. The patients related their experience, which means that they were all different in all ways allowing the final results to touch upon various situations.

2.2 Study findings and significance of findings to research question.

- Research participants admitted to feeling their privacy taken away the moment they stepped in the room.
- The participants showed concern for their information being heard by others next to them.
- The participants expressed that they would have preferred a different setting whenever they were going to receive information on their health.
- The research found that people appreciated the support of those next to them & their families, however when they saw or heard someone on a bad state, the participants showed distress & had bad hopes for their own healing.
- One of the most common privacy tools used on hospital settings are curtains & the study found that the patients felt uncomfortable with disclosing their information knowing someone was next to them, behind a curtain. Even if they could not see th9em, knowing that they could hear them made much more uncomfortable.
- The study found that although many people try to keep to their business when they heard bad news were given to their roommate, they felt compelled to offer consolation or express their condolences on the matter.
- The study shows that even after going through privacy depriving experiences, the participants

admitted that in order for there to be affordable healthcare, methods such as shared rooms were necessary. However, the participants still felt like the conditions could be improved in order to maintain everyone's privacy intact.

- Finally, the research shows that people should have an option to a controlled environment where they can choose whether to engage or not or weather to disclose their information or not.

2.3 Relationship and potential application to typology decision.

The setting in the article & the chosen typologies fall under the same category: Healthcare. Privacy is such a broad topic which can be applied to any setting & still be the same. Privacy in a cancer treatment center will be very similar to that of a hospital room. Most of these facilities house two to three people in the same space which eliminates any notion of privacy. Curtains are the preferred go to of healthcare facilities when it comes to privacy partitions. Visual is not the only factor that affects privacy, audio does it as well. Overall the journal provides an answer to the topics established even if the situation varies.

2.4 List of selected quotations that appear to be useful to include in the literature review

- "Although curtains provide visual privacy, they fail to maintain confidentiality when discussions between patients and health professionals occur in a shared room." (Malcolm, 2005, pg. 2)
- "Some enjoyed the support offered in shared rooms, while, for others, overhearing another person's health issues caused unnecessary distress." (Malcolm, 2005, pg. 1)
- "The participants suggested that knowing they could be overheard constrained information disclosure. This withholding of information has implications for health professionals' ability to diagnose and treat patients appropriately." (Malcolm, 2005, pg. 1)
- "Participants spoke of awareness that their conversations could be overheard because hearing
- dialogue between other patients and their family or health professionals in the shared rooms is inevitable." (Malcolm, 2005, pg. 4)
- "If I was going to be told something terrible to do with my health, I would probably want my husband there and I would certainly want to be in a private setting, not a four-bedded room where everybody else could hear." (Malcolm, 2005, pg. 5)
- "Several of the participants stressed the need for more privacy when patients receive serious or worrying information about themselves." (Malcolm, 2005, pg. 5)
- "Curtains provide only a visual barrier, preventing others from seeing patients in an exposed state; they do not provide auditory privacy." (Malcolm, 2005, pg. 6)

Annotated Bibliography 2: (Marice Guerra)

DuBose, J., MacAllister, L., Hadi, K., & Sakallaris, B. (n.d.). Exploring the Concept of Healing Spaces. *Herd-Health Environments Research & Design Journal*, 11(1), 43–56.

1. The Process:

1.1 Author's Credentials:

This Literature Review has 4 authors which allows the content to be more thorough.
Jennifer DuBose is an expert of evidence-based designs. She is a certified LEED AP & has helped develop a multidisciplinary lab which focuses on bringing healthcare value through human centered design making her an expert of her field.
Lorissa MacAllister is both a researcher & an architect who focuses on blending her specialties in order to bring a unique design approach to healthcare design. She is LEED AP certified as well as having a PhD. She is currently the owner of a firm which focuses on human centered design.
Khatereh Hadi is a design analyst who works research-based analytical methods and tools for design and planning of healthcare. She has also presented her work and findings in national as well as international conferences.
Bonnie Sakallaris has served as an educator, clinical researcher & division director. She currently holds a Masters as well as a PhD. She has published an extensive number of literary articles as well as presenting her work & findings in national as well as international conferences.
Together these women have enough credibility which allows this journal to be used in the final literary review.

1.2 Journal – Date, edition & Tittle.

Sage Publishing was founded in 1965 in New York. The independent publishing company focuses on publishing journals of medicine, technology as well as academic books. The company currently has about 500 employees who are able to publish about 1000 books & 800 journals. With so many years of experience & published work, the company is a pioneer of the publishing industries which affords it a lot of credibility. The article was first published on December 18, 2016 meaning it is only 3 years old. The journal is very recent which helps to keep the literary review current.

1.3 Intended Audience:

The intended audience would be Interior Designers who aim to understand how healing spaces can be affected by the surrounding environment & how it goes far beyond the physical comfort. This article is

also intended for anyone who is interested in designing spaces that help improve the physical & psychological state of ill patients.

1.4 Objective Reasoning:

The article is evidence based through the collection of data created from real life scenarios. The information used in this article was collected through mock scenarios created in the healthcare environment in order to conclude how noise affects patients & how it can be reduced.

1.5 Coverage of Topic:

The Literary review cover the issues of noise in healing spaces & how it affects its users directly or indirectly. It goes in depth by using evidence-based design that proves the bad effects noise can have not only on patients but also on the staff that ensures the patients is well. The journal seeks how the wellbeing of both sides can be guaranteed for the indirectly affect the other.

2. Summary

2.1 Summary of Methodology & Methods:

The Methodology used in this article is Qualitative. The information gathering is of inductive information that led to hypothesis. Although the information that led to the results was collected through data & represented in informational graphs & diagrams, it didn't lead to one clear answer. Instead, it aimed to explain the environmental factors that helped or decreased the chances of healing in any setting. The process of research discovered emerging patterns of behavior as more factors of the environment were introduced into the research. The research was also full of inductive information that led to hypothesis which why I'm inclined towards my qualitative answer.

2.2 Study findings and significance of findings to research question.

- The research does a thorough study on how the architecture & surrounding characteristics of a healing space positively or negatively affects the user's prompt healing. Although many factors are considered, noise is one of the main ones.
- Noise can wear out a patient's mood & patience. Too much noise & their system will not heal as fast as it should.
- Noise causes mental & psychological distress which again slows down the healing process of patients.

- It was found that by reducing noise in places where people were healing it did the following:
  - Reduced Medical error on the staff's part

- Improved patient's sleep which naturally speeds up the recovery process.
- Reduces patient & families stress, adding positive communication among everyone.
- Increased patients' satisfaction & energy
- Decreased staff stress allowing for better service
- Increased staff effectiveness & satisfaction which also increases productivity.

2.3 Relationship and potential application to typology decision.

The setting in the article & the chosen typologies fall under the same category: Healthcare. Healing spaces can be described in many ways. They don't hold a definitive shape in society's eyes therefore this article will be a good source for the final literary review. Noise reduction was one of the most touched topics of the article. The change of setting will not affect how this information will benefit my final review, on the contrary it will provide evidence-based design research which will increase the credibility.

2.4 List of selected quotations that appear to be useful to include in the literature review

• "While healthcare has primarily focused on fixing the body, there is a growing recognition that our healthcare system could do more by promoting overall wellness, and this requires expanding the focus to healing." (DuBose, MacAllister, Hadi, Sakallaris, 2016, pg. 1)

• "Evidence-based design (EBD) uses scientific methods to build the links between design and outcomes such as safety and efficiency to support design decision-making in healthcare." (DuBose, MacAllister, Hadi, Sakallaris, 2016, pg. 1)

• "The research literature has documented both direct effects, at a point in time, of the built environment on outcomes, such as noise that interrupts sleep." (DuBose, MacAllister, Hadi, Sakallaris, 2016, pg. 4)

• "Similarly, spaces with acoustic ceiling tiles, or that are removed from noise producing areas, reduce intrusive noises and therefore patients' stress." (DuBose, MacAllister, Hadi, Sakallaris, 2016, pg. 7)

• "The six groups of variables found in the literature—homelike environment, access to views and nature, light, noise control, barrier-free environments, and room layout—directly affect or facilitate one or more dimensions of healing." (DuBose, MacAllister, Hadi, Sakallaris, 2016, pg. 12)

Annotated Bibliography 3: (Marice Guerra)

Brown, B., Rutherford, P., & Crawford, P. (2015). The role of noise in clinical environments with particular reference to mental health care: A narrative review. *International Journal of Nursing Studies*, 52(9), 1514-1524.

1. The Process:

1.1 Author's Credentials:

Brian Brown is a Professor of Health Communication in the Faculty of Health and Life Sciences at De Montfort University. Currently he has written 12 books & 75 journals which have been all published. He is also the mentor of 12 PhD students & he, himself hold one.

Peter Rutherford holds a Doctorate from the university of Strathclyde. His specialty is in architectural acoustics and psychoacoustics. He has developed emergency auditory devices that warn people in times of emergency. Currently he is a professor in the University of Nottingham where he teaches environmental psychology & lectures in building & architectural science.

Paul Crawford is currently under many positions such as Director of the Centre for Social Futures at the Institute of Mental Health. He is also a Professor of Health Humanities at the School of Health Sciences

As well as a co director of Nottingham Health Humanities Research Priority Area. He specializes in the research to transform the healthcare world as well as shape wellbeing & mental health in these places.

Together, the authors are well qualified to discuss & write this journal that has been published by a reliable source, The International Journal of Nursing Studies.

1.2 Journal – Date, edition & Tittle.

The International Journal of Nursing Studies was created in 1963. Its present editor is Ian Norman, a British professor of nursing. The publisher has ranker 1 out of 100 in the ranking of nursing journals making it the most reliable publisher of its category. The title of the article is: The role of noise in clinical environments with particular reference to mental health care: A narrative review. The journal was created in 6 October 2014, but it was accepted on April 28th of 2015. Because it was only 4 years ago, the journal is still recent, so its content is still current of today's issues.

1.3 Intended Audience:

The intended audience of this journal are people who seek to understand how noise is detrimental to health and recovery. It would also be for designers who aim to reduce undesirable noise yet still allow ambient noise which is more soothing. Finally, healthcare facility owners if they wish to improve conditions for the patients.

1.4 Objective Reasoning:

The article is evidence based. The author's purpose was to document the detrimental effects noise has on wellbeing & recovery. However, he also believe no noise was bad too therefore in order to prove it he created mock rooms and had people experience them, showing that people preferred the room with the ambience noise of water falling.

1.5 Coverage of Topic:

The journal covers the issues noise in the healthcare environment. They analyze what types of noise are wearing to the patients but also recognize that no noise is also bad. They aim to analyze which sounds are soothing, called soundscapes.

2. Summary

2.1 Summary of Methodology & Methods:

The Qualitative Methodology used in this journal allows the research to be subjective & free of bias. The results were based on already existing research that were not amenable to numerical measurements or statistical analysis because the information had already been recorded. The results aimed more to understanding or exploring the detrimental effects noise can have on ill patients going through a recovery process.

2.2 Study findings and significance of findings to research question.

- The study emphasizes the detrimental effects noise can have on patients in the healthcare setting.
- Noise can be distressing not only physically but also mentally which affects the patient's recovery
- They found in a study that patients that were exposed to noise had a slower recovery than those in a quiet setting
- The study emphasizes that no noise is also bad so soundscapes (nature's noise or pleasing sounds) proved to be helpful in the patient's mood & recovery.
- Not everyone has the same tolerance to noise, some may put it off as background noise while for others it can be a persistent annoyance
- Most of the noise in healthcare settings come from equipment as well as staff so reminding personnel that noise can affect patients could help improve the experience.
- Conversation noise can be distracting & most of the time unwanted. People don't always want to hear what others have to say & this might distract them from focusing on their activities.

- Too much silence is also unwanted, so adding soothing background noises could have a positive effect on the mind. For example, noises that will relax a person without them noticing.
- Noise is known to cause stress & anxiety as well as disturb sleep & slow recovery.
- Other negative effects of noise are: raising blood levels, increases heart rate & cholesterol as well as reduce weight gain & affect hormonal balances.
- Noise is known to cause psychological & physiological harm on the patient.
- Crowding is a big factor on noise levels. When an environment is crowded it tends to create more noise which in turn causes more stress to those present.
- The findings of this article provide key information that will support my concept question. I believe that noise can have a negative effect on patient's recovery & mental well-being.

2.3 Relationship and potential application to typology decision.

Although the typologies are the same, the settings differ. Our final literary review will focus on a cancer treatment center while this article focuses on healthcare in general. The article analyzes noise effects in the healthcare environment. Any healthcare environment has two things in common. One, most of the people that go there have an illness which makes them vulnerable & two, noise is present & its consequences are the same in any typology. The findings from this journal will one hundred percent apply to our specific typology.

2.4. List of selected quotations that appear to be useful to include in the literature review

- "The role of noise in clinical environments with particular reference to mental health care: A narrative review." (Brown, Rutherford, Crawford, 2005, pg. 1)
- "Excess unwanted noise can clearly be detrimental to health and impede recovery." (Brown, Rutherford, Crawford, 2005, pg. 1)
- "Unwanted sound may have unwanted effects, especially on those who are most vulnerable, yet this does not necessarily mean that silence is the better option." (Brown, Rutherford, Crawford, 2005, pg. 1)
- "Whilst it can be stressful, sound can also be soothing, reassuring and a rich source of information about the environment as well." (Brown, Rutherford, Crawford, 2005, pg. 1)
- "Rather than simply reducing noise, it may also be fruitful to consider how the soundscape may be made legible and intelligible." (Brown, Rutherford, Crawford, 2005, pg. 2)
- "In other words, the noise, as we shall see, is often patterned and meaningful." (Brown, Rutherford, Crawford, 2005, pg. 2)

- ‘‘Noise can increase heart rate, blood pressure, respiration rate and even blood cholesterol levels. It can reduce weight gain, disturb sleep patterns and negatively affect hormonal balances.” (Brown, Rutherford, Crawford, 2005, pg. 2)
- “The NHS Confederation (2010) reported that an increasing proportion of patients said they were disturbed by noise originating from the staff.” (Brown, Rutherford, Crawford, 2005, pg. 3)

Annotated Bibliography 4: (Marice Guerra)

Huisman, E. R. C. M., Morales, E., van Hoof, J., & Kort, H. S. M. (2012). Healing environment: A review of the impact of physical environmental factors on users. *Building and Environment*, 58, 70–80.

1. The Process:

1.1 Author’s Credentials:

Huisman, E. R. C. M. is an expert of evidence-based designs. He is a certified LEED AP & has helped develop a multidisciplinary lab which focuses on bringing healthcare value through human centered design making her an expert of her. He’s also a researcher & an architect who focuses on blending her specialties in order to bring a unique design approach to healthcare design.

1.2 Journal – Date, edition & Tittle.

Sage Publishing was founded in 1965 in New York. The independent publishing company focuses on publishing journals of medicine, technology as well as academic books. The company currently has about 500 employees who are able to publish about 1000 books & 800 journals. With so many years of experience & published work, the company is a pioneer of the publishing industries which affords it a lot of credibility. The article was first published on December 18, 2012 meaning it is only 6 years old. The journal is very recent which helps to keep the literary review current.

1.3 Intended Audience:

The intended audience would be Interior Designers who aim to understand how healing spaces can be affected by the surrounding environment & how it goes far beyond the physical comfort. This article is also intended for anyone who is interested in designing spaces that help improve the physical & psychological state of ill patients.

1.4 Objective Reasoning:

The findings of the study are evidence based. The research took place in a Healthcare Facility where they studied two groups in a controlled settings with varying variables. The results focus on explaining how the physical environment affects a patient's healing and recovery process.

1.5 Coverage of Topic:

The Literary review cover the issues of noise in healing spaces & how it affects its users directly or indirectly. It goes in depth by using evidence-based design that proves the bad effects noise can have not only on patients but also on the staff that ensures the patients is well. The journal seeks how the wellbeing of both sides can be guaranteed for the indirectly affect the other.

Summary

2.1 Summary of Methodology & Methods:

The Methodology used in this article is Quantitative. The information that led to the results was collected through data & represented in informational graphs & diagrams, which leads to one clear answers. It aims to explain the environmental factors that helped or decreased the chances of healing in any setting. The process of research discovered emerging patterns of behavior as more factors of the environment were introduced into the research. The research was also full of inductive information that led to hypothesis which why I'm inclined towards my quantitative answer.

2.2 Study findings and significance of findings to research question.

- The study found that patients who hear more noise are more stressed.
- Most of the noise problems in these facilities can be easily diminished with simple methods.
- Noise effect can also be considered part of Sick Building Syndrome. It affects a patient's well-being as much as other factors.
- People who have a nice view think of their experiences as less dragging than those with a view to the wall.
- Better views help healing process to be faster. Patients get better comments from nurses and need to take less pain meds.
- Noise creates a lack of privacy for the patients.
- Patients in single rooms feel like they can rest more & report better moods.
- Hearing other people's negative conversations can cause extra stress on patients.
- Studies show that patients are very aware of their surroundings especially when the wait is longer.
- Patients reported to have a higher preference for nature art rather than abstraction.
- In the case that a window is not possible, it's better for patients to see elements of nature in the interior space.

2.3 Relationship and potential application to typology decision.

The setting in the article & the chosen typologies fall under the same category: Healthcare. Healing spaces can be described in many ways. They don't hold a definitive shape in society's eyes therefore this article will be a good source for the final literary review. Noise reduction was one of the most touched topics of the article. The change of setting will not affect how this information will benefit my final review, on the contrary it will provide evidence-based design research which will increase the credibility.

2.4. List of selected quotations that appear to be useful to include in the literature review

- "Certain types of "psychologically appropriate" artwork, including representational images with themes relating to waterscapes, natural landscapes, flowers and gardens, as well as figurative art showing emotionally positive gestures and facial expressions, can reduce stress and improve outcomes such as pain relief." (Huisman, 2012, pg. 75)
- "However, abstract or ambiguous images or emotionally challenging subject matter can evoke dislike or other distinctly negative reactions among patients." (Huisman, 2012, pg. 75)
- "Demonstrated that patients with a view of nature (trees) had shorter postoperative stays, took fewer potent pain drugs, and received more favorable comments about their condition in nurses' notes than did matched patients in similar rooms with a window facing a brick building wall." (Huisman, 2012, pg. 76)
- "Secondly, there is increasing evidence that simply viewing gardens can mitigate pain." (Huisman, 2012, pg. 75)
- "Most disturbances were linked to the presence of other patients in the multi-bed unit." (Huisman, 2012, pg. 78)
- "Closing doors increased noise levels, presumably because most noise emanates from equipment within the room." (Huisman, 2012, pg. 80)

Annotated Bibliography 5: (Marice Guerra)

Cunha, M. (2015). Hospital Noise and Patients' Wellbeing. *Procedia, Social and Behavioral Sciences,* 171, 246–251.

1. The Process:

1.1 Author's Credentials:

Madalena Cunha has completed her Bachelors and Masters of Nursing (with Honors) degrees. She focused her Master's Thesis in the privacy issues people experience in the hospital setting. She spent two years researching the topic which is a generous amount of time for information gathering & fact checks. She is now working towards her PhD which grants her enough credibility. She now has 12 literary works which all focus in the healthcare field demonstrating her aptitude in the topic.

1.2 Journal – Date, edition & Tittle.

Procedia is a peer reviewed journal stemming from Elsevier, one of the most trusted research journals of this time. The organization was started in 1880, making it a field giant. The journal publishes all research proceeding from the medical field and new advances. The article was first published on December 18, 2015 meaning it is only 4 years old. The journal is very recent which helps to keep the literary review current.

1.3 Intended Audience:

The intended audience would be Interior Designers who aim to understand how healing spaces can be affected by the surrounding environment & how it goes far beyond the physical comfort. This article is also intended for anyone who is interested in designing spaces that help improve the physical & psychological state of ill patients. Also, hospital owners who are concerned for patient's improvement.

1.4 Objective Reasoning:

The findings of the study are evidence based. The research took care in a Healthcare Facility where they studied two groups in a controlled settings with varying variables. Patients who have had a stay in a noisy healthcare environment were studied in order to record results. The results focus on explaining how loud noise in a physical environment affects a patient's healing and recovery process.

1.5 Coverage of Topic:

The Literary review cover the issues of noise in healing spaces & how it affects its users directly or indirectly. It goes in depth by using evidence-based design that proves the bad effects noise can have not only on patients but also on the staff that ensures the patients is well. The journal seeks how the wellbeing of both sides can be guaranteed for the indirectly affect the other.

2. Summary

2.1 Summary of Methodology & Methods:

The Qualitative Methodology used in this journal allows the research to be subjective & free of bias. The results were based on experiences that were not amenable to numerical measurements or statistical analysis. The results aimed more to understanding or exploring the common human problem of privacy & ascertain their perceptions on the matter. The information that developed as the interviews went on was subjective to each individual & interpretive which is another characteristic of qualitative research methods. The patients related their experience, which means that they were all different in all ways allowing the final results to touch upon various situations encountered in a noisy environment.

2.2 Study findings and significance of findings to research question.

- Everyone has a different definition to their ear as to what noise is however after a certain number of decibels all noise is considered loud
- Hospitals have started implementing quiet time since research has shown improvement on facilities who dedicate some hours of the day to very quiet time
- Most incidents reported with noise is lack of sleep which creates irritability & annoyance towards staff
- Noise activates the pituitary glands which produces endocrine effects usually activated during stressful time
- Most healthcare facility noise can be easily avoided however some facilities still believe that noise is not bad for their patients.
- More & more technology is helping cure or detect diseases however these tend to add more noise to the physical environment.
- Noise is unavoidable however it is manageable. There are techniques such as music ambience which covers noise.
- Aside from stress noise can cause, anxiety, headache, nervousness & discomfort

2.3 Relationship and potential application to typology decision.

The setting in the article & the chosen typologies fall under the same category: Healthcare. Healing spaces can be described in many ways. They don't hold a definitive shape in society's eyes therefore this article will be a good source for the final literary review. Noise reduction was one of the most touched topics of the article. The change of setting will not affect how this information will benefit my final review, on the contrary it will provide evidence-based design research which will increase the credibility.

2.4 List of selected quotations that appear to be useful to include in the literature review

- "Noise can produce an undesired physiological or psychological response in an individual and it has implications in chronic mental and physical health." (Cunha, 201, pg. 275)

- “The results showed that: Clinical Sources of Noise, the Sum Score of the Environmental Comfort and physiological and psychological effects caused by noise are statistically significant related with patients´ subjective well being.” (Cunha, 201, pg. 277)
- “It is confirmed that subjective wellbeing is influenced by the hospital noise in general and, more specifically, the noise from clinical sources.” (Cunha, 201, pg. 278)
- “It is also confirmed that some physiological and psychological disturbances in patients are related to hospital noise. Facing the results, it is imperative to promote the wellbeing of admitted patients by lowering the noise levels.” (Cunha, 201, pg. 279)
- “Sound is a sensory perception and depending on the pattern of the sound waves generated, it is recognized as music, speech or any of the myriad of environmental noises to which we are continuously exposed.” (Cunha, 201, pg. 280)
- “Well-being is considered a subjective concept that expresses a feeling or belief that life is going well.” (Cunha, 201, pg. 281)

Annotated Bibliography 6: (Marice Guerra)

Khan, A., (2016). Influence of soundscape and interior design on anxiety and perceived tranquility of patients in a healthcare setting. Applied Acoustics, 104, 135-141.

1. The Process:

1.1 Author’s Credentials:

Dr Amir Khan is currently as professor at University of Bradford, UK. He went from a research fellow to a full-time professor. He is currently in charge of many research project under the leadership of DTI, EU, and SME's. His main field of interest are materials & their applications in specific settings such as healthcare. He holds a PhD in the same university he teaches now.

1.2 Journal – Date, edition & Tittle.

Since being established in 1968, Applied Acoustics has covered all major issues regarding acoustics. They are a biweekly peer-reviewed scientific journal run by Elsevier, one of the major journal of technical, scientific and medical information in Germany. The article was published in 2016 which make it only 3 years old so still pretty recent.

1.3 Intended Audience:

The intended audience would be Interior Designers who aim to understand how healing spaces can be affected by the surrounding environment & how it goes far beyond the physical comfort. This article is also intended for anyone who is interested in designing spaces that help improve the physical &

psychological state of ill patients. Also, researchers could benefit from the example of the analytic data here presented.

1.4 Objective Reasoning:

The author conducted a research with a control room & an experimental room. After changes were made to the experimental group, then 81 people were brought into these rooms and asked a series of fixed questions in order to come up with a result. Based on this explanation the conclusion & research of this article are evidence based.

1.5 Coverage of Topic:

The Literary review addressed the issues related to noise and stress/anxiety levels in a healthcare setting. They explore the different alternatives to reduce this issues as well as uncover the factors that cause it.

2. Summary

2.1 Summary of Methodology & Methods:

The Methodology used in this article is Quantitative. The information was collected through the testing of a hypothesis. The information that led to the results was collected through data & represented in informational graphs & diagrams. The process of research discovered emerging patterns of behavior as more factors of the environment were introduced into the research. The research is filled with analytical data which led to a clear and concise answers as well as some errors which led to changes in many interior settings.

2.2 Study findings and significance of findings to research question.

- People tend to feel more relaxed in spaces where soundscapes are implemented
- Even if the exterior noise levels are high, it still won't affect the patient for this is noise that our ears tend to filter. However, measurements should be implemented to add an extra layer of acoustics.
- Tranquility is usually associated with nature & spaces where no man-made structure has reached so bringing the characteristics that mimic these scenarios into an interior space, specially in healthcare, will add more tranquility to the space creating happier patients.
- Restorative environments are those who aim to achieve a level of peace and tranquility through the implementation of characteristics which have previously been proven to cause such effect.
- Tranquil spaces in hospital settings have proven to reduce stress as well as rise comfort and recovery rates.

- Currently, healthcare settings are only concerned with the medical part of the issue, However, there needs to be a balance between the physical well-being and the psychological/emotional well-being.
- The study found that patients are already stressed due to their condition so many things such as cluttered informational walls with many diseases, overall clutter, noise, & views can greatly increase the stress condition of the patient.
- Music can be a good sound masking method however since people have different taste in music then it is recommended that neutral recordings are used such as nature sounds. EX: waves breaking on the rocks or rain falling.

2.3 Relationship and potential application to typology decision.

Views and soundscapes were greatly explored as methods to make an interior setting seem more relaxing or less intimidating. Many of the finding of this article can be applied to the final literary review. The setting in the article & the chosen typologies fall under the same category: Healthcare. Healing spaces can be described in many ways. They don't hold a definitive shape in society's eyes therefore this article will be a good source for the final literary review.

2.4 List of selected quotations that appear to be useful to include in the literature review

- "Tranquil spaces are often natural environments where man made sounds are not dominant. research has shown that such environments improve hospital recovery rates, reduce stress, improve longevity, reduce pain and can affect how the brain processes auditory signals." (Khan, 2016, pg. 1)
- "…hospitals and primary care facilities there is a need to improve patient waiting rooms as current designs are largely based solely on medical need." (Khan, 2016, pg. 1)
- "In order to improve healthcare environments, it is important to understand the role of sound and to determine what may be positive, negative, and the feelings that different soundscapes can evoke." (Khan, 2016, pg. 2)
- "Introduction of natural sounds such as water sounds. Earlier work has demonstrated that this should be as natural as possible and a low level but audible." (Khan, 2016, pg. 2)
- "Here we are attempting to gauge the influence of the room to induce tranquility so in that sense it is a constant external environmental quality rather than an internal mental state subject to fluctuation." (Khan, 2016, pg. 6)
- "There would also be gains from considering the visual aspects e.g. using floor to ceiling murals of natural landscapes rather than using pictures with limited areas in order to substantially increase." (Khan, 2016, pg. 7)

Annotated Bibliography 7: (Marice Guerra)

Appold, K. (2018). SILENCE IS GOLDEN: Design strategies to absorb hospital noise and improve the environment of care. *Health Facilities Management,* 31(4), 34-38.

1. The Process:

1.1 Author's Credentials:

Karen Appold has more than 20 years of experience in the editorial and writing business. She holds a B.A in journalism from the university of Pennsylvania. Throughout her career she has done many researches on the healthcare facility and published countless articles with the most recent being for the Health Facilities Management.

1.2 Journal – Date, edition & Tittle.

Health Facilities Management is considered to be the most trustful source of its field regarding any innovations in the healthcare field. In order to create a more accurate research, they work closely with the people who experiences these facilities everyday including managers, facility owners, nurses & doctors as well as patients & material suppliers. The issue was published in 2018 which makes it very recent. They go in depth and use examples of real life.

1.3 Intended Audience:

Designers who aim to change the current healthcare standards may be interested in this article. Today's concerns of the healthcare environment are mostly functional and any disregard the issues that comes with factors such as noise, inappropriate lighting and even views. The intended audience would be Interior Designers who aim to understand how healing spaces can be affected by the surrounding environment & how it goes far beyond the physical comfort. This article is also intended for anyone who is interested in designing spaces that help improve the physical & psychological state of ill patients. Also, researchers could benefit from the example of the analytic data here presented.

1.4 Objective Reasoning:

The article is evidence based. It is supported by other designers and their work in the healthcare field. It addresses issues and offers solutions to many scenarios which are common on the everyday clinic.

1.5 Coverage of Topic:

The Literary review addressed the issues in hospitals when the noise becomes disturbing to the point where it can even raise the patient's blood pressure. It offers solutions as well as examples of real life scenarios.

2. Summary

2.1 Summary of Methodology & Methods:

The Methodology used in this article is qualitative. There was no testing of information. Simply an issue was presented, and a solution was offered. There was no data collection or participants. The study is subjective and free of bias since it's not trying to prove anything, instead it aims to show how acknowledged issues can be addressed.

2.2 Study findings and significance of findings to research question.

- Noise can be distressing to patients in recovery especially if they are staying with more than one person in the same room
- There are many small noised in a healthcare setting and although they may seem minimal when they all combine, they can create distressing noise levels.
- Most of this noises can be fixed with very easy methods such as fixing a squeaky cart or using silent door locking devices.
- It is suggested that partition are built all the way up as opposed to just the ceiling to pipes and cables do not help noise travel in between partitions.
- Using noise proof glass in between patient's cubicles as opposed to curtains can make a great difference in their overall stay as well as their recovery.
- It is understandable that a hospitals main purpose is to save lives and for that there needs to be optimal communication between patients and staffs. However, this does not mean that it can be done in a noise reduced and efficient way.
- Hospitals have come up with a quiet time from 1:00pm-3:00pm in where all Tv and monitors have their volume lowered in order to provide quality rest for those hours.
- Hanging visuals on the wall to remind people to be mindful of their volume seem to be effective in many cases.
- A good way to make people react psychologically to the setting is by dimming the lights where possible. This creates a feeling of intimacy & privacy which in consequence makes people adjust their voice & noise.
- Maintaining the hospital equipment either physically or technologically allows for error noises or unoiled parts to be avoided.
- A good recommendation is to avoid noisy communication where possible. Instead of having a sound alarm that alerts the nurse of the patients' needs help, a flashing light could be used.

- Hospitals should not reflect the illness but the recovery so using sound functional materials which at the same time help with the overall look is a reasonable request. For example, walking into a spa has that unique feeling which gets the user ready to be relaxed

2.3 Relationship and potential application to typology decision.

Views and soundscapes were greatly explored as methods to make an interior setting seem more relaxing or less intimidating. Many of the finding of this article can be applied to the final literary review. The setting in the article & the chosen typologies fall under the same category: Healthcare. Healing spaces can be described in many ways. They don't hold a definitive shape in society's eyes therefore this article will be a good source for the final literary review.

2.4 List of selected quotations that appear to be useful to include in the literature review

- "Excessive noise in hospitals can adversely affect the physiological and psychological well-being of both patients and staff." (Appold, 2018, pg. 34)
- "Increased noise levels negatively impact the patient experience during a hospital stay. This might be due to the fact that excessive noise can increase patients' heart and respiratory rates, heighten blood pressure and increase stress." (Appold, 2018, pg. 34)
- "In addition, patients are often fatigued by the blast of medical alarms and do not get needed rest." (Appold, 2018, pg. 34)
- "Although a hospital is a healing environment, it is also a functioning one. For the patient's safety, clinicians need to communicate, alarms need to sound, and equipment and staff must move throughout corridors." (Appold, 2018, pg. 34)
- "Designers can't eliminate activity or noise, and materials can only do so much to absorb it," (Appold, 2018, pg. 34)
- "Manufacturers also are offering sound-absorptive products that provide nature-inspired design flexibility — through perforated natural wood veneers or the use of sound-absorbing geometric patterns and curved baffles, Chu adds. Such materials tie into the biophilic design trend toward interiors that encourage complexity of visual stimuli." (Appold, 2018, pg. 36)
- "And for those institutions that prefer carpeted corridors, Kaminski recommends carpeted tiles because, in addition to the carpet's face being sound absorbing, the backing is as well." (Appold, 2018, pg. 36)
- "In addition to absorbing sound, materials can promote peaceful, calming surroundings which, in turn, encourages staff to do so as well." (Appold, 2018, pg. 36)
- "The loud clicking of door-latching hardware also can be annoying. Choose hardware that ensures a quiet closing and soft latching." (Appold, 2018, pg. 38)
- "The loud clicking of door-latching hardware also can be annoying. Choose hardware that ensures a quiet closing and soft latching." (Appold, 2018, pg. 38)

- "Using dimmable lighting in the evenings also can be beneficial. Just like being in a restaurant, if lighting is dim, people speak more quietly." (Appold, 2018, pg. 38)

Annotated Bibliography 8: (Marice Guerra)

Konkani, A., & Oakley, B. (2012). Noise in hospital intensive care units—a critical review of a critical topic. Journal of Critical Care, 27(5).

1. The Process:

1.1 Author's Credentials:

Barbara Oakley is currently a professor in Oakland university where she is involved in several areas of research including STEM & engineering. Her work has been featured in many publications including the Wall Street Journal. She graduated with a PhD in engineering in 1998.

Avinash Konkani is currently a professor at Harvard Medical School. His years of expertise on the field have led him to document his findings in journals such as ELSEVIER. He received a PhD in Engineering from Oakland University. He is also the only US recipient to receive AAMI's Michael J. Miller Scholarship.

1.2 Journal – Date, edition & Tittle.

The Journal of Critical Care is a peer reviewed journal run by Elsevier, a very prestigious analytics company. The journal's purpose is to inform those in the healthcare field whether they treat illnesses or are treated for illnesses. Las but not least, the journal works closely with professionals in the field in order to provide the most accurate information. The journal was published in 2015 which can make it somewhat outdated

1.3 Intended Audience:

The intended audience are people or designers concerned with the interior characteristics. People who aim to improve these facilities will also benefit from the findings of this article. Today's concerns of the healthcare environment are mostly functional and any disregard the issues that comes with factors such as noise, inappropriate lighting and even views. The intended audience would be Interior Designers who aim to understand how healing spaces can be affected by the surrounding environment & how it goes far beyond the physical comfort.

1.4 Objective Reasoning:

The article is evidence based. It is supported by other 10 previously conducted researches whose results have been approved. The article aims to prove the negative effects high noise levels may have on patients as wells as staff.

1.5 Coverage of Topic:

The Literary review addresses the noise issues in intensive care units. It shows how most of the noise in these facilities come from the staff themselves. The offer solutions & explore the advantages of reducing noise.

2. Summary

2.1 Summary of Methodology & Methods:

The Methodology used in this article is qualitative. There was no testing of information, only referenced work. No data was collected since their aim was to find a solution to the noise problem in intensive care units. The article is free of biased for its does not seek to prove a point but instead it aims to educate and inform users on how to better the environment for better recovery chances for the patients.

2.2 Study findings and significance of findings to research question.

- Most of the noise found in healthcare settings comes from the staff itself. Sometimes they are not aware of it so informational meetings are advised to be held in order to educate and inform the staff member on how to create a more pleasing and tranquil space for the patients.
- As technology advances, so does noise. It is important to create techniques which will help cope with all the noise new technology creates.
- Noise is not only annoying but also disrupts the tasks of the nurses. Nurses reported that noise in their workplace has prevented them from concentrating in the task at hand. This creates margin for error which cannot be allowed when dealing with lives.
- High levels of noise may affect mental health as well as the cardiovascular rhythm of the patient & disrupt sleep patterns.
- There are many sources of noise in a healthcare setting so managing them is important so that noise levels do not get out of hand
- When noise levels arise so do people's voice. We respond to our surroundings and when engaging in conversations it is our main purpose for the other party to hear us therefore adjusting the voice level according to the surrounding environment noise.
- The levels of noise in the cafeteria during the day was compared to that of a boiler room. It is important to understand that there are sick, grieving & weary people in these environments so noise levels should be kept down.

2.3 Relationship and potential application to typology decision.

Many settings including treatment facilities were tested to be able to assess the level of noise disturbances. Many of the finding of this article can be applied to the final literary review. The setting in the article & the chosen typologies fall under the same category: Healthcare. Healing spaces can be described in many ways. They don't hold a definitive shape in society's eyes therefore this article will be a good source for the final literary review.

2.4 List of selected quotations that appear to be useful to include in the literature review

- "Noise in ICUs has increased dramatically as a consequence of these changes, and the effect of noise on patients and staff has become an important issue." (Konkani, Oakley, 2012, pg. 520)
- "One group studying noise levels and sources in acute care hospital wards concluded that "34% of noise sources appear to be totally avoidable and 28% of noise sources are partially avoidable." (Konkani, Oakley, 2012, pg. 521)
- "…noise has cardiovascular and physiologic effects that can also affect mental health. Moreover,
- noise causes sleep disturbances for patients who are vitally in need of sleep; it can also have long-term effects on hearing…" (Konkani, Oakley, 2012, pg. 521)
- • "…noise is potentially a significant contributor to higher heart rates, tachycardia, stress, and annoyance in nurses." (Konkani, Oakley, 2012, pg. 522)
- "…there is a positive correlation between hospital noise and physiological responses experienced by patients, the most significant being an increased risk of hypertension and ischemic heart disease." (Konkani, Oakley, 2012, pg. 522)
- "…quiet time" protocol may be helpful to institute a culture change for the staff. Even if it only runs for an hour during the afternoon, such a protocol serves as a useful reminder for every one of the importance of quiet." (Konkani, Oakley, 2012, pg. 522)

5.How do furnishings and finishes contribute to patient well-being?

Annotated Bibliography 1: (DiVito)

Timmermann, C., Uhrenfeldt, L., & Birkelund, R. (2013). Cancer patients and positive sensory impressions in the hospital environment--a qualitative interview study. *European Journal of Cancer Care, 22*(1), 117-124. doi:http://dx.doi.org.ezproxy.fiu.edu/10.1111/ecc.12007

1. Critical analysis of the source:

1.1. Author's credentials.

C. Timmermann: Timmermann is an RN, MSCN and PHD Student. He/she is affiliated with Horsens Hospital Research Unit and Medical Department; and the Department of Nursing Science, Health at Aarhus University in Aarhus, Denmark.
L. Uhrenfeldt has a PHD, Clinical Research lead and Assistant Professor. He/She is also affiliated with Horsens Hospital Research Unit and the Department of Nursing Science, Health at Aarhus University in Aarhus, Denmark.
R. Birkelund has a PHD, is a Dr. of Philosophy and Associate Professor affiliated with the Department of Nursing Science, Health at Aarhus University in Aarhus, Denmark.

1.2. Journal – date, edition, title.

The article appears in the European Journal of Cancer Care, accepted July 1, 2012 and eventually published in 2013. The Journal issued its first publication in 1992 and is still a bi-monthly publication with peer-reviewed medical studies.

1.3. Intended Audience.

The European Journal of Cancer Care is targeted to the medical community, which includes but is not limited to doctors, surgeons, registered nurses, physicians, PHD's and students. Because the journal primarily focuses on cancer care – the journal has a very targeted audience compared to general practice journals.

1.4. Support – (opinion, evidence based, propaganda)

The authors research consisted of interviews with cancer patients to understand how sensory impressions from architecture, decoration and the interior in general affected the patient experience. Feedback from the patients could be viewed as evidence based for the purposes of this study. However, the feedback was the opinion of the participants. It's also important to note that the interpretation of the answers given could be swayed, whether purposely or innocently, to support the given argument. In addition to the interviews done for this particular study, much of the support came from evidence-based studies done in previous years by various people. So while the interviews may have been opinion based, the evidence-based support strongly supported the interpretation of the interview findings.

1.5. Coverage.

The purpose of this paper is to explore how design can help support cancer patients well-being during treatments. The article of support discusses cancer patients and their sensory impressions in the environment in which the receive treatment. The authors further describe sensory impressions to be focused on architecture, decoration and the interior.

2. Summary of information:

2.1. Summary of methodology and methods.

The study is based on qualitative research methods by utilizing interviews to generate data. Six interviews were performed using adult patients, both male and female, between the ages of 61-89. Two patients had single rooms while one patient shared a room with two other patients. The other three patients shared a room with one other person. It's important to note that all the patients had views to outside, with varying landscapes of water, green or cityscape.

2.2. Study findings and significance of findings to research question.

- Existing research gathered by the authors strongly supports the idea that sensory impressions such as sunlight or artwork of natural outdoor scenes had a positive effect on patients pain and stress (Timmerman *et al*, 2013, p.118).
- Studies have been conducted to determine which sensory impressions have the most positive impact on hospitalized patients. The findings ascribed importance to a welcoming, calm and familiar environment (Timmerman *et al*, 2013, p.118). This importance strongly makes the case for an environment which feels much more residential than clinical in supporting patients well-being.
- Environmental psychology and architectural psychology examine the aesthetic relationship between humans and their physical surroundings. It is believed that the human body is affected overall from the physical environment, which includes the senses, thoughts and emotions (Timmerman *et al*, 2013, p.118).
- Interviews with the cancer patients revealed a clear importance to have moveable furnishings that would allow them to sit by the window and eat or relax. Have paintings in the rooms that depicted water scenes or outdoors allows patients to escape their thoughts (Timmerman *et al*, 2013, p.121).

2.3. Relationship and potential application to typology decision.

The typology decision was healthcare and this particular study focuses on the interior, decoration and architecture of hospitals, specially cancer treatment and recovery areas.

2.4. List of quotations that appear to be useful to include in the literature review.

"In the 19th century, Florence Nightingale (1859/1992) contributed to the nursing field heralding patients' need for natural light, a beautiful view, proper ventilation and aesthetic sensory impressions such as flower at the bedside. Nightingale considered such sensory impressions important for the patient's ability to recover from illness." (Timmermann, Uhrenfeldt & Birkelund, 2013, p.117)

"Several interviewees highlighted that their positive thoughts and feelings were enhanced by architecture of space which was neither too small nor too narrow and had much natural light" (Timmerman *et al*, 2013, p.121).

"According to the theory of Norberg-Schulz (1978), being at home is deeply connected with identity. Home is where we get a foothold, feel safe and connect with a deeper sense of who we are" (Timmerman *et al*, 2013, p.122).

"The patient's' personal experiences of architecture, interior and decoration are perceived to have a significant influence on their thoughts and feelings" (Timmerman *et al*, 2013, p.122).

Annotated Bibliography 2: (DiVito)

Blaschke, S., O'Callaghan, C.,C., & Schofield, P. (2018). Cancer patients' recommendations for nature-based design and engagement in oncology contexts: Qualitative research. *Herd, 11*(2), 45-55. doi:http://dx.doi.org.ezproxy.fiu.edu/10.1177/1937586717737813

1. Critical analysis of the source

1.1. Author's credentials

Sarah Blaschke, PHD Candidate is affiliated with the Department of Cancer Experiences Research, Peter MacCallum Cancer Center in Melbourne. She is also part of the Sir Peter MacCallum Department of Oncology, Faculty of Medicine, Dentistry and Health Sciences at the University of Melbourne in Victoria, Australia.

Clare C. O'Callaghan, PhD is affiliated with the Department of Cancer Experiences Research, Peter MacCallum Cancer Center in Melbourne. In addition, Ms. O'Callaghan is part of the Department of Medicine at St. Vincent's Hospital, The University of Melbourne and Palliative Care Service, Cabrini Health in Melbourne.

Penelope Schofield, PhD is affiliated with the Department of Cancer Experiences Research, Peter MacCallum Cancer Center in Melbourne. She is also part of the Sir Peter MacCallum Department of Oncology, Faculty of Medicine, Dentistry and Health Sciences at the University of Melbourne in Victoria, Australia. In addition, Ms. Schofield is part of the Department of Psychology, Faculty of Health Sciences, Swinburne University of Technology in Melbourne.

1.2. Publisher

The Health Environments Research & Design Journal (HERD) is an interdisciplinary, peer-reviewed journal whose mission is to enhance the knowledge and practice of evidence-based healthcare design by disseminating research findings, discussing issues and trends, and translating research to practice. (www.healthdesign.org) The Journal began publication in 2010, around the time design and well-being started becoming more mainstream.

1.3. Journal – date, edition, title

This study was published in 2018, which makes the information relevant. What was extremely interesting to notice was the awareness among patients about environmental impact and well-being. When compared to older-published studies, the authors typically need to argue for nature-based design, but in this particular study, the patients were asking for it.

1.4. Intended Audience

Articles in the Journal are published by various audiences from doctors to designers. Therefore, the intended audience would be such as well as hospital/healthcare administrators. It's important to note that those in charge of budget and construction methods are also the intended audience as cost in healthcare is a big issue. In this particular article, the authors describe a balance of cost and return, making their case for the financial people involved.

1.5. Support

The article itself presents 29 professional references in a range of journals such as Journal of Advanced Nursing, Journal of Environmental Psychology and the World Health Organization. The prestige of the journals referenced supports the material in
addition to the research executed by the authors themselves.

1.6. Coverage

The article covers patients suggestions for implementing nature-based design into healthcare, specifically oncology, environments. While it does present information on views of nature, which is outside the scope of this portion of the paper, it also goes into specific recommendations about finishes and design inside the hospital. The article also touches on costs affiliated with the design changes as well as the feasibility and maintenance associated with having living walls and plants throughout.

2. Summary of information

2.1. Summary of methodology and methods

The article uses a qualitative research design to incorporate deductive content analysis and inductive analysis of unanticipated data (Blaschke et al., 2018, pp.47). The study was designed to record and interpret recommendations from cancer patients about their experiences in the healthcare system, specially experiences dealing with nature. The authors also aimed to understand cautionary advice from the patients, such as things to avoid and be mindful of when dealing with a population with compromised immune systems.

2.2. Study findings and significance of findings to research question

- The study found that patients wanted nature incorporated into the design in order to create sensory stimulation and engagement. This included specifying materials inspired by nature. However, they cautioned about having overstimulation, which can have adverse effects on healing (Blaschke et al., 2018, p. 46).
- Patients expressed concern about design choices driving up the cost of the already expensive healthcare. They realized there needs to be a balance between design and cost (Blaschke et al., 2018, p. 46).
- When it comes to oncology settings, Blaschke et al. (2018) found that nature can be used to create a sensory environment and that nature affords patients distraction from unpleasant clinical conditions.
- Materiality can play a significant role in cancer patient healing. The research found that highly patterned materials can cause overstimulation and overwhelm while materials that resemble nature, such as natural timber and wall colors, presents a relief to the stark atmosphere associated with healthcare facilities (Blaschke et al., 2018, pp. 46).

2.4. List of quotations that appear to be useful to include in the literature review

“Strategies should be patient-centered and focus on establishing and developing patients’ own capacity to manage disease and maintain health and well-being” (Blaschke et al., 2018, p. 46).

“Evidence indicates that well-designed noncancer healthcare setting render hospitals safer and more healing for patients” (Blaschke et al., 2018, p. 46).

“Patients submitted compelling reason for responsive design that allows for scaling levels of engagement and, importantly, disengagement according to patients’ momentary and shifting needs” (Blaschke et al., 2018, p. 53).

“Digital devices with interactive nature displays and sounds including virtual reality headsets can be offered during clinical procedures to distract patients and assist with anxiety” (Blaschke et al., 2018, p. 53).

“Critical health and safety factors include attention to appropriate design materials such as nonslip surfaces, shelter from harsh weather conditions, avoiding exposure to soil bacteria for patients at high risk of infection, sensory overstimulation, and allergy-inducing materials” (Blaschke et al., 2018, p. 54).

Annotated Bibliography 3: (DiVito)

Schiffman, S. S. (2007). Critical illness and changes in sensory perception. *The Proceedings of the Nutrition Society, 66*(3), 331-45. doi:http://dx.doi.org.ezproxy.fiu.edu/10.1017/S0029665107005599

1. Critical analysis of the source

1.1. Author's credentials

Susan S. Schiffman is a professor in the Department of Psychiatry at Duke University Medical Center.

1.2. Publisher

Proceedings of the Nutrition Society (PNS) publishes papers and abstracts presented by members and invited speakers at the scientific meetings of The Nutrition Society, and abstracts of Original Communications presented during the Society's scientific meetings. This journal appears as five issues per year. (www.nutritionsociety.org)

1.3. Journal – date, edition, title.

Published in 2007, the article explores effects of newer medications on the patients receiving them.

1.4. Intended Audience

The intended audience for this article, because it is published in a nutrition society journal, is intended for nutritionists and doctors treating patients. It explores the five senses and the effect chemotherapy and other drugs has on cancer patients. While the conclusion relates how malnutrition and lack of interest in eating results from the loss of five senses, the article can still be helpful and useful in understanding how the sense of touch is affected by chemotherapy and what that means for materiality within the space.

1.5. Support

The article is backed by 120 references, the vast majority published in well-established and respected journals.

1.6. Coverage

The article covers sensory perceptions and impairment of these senses due to both age and different critical illnesses including chemotherapy. It's objective is to understand how people are affected by different treatments such as surgery and chemotherapy. The author took into account preexisting conditions such as age-related vision issues (cataract, macular degeneration), hearing loss and chemical senses of taste and smell. The study wanted to explore if and how medical treatments exaggerated preexisting conditions and what happened to people who did not have those conditions.

2. Summary of information

2.1. Summary of methodology and methods

The primary methodology for this article is quantitative research. It dives deep into biological research and understanding the human anatomy as it changes with age. The author read and dissected 120 published articles to begin understanding how doctors can help patients with their nutritional intake during critical illness. To fully understand how patients are affected, the author divided the study group into three: one group of critical illness patients with preexisting conditions, one group of critical illness patients with no preexisting conditions and a third control group that were not sick or had preexisting conditions.

2.2. Study findings and significance of findings to research question

- The study found that certain drugs had different effects on the senses. Depending on the exact drug being used, patients experienced different somatosensory changes. The largest percentage of patients reported losing their sense of touch and experienced numbing and tingling in the hands and feet. A small percentage of patients had a heightened sense of touch, where roughness was magnified and vice versa (Schiffman, 2012).
- One of the biggest takeaways from this article is to understand all the different chemotherapy drugs being used and understand the specific reactions for patients. For instance, those patients who receive treatment that makes them hypersensitive to touch might need a room design different from those who report losing feeling (Schiffman, 2012).

2.3. Relationship and potential application to typology decision

The article dives into all the sensory perceptions of critical illness patients and helps designers understand how treatments affect patients differently. From a materiality standpoint, it is important to understand these changes in sensory perceptions so designers can provide the best accommodations available.

2.4. List of quotations that appear to be useful to include in the literature review

“While medical science has substantially improved the prognosis for individuals who suffer from many critical illnesses, there are often negative physiological and perceptual effects that prolonged survival that can have a serious impact on daily functioning and quality of life” (Schiffman, 2012, p.331).

“Chemotherapy for a broad range of cancer types has been associated with visual disturbance. (Al-Tweiger *et al.* 1996; Gianni *et al.* 2006). (Schiffman, 2012, p.331)

Annotated Bibliography 4: (DiVito)

Rajagopal, A. (2018). Clean finish: Textiles are key to designing health and safety into our hospitals -- and the industry is changing its thinking about how these fabrics should be made. *Metropolis, 38*(2), 126-131. Retrieved from http://ezproxy.fiu.edu/login?url=https://search-proquest-com.ezproxy.fiu.edu/docview/2162491509?accountid=10901

1. Critical analysis of the source

1.1. Author's credentials

Avinash Rajagopal is the editor-in-chief of Metropolis magazine. He is an expert on product and interior design in the digital age, as a historian of contemporary design as well as a frequent speaker at key industry events. He is the author of *Hacking Design* (Cooper Hewitt, Smithsonian Design Museum, 2013). and has contributed to numerous volumes on architecture and design, including *Adhocracy* (Istanbul Design Biennial, 2012), *Making Africa* (Vitra Design Museum, 2015) and *Atlas of Furniture Design* (Vitra Design Museum, forthcoming). He has lectured on design history and writing at the School of Visual Arts, New York; the University of Texas at Austin; and the National Institute of Design, India. (https://www.metropolismag.com/bios/avinash-rajagopal/)

1.2. Journal – date, edition, title

The article was published in 2018 in Metropolis Magazine. Volume 38, Issue 2. The magazine has been in publish for 35 years and is the frontrunner in keeping the industry ahead of trend curves and the latest innovations in architecture and design.

1.3. Intended Audience.

Metropolis' main audience are people involved in architecture and design. Most of the articles deal with in-depth interviews with some of the biggest names in architecture from firms to individuals.

1.4. Support – (opinion, evidence based, propaganda)

While no citations for this article exist, it appears, from the information presented, that the topic has been well-researched. The history of the textile industry in regards to healthcare is backed up thoroughly by interviews with CEO's from the major textile companies. Additional references include press releases from Kaiser Permanente, one of the largest hospital systems in the United States, and information from HHI (Healthier Hospitals Initiative).

1.5. Coverage

This article covers the history of textiles in healthcare, specifically how textiles have been portrayed as the carriers of infectious bacteria. As the trend towards healthier interiors continues, textile manufacturers are dealing again another blow: to make textiles that are not treated with antimicrobials and other stain-resistant finishes. As sick-building syndrome becomes more globally accepted, the harsh cleaners and off-gasing of materials are being examined as prime contributors to this disease. Healthcare textiles are taking the brunt of the negative press and this article explores how manufacturers are weathering the storm.

2. Summary of information

2.1. Summary of methodology and methods

The study is based on qualitative activities because there are no concrete measurements or statistical analysis. The means for exploring and understanding the problem are centered on history research. Most of the inference gained is from interviews around the specific problem of healthcare textiles and bacteria. Because this is qualitative, there were no true methods discussed in this article, such as a sample group and/or control group.

2.2. Study findings and significance of findings to research question

- Today, there are no fewer than 18 options for coatings and finishes availble when sourcing contract textiles for hospitals or healthcare typologies. Some choices available include antimicrobial, polyester, nylon, cleanable with bleach or harsher chemicals and most are likely to be treated or chemically engineered to be flame retardant (Rajapopal, 2018).
- Hospital textiles can be breeding grounds for infections and have long been the scapegoat for bad publicity when infectious outbreaks occurred. The culprits were named as staff uniforms, bed linens, curtains and upholstery for furniture (Rajapopal, 2018).
- In the 1970’s, manufacturers of healthcare textiles focused on making the materials flame-retardant. By the 1990’s, the focus shifted and manufacturers were trying to make textiles resistant to stains (Rajapopal, 2018).
- By the new millennium, manufacturers were focused on creating healthcare textiles that were antimicrobial-resistant (Rajapopal, 2018).
- In 2012, Healthier Hospitals Initiative (HHI) was formed by major players in the healthcare system, including Kaiser Permanente, one of the United States largest healthcare systems. The intention of the new initiative was to begin reducing harmful chemicals in hospital interiors (Rajapopal, 2018).
- While textiles are a source of major blame for infectious disease transfer, it is important to remember that textiles can not do everything. More focus needs to be placed hygiene practices,

such as hand washing, and less on the antimicrobial properties of a piece of fabric (Rajapopal, 2018).

2.3. Relationship and potential application to typology decision

The typology decision was healthcare and how finishes and furnishings can aid in well-being and recovery. This article explores the history of textiles in healthcare design and the trends that existed during specific decades that allowed the industry to evolve to what it is today. As we begin to understand how synthetic materials impact human health, we are also understanding the role textiles play in the healthcare setting.

2.4. List of quotations that appear to be useful to include in the literature review

"Textiles were implicated in major hospital fires, and "one white paper found that 63 percent of the drapery hanging in the room was infected with both MRSA and *Klebsiella pneumoniae,"* recalls Jeff Layne, the founder of Arc-Com" (Rajapopal, 2018, p.127).

"Meanwhile, studies emerged suggesting that many chemicals used in stain-resistant textile coatings or antimicrobial treatments – such as poly- or perfluorinated compounds, ionic silver, and zinc pyrithione – were either carcinogenic or likely to bio-accumulate to toxic levels in humans" (Rajapopal, 2018, p.128).

"In 2014, Kaiser Permanente banned the use of flame-retardant treatments in any furniture used in its facilities. A year later, 15 chemicals commonly used as antimicrobial coatings or additives were added" (Rajapopal, 2018, p.129).

"Perhaps though, designers and specifiers misdiagnosed the problem in placing so much emphasis on textile performance. So, rather than put the burden of infection prevention on an upholstered chair, facilities may ensure that the hands and bodies that touch it have been disinfected to the fullest extent possible" (Rajapopal, 2018, p.130).

Annotated Bibliography 5: (DiVito)

Wolverton, B.C., Johnson, A., Bounds, K. (1989). Interior Landscape Plants for Indoor Air Pollution Abatement. *National Aeronautics and Space Administration, NASA-TM-101766*. Retrieved from https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19930073077.pdf

1. Critical analysis of the source

1.1. Author's credentials

B.C. Wolverton, Ph.D. was the principal investigator and employee of the National Aeronautics and Space Administration (NASA).

Anne Johnson, M.S. was an employee of the National Aeronautics and Space Administration (NASA).

Keith Bounds, M.S. was an employee of Sverdrup Technology, a Pasadena-based unit of Jacobs Engineering Group. Jacobs Engineering Group Inc. is an international technical professional services firm. The company provides technical, professional and construction services, as well as scientific and specialty consulting for a broad range of clients globally including companies, organizations, and government agencies.

1.2. Journal – date, edition, title

The article was published in September 15, 1989 as a final unclassified report from the NASA division of the United States Government. The work was jointing supported by the NASA Office of Commercial Programs – Technology Utilization Division and the Associated Landscape Contractors of America (ALCA).

1.3. Intended Audience

The intended audience included a wide range of people from specific internal NASA employees, the scientific community, landscape contractors and the general American public, as they are usually concerned with what the government is up to.

1.4. Support – (opinion, evidence based, propaganda)

The article is supported by 37 references from a range of publications including scientific journals and other United States government reports. The findings are evidence-based due to the extensive statistical analysis and in-depth description of the study setup, including accounting for potential bias and errors.

1.5. Coverage.

This article aims to understand the role certain houseplants play in cleansing the air of volatile organic compounds (VOC's) in a confined environment. While this study was really intended to see what role plants could play in reducing indoor air pollution in confined space stations, it's findings can be applied to understand the role houseplants can possibly play in the interior environment.

2. Summary of information

2.1. Summary of methodology and methods

The study is based on quantitative activities due to the extensive statistical analysis. The study identified 12 types of common houseplants, kept in their original pots and potting soil and put into Plexiglas chambers. To determine if the plants had an effect on reducing indoor air pollution, each chamber was introduced with three common chemical contaminations, separately: benzene, trichloroethylene and formaldehyde.

2.2. Study findings and significance of findings to research question

- The energy crisis of the 1970's spurred innovations in building methods and materials intended reduce energy costs. This airtight sealing did help to maximize energy efficiency, but it also became a source of health problems, including respiratory illnesses, itchy eyes, rashes and other allergy-related symptoms (Wolverton *et al.*, 1989).
- Sick Building Syndrome was identified as the reason for the new influx of allergy-related symptoms and additional culprits were identified as contributing to the problem: synthetic building materials which "off-gas" VOC's and furniture and office equipment (Wolverton *et al.*, 1989).
- Two major air pollution strategies were identified: allowing materials to off-gas before installation or by providing potted plants (Wolverton *et al.*, 1989).
- There are three common chemicals used in a variety of applications that off-gas into the environment. The first is Benzene, commonly found in paints, plastics and rubbers. It is known to irritate the eyes and skin, but is now being linked to leukemia in humans. The second is trichloroethylene which more commonly found in the dry cleaning industry, but is used in inks, paints, lacquers and varnishes. This chemical is considered a carcinogen that can lead to liver cancer. The third and possibly the most common chemical is formaldehyde, often found in urea-formaldehyde foam insulation (UFFI), and particle board or pressed-wood products, such as toilet paper, paper towels, water repellents, adhesive binders for flooring, among other uses. It was initially thought to be a topical allergen, causing upper respiratory issues, but has now been linked to throat cancer (Wolverton *et al.*, 1989).
- The following plants demonstrated high chemical removal: English ivy, marginata, janet craig, golden pothos and the peace lily (Wolverton *et al.*, 1989).
- When the same plants and potting soil are constantly exposed to air containing such toxic chemicals as benzene, their capacity to continuously clean the air improves and they are able to utilize the chemicals as a food source. (Wolverton *et al.*, 1989).

2.3. Relationship and potential application to typology decision

The typology decision was healthcare and how finishes and furnishings can aid in well-being and recovery. This article explores the history of textiles in healthcare design and the trends that existed during specific decades that allowed the industry to evolve to what it is today. As we begin to understand how synthetic materials impact human health, we are also understanding the role textiles play in the healthcare setting.

2.4. List of quotations that appear to be useful to include in the literature review.

"Energy-efficient buildings that are filled with modern furnishings and high-tech equipment off-gas hundreds of volatile organics which possibly interact with each other" (Wolverton *et al.*, 1989, p.1).

"Dr. Tony Pickering of the Wythenshawe Hospital near Manchester, England, has studied sick building syndrome extensively and has learned that symptoms are minimal in naturally ventilated buildings which contained the highest levels of microorganisms" (Wolverton *et al.*, 1989, p.1).

"This plant system is one of the most promising means of alleviating the sick building syndrome associated with many new, energy-efficient buildings." (Wolverton *et al.*, 1989. pp.18)

Annotated Bibliography 6: (DiVito)

Norbäck, D., Michel, I., & Widström, J. (1990). Indoor air quality and personal factors related to the sick building syndrome. *Scandinavian Journal of Work, Environment & Health, 16*(2), 121-128. Retrieved from http://ezproxy.fiu.edu/login?url=https://search-proquest-com.ezproxy.fiu.edu/docview/79822916?accountid=10901

1. Critical analysis of the source

1.1. Author's credentials

Dan Norback, BA is a professor in the Department of Occupational Medicine, University Hospital in Uppsala, Sweden.

Ingegerd Michel, MSc, is a professor in the Department of Occupational Medicine, University Hospital in Uppsala, Sweden.

John Widstrom, MHSc is also a professor in the Department of Occupational Medicine, University Hospital in Uppsala, Sweden.

1.2. Journal – date, edition, title

The article was published in the Scandinavian Journal of Work, Environment & Health in cooperation with The Finnish Institute of Occupational Health, The Danish National Research Centre for the Working Environment, and the Norwegian National Institute of Occupational Health.

1.3. Intended Audience

The main audience are medical professionals who focus on occupational health and the working environment. However, sick building syndrome can be present in the healthcare setting as well, so it targets anyone looking into indoor air quality.

1.4. Support – (opinion, evidence based, propaganda)

This short article has 34 references that, based on the journals the citations come from, it is likely most of the citations are evidence based.

1.5. Coverage

This article explores indoor air quality and additional personal factors related to sick building syndrome. The authors are trying to understand if there are additional factors that leave one person more susceptible to sick building syndrome than another. The authors are also trying to understand what role indoor air quality factors such as temperature and humidity play in the onset of symptoms.

2. Summary of information

2.1. Summary of methodology and methods

The study is based on qualitative activities performed by the Department of Occupational Medicine at the University Hospital in Uppsala, mainly through self-administered questionnaires and exposure measurements in order to determine sick buildings. The hospital reports the buildings to the University and this study takes those survey analyzes them. In addition to the 11 sick buildings, the authors found an additional 44 sick buildings not reported to them from the hospital and used as a control group.

2.2. Study findings and significance of findings to research question

- Those who have other symptoms, such as a common cold, create a temporary hyperactivity that leaves them more sensitive to irritants in the air. This would also increase their likelihood of developing sick building syndrome (Norbäck *et al.*, 1990).
- Another important finding is the relationship between electrostatic shocks and chronic fatigue. This ma possibly suggest that finding materials that do not carry electric charges may be of the utmost importance in the hospital setting (Norbäck *et al.*, 1990).

2.3. Relationship and potential application to typology decision

This study focuses on the factors that contribute to sick building syndrome. In order to understand how finishes and furniture affect cancer-patient well-being, it is important to understand how finishes and

furniture can have adverse effects on well-being. The most important to note from this study is that people who have compromised immune systems are much more likely to be affected by indoor air pollution – specifically the off-gassing of finishes and materials as well as the cleaners used in hospitals. Therefore, this study suggests that any off-gassing in the hospital setting could derail patient well-being.

2.4. List of quotations that appear to be useful to include in the literature review

"Recent Swedish studies showed there is a possible link between electrostatic shocks in the hospital environment and an enhanced prevalence of fatigue. One study revealed a significant association between the degree of charge and the prevalence of symptoms associated with the sick building syndrome" (Norbäck *et. All*, 1990, p. 126).

"We conclude that the sick building syndrome is of multifactorial origin, depending on both personal factors and environmental factors such as the indoor hydrocarbon concentration." (Norbäck *et. All*, 1990, pp. 126)

Annotated Bibliography 7 : (DiVito)

Senitkova, I. (2014). Impact of indoor surface material on perceived air quality. *Materials Science and Engineering C, 36*(1), 1-6. Retrieved from https://www-sciencedirect-com.ezproxy.fiu.edu/science/article/pii/S2212609016300140

1. Critical analysis of the source

1.1. Author's credentials

Ingrid Senitkova is a professor in the Civil Engineering Department at the Technical and Economical University of Ceske Budejovice in the Czech Republic.

1.2. Journal – date, edition, title.

Materials Science and Engineering C is a peer-reviewed scientific journal published monthly since 1993 after the Materials Science Reports split into two separate publications.

1.3. Intended Audience

The main audience for this journal are scientists and engineers who work with chemicals and materials development. The journal would also be of interest to the chemical companies and people who use engineered materials in their work and/or projects.

1.4. Support – (opinion, evidence based, propaganda)

This short article has 13 references which focus on volatile organic compounds and indoor air quality. The paper itself uses focus groups to understand how chemical and sensory assessments are made.

1.5. Coverage

This article explores indoor air quality as it relates to not only chemical off-gassing but also sensory perceptions of air quality. The author attempts to explore people's perceptions of certain materials and if those already-determined perceptions have a psychological effect of perceived indoor air quality versus the actual chemical analysis of the air quality.

2. Summary of information

2.1. Summary of methodology and methods

The study is based on both qualitative and quantitative methods. The qualitative method was used to understand sensory assessments in which research groups were formed to understand how people viewed different interior surface materials which consisted of several types of typical flooring (polyvinyl chloride (PVC), high density fiberboard laminate (HDF), polyamide carpet (PA) and oriented strand boards (OSB) and wall and ceiling materials (painted gypsum board (PGB) and polyvinyl chloride wallpaper (PVCW). The quantitative portion of the study focused on the actual chemical measurements – or VOC concentration in the air by placing materials in test chambers to get a reading.

2.2. Study findings and significance of findings to research question

- Selection of interior finishes has historically been based on cost, aesthetics, availability and durability, but with “green building” initiatives having an impact on material selections, most healthcare environments are selecting products rated as “reduced or non-toxic,” “low-VOC” or “PVC-free” (Senitkova, 2013).
- The biggest contributors to indoor air pollution are interior materials and finishes, which can generate large amounts of volatile organic compounds (VOC’s). The finishes for floors, walls and ceilings are believed to have the biggest impact in perceived indoor air quality (Senitkova, 2013).
- Temperature and humidity are potentially the biggest influences on the emission of VOCs from building materials, especially on paint and varnish (Senitkova, 2013).
- While many studies are focused on materials that release VOCs, it’s important to also consider that some porous materials act as sorbents, which can help reduce VOCs in the air (Senitkova, 2013).

2.3. Relationship and potential application to typology decision

The author of this study attempts to explore how ratings of “low-VOC” effect sensory perceptions and whether the chemical off-gassing is actually reduced. It’s important to understand how perception of materials plays a role in the overall perception of indoor air quality. For instance, if people perceive a material to be detrimental to indoor air quality, even if chemical analysis states otherwise, it’s important for the interior designer to understand this perception when trying to promote well-being within the interior environment.

2.4. List of quotations that appear to be useful to include in the literature review

“Building materials can have a major impact on air quality and can affect occupants, especially sensitive ones including children and patients who are immunocompromised or have respiratory problems” (Senitkova, 2013, p.1).

“Indoor surface materials can act as sorbents or sources of VOC emission. The pollutants emitted from one material can be absorbed on the surfaces of other materials. That results in reducing the concentration of sensory pollutants and improving the perceived air quality” (Senitkova, 2013, p.2).

“The selection of materials is strongly based on the intuitive assumption that they will reduce exposure of occupants to potentially dangerous or harmful chemicals” (Senitkova, 2013, p.4).

Annotated Bibliography 8 : (DiVito)

Al horr, Y., Arif, M., Katafygiotou, M., Mazroei, A., Kaushik, A., Elsarrag, E. (2016). Impact of indoor environmental quality on occupant well-being and comfort: A review of the literature. *International Journal of Sustainable Built Environment, 5*(1), 1-11. Retrieved from http://dx.doi.org/10.1016/j.ijsbe.2016.03.006

1. Critical analysis of the source

1.1. Author’s credentials

Yousef Al horr is a researcher with the Gulf Organisation for Research and Development (GROD) in Qatar.
Mohammed Arif is a professor at the School of Built Environment, University of Salford in Manchester, UK.
Martha Katafygiotou is a researcher with the Gulf Organisation for Research and Development (GROD) in Qatar.
Ahmed Mazroei is associated with Qatari Diar Real Estate Development Co. in Qatar.

Amit Kaushik is a professor at the School of Built Environment, University of Salford in Manchester, UK.
Esam Elsarrag is a researcher with the Gulf Organisation for Research and Development (GROD) in Qatar.

1.2. Journal – date, edition, title.

International Journal of Sustainable Built Environment is a peer-reviewed, subsidized open access journal where The Gulf Organisation for Research and Development pays the OA fee.

1.3. Intended Audience

The main audience for this journal can include architects, engineers, interior designers and scientists that work to develop products for the built environment.

1.4. Support – (opinion, evidence based, propaganda)

This article is supported by 127 published scientific articles and books.

1.5. Coverage

This article covers the keywords of occupant, well-being, indoor environment quality, occupant comfort, well-being and green buildings. It tries to understand how indoor air quality and the environment impact user well-being. While the article does focus mainly on productivity in the workplace setting, its important to note that in the healthcare setting, there are just as many workers as patients so this applies to the target topic.

2. Summary of information

2.1. Summary of methodology and methods

The study is a literature review of 127 published articles. The aim is to follow how research and opinions have changed about indoor air quality and user well-being from 1970's until the present. The researchers also aimed to focus on what they called "state of the art" research, meaning research done within the past decade. The research was selected based on certain criteria such as the year of publication, the reputation of the journal in which it was published and the top ten cited papers.

2.2. Study findings and significance of findings to research question

- An occupants well-being and comfort can be affected by a number of different factors which include sick building syndrome, indoor air quality, thermal comfort, visual comfort and acoustic comfort (Al horr *et al.,* 2016).

- When architects and designers focus on building green or sustainable buildings, often times they overlook factors of occupant well-being that include psychological, cultural and sociological dimensions (Al horr *et al.,* 2016).
- Indoor environmental quality (IEQ) has been shown through research to have a direct impact on the comfort, health and productivity of the occupants (De Giuli et al., 2012).
- Research indicates that the relationship between IEQ and wellbeing is complicated. A range of indoor factors such as thermal, visual, acoustic, and chemical can impact the wellbeing of the occupants (Apte et al., 2000; Jantunen et al., 1998, WHO, 2002).
- Issues such as sick building syndrome (SBS), building related illness, and pollutants have an impact on the overall productivity of the occupants (Al horr *et al.,* 2016).
- Sick building syndrome is a group of health problems related to the indoor environment of the built environment. The biggest contributors include the type of furniture, office equipment (printers, computers) and the closure of natural openings which would create ventilation (Al horr *et al.,* 2016).
- Root causes of SBS have also been linked to uncomfortable temperature and humidity, chemical and biological pollution, physical condition, and psychosocial status (Al horr *et al.,* 2016).
- Additional factors that cause SBS include volatile organic compounds (VOC), dust, mold, mite, allergens, pesticides, indoor aldehydes and lighting (Al horr *et al.,* 2016).
- Materials play a significant role in promoting well-being and selection requires special attention. Selecting appropriate third-party certified building materials can help improve indoor air quality and reduce sick building syndrome.

2.3. Relationship and potential application to typology decision

The article focuses on how indoor air quality and the environment impact user well-being. While the article does focus mainly on productivity in the workplace setting, it is important to note that in the healthcare setting, there are just as many workers as patients so this applies to the target topic.

2.4. List of quotations that appear to be useful to include in the literature review

“As ASHRAE guidelines stated since people spend about 80-90% of their time indoors and studies have indicated that a range of comfort and health related effects are linked to characteristics of the building, there has been a growth in interest in both academic and practitioner literature on occupant health and building design” (Al horr *et al.,* 2016, p.2).

“There are two common strategies in building design that are employed to deal with the IAQ in a building: increasing the ventilation rate, which in turn reduces air pollutants and reducing the source of pollution within the building” (Al horr *et al.,* 2016, p. 4).

“There is research to indicate that occupants of naturally ventilated offices have fewer sick building syndrome symptoms than occupants of air-conditioned offices” (Al horr *et al.,* 2016, p. 4).

“Architects and designers can select materials that do not produce irritating odor or VOCs.” (Al horr *et al.,* 2016, p. 8).