A Modeling of Occupational Therapy Room Prototypes for Mental Disorders

Brigitha Priskila Watuseke[1]
[1] PT. Vastu Cipta Persada, Jl. HOS Cokroaminoto No.225, Tegalrejo, Kec. Tegalrejo, Kota Yogyakarta, Daerah Istimewa Yogyakarta 55244

Article Info

ABSTRACT

People with Mental Disorders (ODGJ) are less likely to recover completely. Still, there is a chance to recover and return to their normal activities Therapy that can make people with mental disorders carry out activities like ordinary people is occupational therapy. However, Indonesia still needs to offer an occupational therapy room design that can support the therapeutic process. This research developed an occupational therapy room modeling that can help the recovery process of people with a mental health condition with a neuroarchitecture approach through a 360o panoramic illustration. This research collects data from reliable sources regarding people with mental disorders, health workers, occupational therapy, neuroarchitecture, and theories regarding visual, texture, thermal, aroma, and audial. After that, space exploration is carried out based on ergonomics and considers the patient's senses. Based on the analysis results, it produces several rooms: outdoor areas, individual therapy rooms, group therapy rooms, entertainment rooms, work rooms, and toilets. The illustration of space modeling shows the use of interior elements such as the dominant color of the space, green and blue, the placement of high ceilings in the room that accommodates creative activities, and the low ceiling for the room accommodates privacy activities. In addition, space modeling also shows the type and placement of the furniture in every kind of space. Doctors or health experts can consider this modeling when making interior design guidelines for occupational therapy rooms.

Corresponding Author:

Brigitha Priskila Watuseke,
PT. Vastu Cipta Persada, Jl. HOS Cokroaminoto No.225, Tegalrejo,
Kec. Tegalrejo, Kota Yogyakarta, Daerah Istimewa Yogyakarta 55244
Email: brigithapriskila@gmail.com

1. INTRODUCTION

Mental disorders are one of the diseases that have the highest percentage of YLDs (living with disabilities) compared to other types of diseases. In Indonesia, the most significant contributor to disease burden (DALYs) and current cause of death is cardiovascular disease, as much as 26.4%. When viewed from the causes of disability (YLDs), the highest was due to mental disorders (13.4%) [1]. In Indonesia, based on the results of Health Research in 2018, it continues to increase. Psychiatric disorders are diseases with a slight chance of being completely cured because there is still a possibility of recurrence. The process of recovering from mental disorders can only be done by taking medicines from a doctor and carrying out routine therapy. The method of recovering from mental disorders makes it possible for patients to return to their normal activities in daily life.

Occupational therapy is the prominent and most effective therapy for patients to return to normal activities. Occupational therapy can train focus and concentration and control hallucinations experienced by patients with mental disorders so that they become calmer in carrying out activities. Psychiatric patients are

patients who are very sensitive to stimuli. Hospitals that do not pay attention to the placement of the therapy room and the use of space elements often cause patients to become distracted by the conditions around the room, thus making occupational therapy activities hampered and not optimal. The increasing number of patients with mental disorders also narrows many occupational therapy rooms in mental hospitals and are even used for various activities, so therapy becomes ineffective because therapy becomes more limited.

Based on neuroscience studies, an environment such as an interior space can impact human activity, even memory [2]. The science that deals with this is neuroarchitecture. Therefore, this research focuses on research into occupational therapy rooms in rehabilitation installations for mental disorders with a neuroarchitecture approach that can support recovery.

1.1. Health Workers

Occupational therapists teach a person how to manage their anxiety or hallucinations so that they do not interfere with their activities and work. As a result, occupational therapists can work to increase independence or interdependence. The goal will be determined by what the person wants. Patient-centered practice requires the occupational therapist to be able to process large amounts of information to select the most appropriate course of action with the individual within a given setting. Therefore, therapists must understand each patient's condition, so more is needed if one therapist supervises all patients in practice. The therapist also has a relaxed demeanor, always mingling and respecting patients. The process of occupational therapy services is as follows:
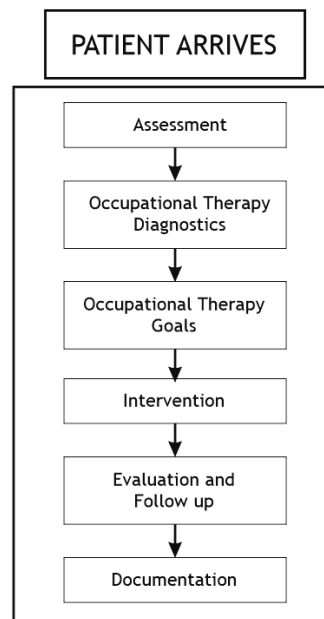
Figure 1. Occupational Therapy process
Source: Regulation of the Minister of Health of the Republic of Indonesia No.76/2014

1.2. Occupational Therapy

Occupational therapy is the most effective therapy in recovery [8]. Occupational therapy is fundamentally patient centered, meaning the occupational therapist does not impose their value system on the patient. Instead, through his skills and knowledge, they expose the patient to the possibilities of their external reality. The occupational therapy activities in mental rehabilitation include *physical activity, Cognitive, client-centered group, Creative Activity, play, Life Skills, Green Care, Work, and Vocational Pursuit* [9]. In occupational therapy, rhythmic physical activity, such as rowing or swimming, is used in symptom management to distract from hearing noises [10]. In addition, playing green sports improves mood and self-esteem, with individuals with mental health problems showing one of the most significant changes in self-esteem [11].

In occupational therapy, the therapist identifies the disorders experienced by the patient and then performs the initial stage of occupational therapy. After passing through this stage, it is necessary to evaluate the patient to see the patient's progress in recovery. If the patient is considered calm enough, then the patient can do occupational therapy according to the profession chosen by the patient. This stage is the preparatory stage for leaving the rehabilitation.

1.3.   Neuroarchitecture

Neuroarchitecture combines two different disciplines, namely neuroscience and architecture. In neuroarchitecture, designing an efficient environment is not only based on legal, ergonomic, and environmental comfort parameters but also subjective indices such as emotion, happiness, and well-being [12]. How to apply neuroscience in various forms of space through the design process and determine the main principles of neuro-interior design through the following table [2]:

Table 1. Application of Neuroscience in interior space
Source: [2]

Principles	Stimulus		Impact On Human Experience
1-Planning and navigation	Clear planning		Find the way. Form a mental map of interior spaces.
	Hidden planning		Excite learning and exploration.
2-Inriched interior spaces	Form	Symmetric shapes	Feel satisfy and aesthetic response
		Curved line	Feel safety and pleasing (from low expertise)
		Complex polygons	Aesthetic preference (from experts)
		High ceiling	Encourage creativity
		Low ceiling	Strength concentrating
	Material	Rich expression of materiality (sense of touch)	Emotional connection to the space
	Color	Brightness colors	Strength the mental map. Stimulates the memory. Attract attention.
		Neutral colors	less attention
	Light	Natural light	Stimulate higher cognitive brain activity. Effect mood.
		Red light	Stimulate relaxation.
		Bright white light	Stimulate activity.
3-Natural features	Connection with nature		Improve mood Enhance working memory, Improve focus Accelerate recovery from stress and surgery Stimulate learning abilities.
	water		Meditation and relaxation. Evokes feelings of delight and serenity.

1.3.1. Visual

According to the Oxford Dictionary, the sense of sight (eyes) captures something visually. Visuals relate to color, lighting, and shape. Color is one of the visual stimuli that have a significant impact on user psychology [13]. Effects of colors like red, orange, and yellow can create a warm, supportive, happy, and stimulating mood. On the other hand, the cool color group, namely green to blue, can have a psychological effect, which can provide calm and a sense of peace, while purple can have an unfortunate impact. White color gives a clean impression, open and also bright, while black gives the impression of being heavy, formal, and less pleasant [14]. Research explains the correlation of color with individual personality, where healthy people positively correlate with green because it is associated with economy, material comfort, and

protection. Meanwhile, patients with schizophrenia have a positive correlation with black and brown, which are associated with comorbid depression, dull negative emotions, or others [15].

Natural lighting is a source of light that comes from sunlight. Sunlight has many advantages; besides saving electricity, it can also kill germs. But sunlight can generate heat, especially during the day [16]. Research proves that patients with higher light intensity experience less stress and pain and only need 22% fewer pain relievers than patients whose rooms are in shaded areas or where the sun's intensity is less [17]. Textures can also be seen visually, such as the shape of the patterns applied to an element. For example, tight vertical patterns can add to the room's atmosphere to make it look taller [18].

1.3.2. Thermal & Odour

In achieving thermal comfort, it is necessary to consider the room temperature so that it is not too cold or hot. In reaching this comfort, we can take advantage of natural ventilation in the room. Natural ventilation is the supply of outdoor air into a room. Ventilation primarily controls indoor air quality by diluting and displacing indoor pollutants. Moreover, vents can also be used to control indoor temperature, humidity, and air movement for thermal comfort, satisfaction with other aspects of the indoor environment, or other purposes. Natural lighting is a source of light that comes from sunlight. Sunlight has many advantages. Besides being able to save electricity, it can also kill germs. But sunlight can generate heat, especially during the day [16]. Research proves that patients under higher light intensity experience less stress and pain and only need 22% fewer pain relievers than patients whose rooms are in shady areas or where the sun's intensity is less [17].

Human behavior is greatly influenced by smell. Environmental odors can trigger specific memories and emotions, control the activation of the autonomic nervous system, shape perceptions of stress and affect, and precipitate approach and avoidance behaviors [19]. To help reduce claustrophobia and tension, the MRI facility introduced vanilla. Scents of lemon, cinnamon, and vanilla can also uplift the mood. Fragrant lavender and cedar can relieve anxiety. Orange, vanilla, cypress, and flowers (jasmine, hyacinth, rose, and lavender also have a calming effect. The jasmine's smell can make you sleep better. Peppermint, lemon, basil leaves, Patchouli, and grapefruit, can provide energy. The scent of cinnamon and vanilla can increase the level of creativity. Rosemary can improve memory [20]. Yuzu can also reduce harmful emotional stress levels [21]. Some exposure to aromas can also affect people of different sexes. In one study, the smell of roses negatively affected men, while for women, it had a positive effect [22]. So, the scent also needs to be considered.

1.3.3. Audial

Sound is a mechanical wave. Based on the definition of perception, sound is a listening experience [23], where sound perception depends on sound properties, including frequency, sound level, and room placement. The auditory scene is a collection of sound sources from various environmental locations. In some studies, indoor silence can guarantee human concentration. In several studies, indoor silence can ensure human engagement. It can also reduce stress and tension. But in several studies, music can be used as therapy for people with schizophrenia [24]. Music is another way to get positive and negative emotions [25]. Music is also effectively used as a therapy to reduce violent behavior in schizophrenic patients [26]. So, music also needs to be considered in the occupational therapy process as therapeutic music and as a background sound.

1.3.4. Texture

The texture is a surface or substance's feel, appearance, or consistency [27]. For example, surface texture is the physical texture of a surface that looks like hills and valleys. The texture is also related to the material. According to DK CHING, Texture is a game of shape and color that describes a material's surface quality characteristics. A texture can be seen and felt to get psychological comfort. The texture does not provide psychological comfort because it must be understood and felt. Only then can we feel the comfort created by texture. But without the play of color in texture, it cannot provide psychological comfort. Therefore, the texture and color are very influential.

2. RESEARCH METHOD

The method used consists of several stages. First, a literature data search was conducted at the

beginning of the research process, followed by a library study and bibliometric analysis. The research concluded with a prototype exploration stage and technological implementation.

2.1.   Literature Data Search

The data collected are data from trusted official sources, observation data as support, and data from interviews with health workers who are directly involved in the mental occupational therapy process.

2.2.   Library Study

Data collection comes from trusted sources such as articles, books, journals, and government regulations. Searching for these data is assisted by using the Publish or Perish software. These data range from theories about people with mental disorders, health workers, occupational therapy, and neuroarchitecture to views about visual, textural, thermal, aroma, and audial. For example, the literature review aims to identify and find general and specific criteria for occupational therapy rooms that support the occupational therapy process.

2.3.   Bibliometric analysis

Before conducting research, it is necessary to perform a bibliometric analysis and an analytical study of a scientific work or publication. The trick is to use evaluative and descriptive methods. The aim is to find mapping and regularity of the researcher toward the issues that follow the research or the field. A collection of journals from 2011-now related to psychosis, occupational therapy rooms, and neural architecture is the basis for making visualizations with the VOS viewer software. In the existing diagram, color functions to divide clusters. The size of the circle determines the importance of the components. This diagram shows a correlation between neuroscience, architecture, and mental health. So, this research can continue.

Figure 2. Analysis Diagram with VOSviewer Based on Clusters

2.4.   Prototype Exploration

According to the results of the interviews, one of the problems in occupational therapy is limited space and improper placement of space so that patients experience distraction due to other activities in the surrounding room. Therefore, space exploration is needed by carrying out two stages based on ergonomic analysis and developed with a neuroarchitecture approach by paying attention to the senses of mental patients and health workers based on obtaining data from reliable sources.

2.5.   Technology

Technology serves to create illustrations for modeling occupational therapy rooms whose gains come from space exploration. The technology used is Sketchup software for 3D modeling, then uses Enscape to process the 3D modeling to become more realistic with 360° illustrations or VR. Here we explain research chronologically, including research design, research procedure (in the form of algorithms, Pseudocode, or other), how to test, and data acquisition [1-3]. References should support the description of the course of research so that the explanation can be accepted scientifically [2, 4].

3.   RESULTS AND DISCUSSION

3.1.   Ergonomics

The occupational therapy room must be able to accommodate all the activities of patients and nurses in carrying out occupational therapy optimally. In addition, the body posture and gait of mental disorder patients that are different from normal humans [28] make specific room dimensions different from usual human room standards.

3.2.   Activity Analysis

There are two categories of division of people in the occupational therapy process, namely:

1. **Patients with Psychiatric Disorders**
    - Patient A: A Patient before evaluation who is not calm enough and tends to hallucinate.
    - Patient B: A patient who has passed the evaluation and is calm enough to do activities. (3-4 people/work)

2. **Health workers (Therapist)**
    - Therapist A: Nurses as therapists (2-3 patients/therapist)
    - Therapist B: Therapist with occupational specialty (1-2 therapists/occupation)

Table 2. Patient Activity Analysis

Subject	Activities	Room Requirements	Information
Patient A	- Come - Gymnastics - Back to activities outside - Come - Group therapy (sharing) / individual therapy - Writing / Painting / Singing / Playing - Display creations. - Evaluation - Washing hands - Return to their respective rooms.	- Individual therapy room - Group Therapy Room (Indoor) - Group therapy area (Outdoor) - Karaoke Room - Showroom - Toilet	Group and individual therapy alternated every day. Writing, painting, singing, and playing therapy are also carried out alternately according to the therapist's plan. Carrying out evaluations on a particular schedule by the therapy schedule.
Patient B	- Come - Group therapy (sharing) - Individual therapy - Occupational Therapy (Gardening / Sewing or knitting / Cooking / Crafting) - Get back to work. - Washing hands - Return to their respective rooms.	- Group Therapy Room (Indoor) - Group therapy area (Outdoor) - garden area - Sewing room - Craft Room - Kitchen - Toilet	Group and individual therapy alternated every day. Occupational therapy is carried out according to the patient's choice at the beginning.

From the user activity analysis results above, there are two areas needed in occupational therapy: Outdoor and Indoor. The outdoor area is in the form of a green area and courtyard (outdoor therapy area), while the indoor space is in the form of individual therapy rooms, group therapy rooms, entertainment rooms, sewing rooms, and handicraft rooms. Based on the type of patient, there is also a division of

occupational therapy rooms, namely group therapy rooms and occupational therapy rooms. Psychotic patients undergoing early-stage occupational therapy use group therapy rooms. The occupational therapy room is a place of treatment for patients who have passed the evaluation stage and are considered calm enough.

Table 3. Therapist Activity Analysis

Subject	Activities	Room Requirements	Information
Therapist A	- Come - Directing Patients - Counseling individual patients / Leading group therapy - Directing patients in therapy (Writing / Painting / Singing / Playing) - Directing Patients - Record patient progress - Back to work	- Individual therapy room - Group Therapy Room (Indoor) - Karaoke Room - Group therapy area (Outdoor) - Showroom - Toilet	Giving consultations to individual patients and leading group therapy are carried out alternately daily.
Therapist B	- Come - Directing Patients - Supervising patients (Gardening / Sewing or knitting / Cooking / Handicrafts) - Directing Patients - Washing hands - Go home	- Garden Area - Sewing Room - Craft Room - Kitchen - Toilet	Supervise patients according to their respective fields.

3.3. Occupational Therapy Room Prototypes

3.3.1. Green Area

It is necessary to provide a green area in a mental hospital. The green area is an area for occupational therapy, such as gardening or farming for people with a mental health condition. The green area can also be used as a view for several spaces around it because the atmosphere can provide calm. As a recommendation, the green area is placed close to the occupational therapy area and not close to the main road. The aim is to maximize its function. A shady area is needed to rest in a green area.

3.3.2. Courtyard & Sports Area

The yard is an area for patients to exercise in gymnastics, yoga, and other sports. Therefore, the site must be able to load all patients in sports such as gymnastics. In addition, preparing an area for patients to jog within the mental hospital area is also necessary.

3.3.3. Individual Therapy Room

It is a room for patients to do face-to-face therapy with a therapist. The right advice is to use a low ceiling height, about 2.5 meters from the floor. The only furniture needed are chairs for patients and therapists, such as sofas and tables. There is no need to add too much decoration so as not to distract the patient's focus. If we want to use decoration, we can look for abstract decorations.

For lighting, it is preferable to use natural lighting because it can also provide many benefits for users besides saving electricity usage. Therefore, we should not place windows under direct sunlight, or we can also use window blinds so that they don't glare on the room. It is also necessary to pay attention to the placement of furniture, such as chairs, so that they do not face the window and do not interfere with the patient's focus in individual therapy. Artificial lighting is needed to light the room if the weather is not good. The right advice is to use bright enough lighting. The lighting used is adjusted to the room's function that requires privacy, namely by using overhead lights (ceiling) at low heights with warm tones.

We should avoid dark colors like black and brown when using color for space elements. The use of bright colors for space elements is the right suggestion. Using color on the room's walls is recommended to use light blue. For the floor of the room, it is advisable to use a carpet to give a calming effect during therapy. After the treatment, the staff must clean the rug so that dust does not accumulate on the mat.

For individual therapy room ventilation, it is advisable to use artificial ventilation during the therapy process to increase privacy in the room so that patients become more open to the therapist. However, natural ventilation must also be applied to remove odors and replace the air in the room with fresh air. Therefore, it takes a living window in the room. The right suggestion is to use a diffuser for aromatherapy to increase the comfort of the therapist and the patient. Additionally, speakers are needed for individual therapy rooms to play background music during the therapy process. The right suggestion is to play music with simple harmonies and easy-to-guess rhythms for a calming effect.
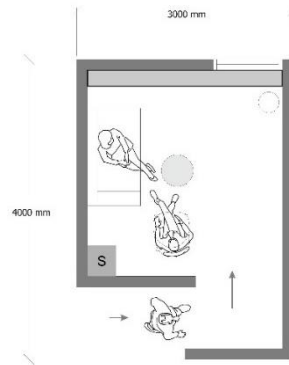
Figure 3. Analysis of subject's Ergonomic Efficiency (Individual Therapy room)
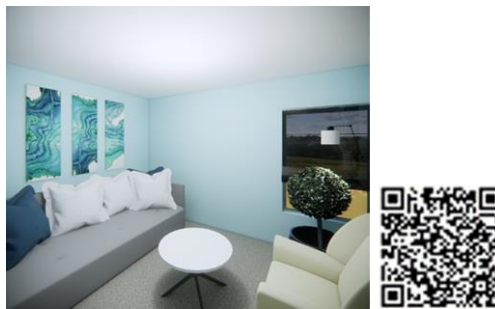
Figure 4. Modeling of Individual Therapy Room Prototype

3.3.4. Group Therapy Room and Showroom

The group therapy room and showroom are used by patients still in the early stages of therapy, so the patients are still not calm enough. The patient's comfort is the main thing in this room, so patients become calmer while doing the treatment. Based on the ergonomics analysis, the group therapy room only needs enough space to carry out therapy activities such as writing, painting, and making handicrafts. This room is also a showroom for patient creative results. It takes a table and a kneeling chair with a back and set at + 20° for therapies such as writing, painting, making crafts, and improving the posture of patients who tend to slouch.
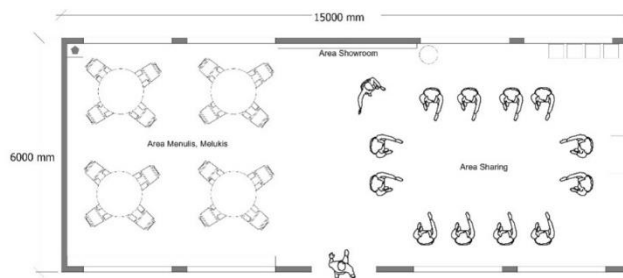

Figure 5. Analysis of subject's Ergonomic Efficiency (Group Therapy room and Showroom)

In considering neuroarchitecture analysis, the occupational therapy room needs to be wider than the ergonomic analysis results to stimulate the patient's creativity in therapy. In group therapy rooms, ceilings are high (higher than individual therapy rooms), about 3 meters or more. For room lighting using natural lighting, many openings, such as windows, are needed to maximize lighting in space. Artificial lighting in a room requires bright, diffused light from the ceiling. Artificial lighting is an alternative if sunlight is possibly less than room lighting (for example, when the weather is not good or cloudy). In a group therapy room, use pastel green on the walls to relax the patient. For space ventilation, by applying cross ventilation. Speakers are also needed as music players during the therapy process to reduce the patient's auditory hallucinations and add a relaxing effect for both the patient and the therapist. The floor in the therapy room is covered with carpet to give a warm effect to the feet, adding peace to the patient. A diffuser is needed to provide aromatherapy to the room to support the therapist's therapeutic process. In addition, using a diffuser can add to the mood of the therapist, making it more comfortable to carry out the therapy process.

Figure 6. Modeling of Group Therapy Room Prototype

3.3.5. Karaoke Room

The karaoke room can be used for activities that produce sound, such as singing (karaoke) and playing music. The placement of the room is not adjacent to a room that requires quiet, such as individual therapy rooms and occupational therapy. This room involves furniture in the form of chairs made of cloth, a TV to display song lyrics while singing, and speakers to play music. Placing a chair in the living room facing the TV.
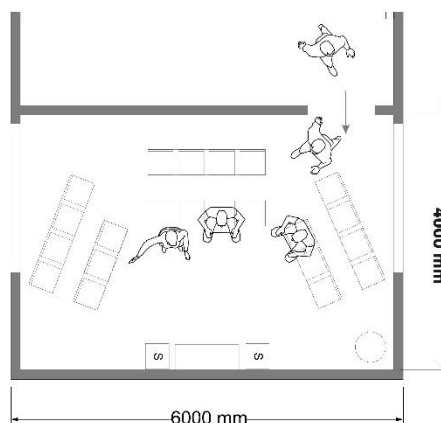

Figure 7. Analysis of subject's Ergonomic Efficiency (Karaoke Room) Source: Author
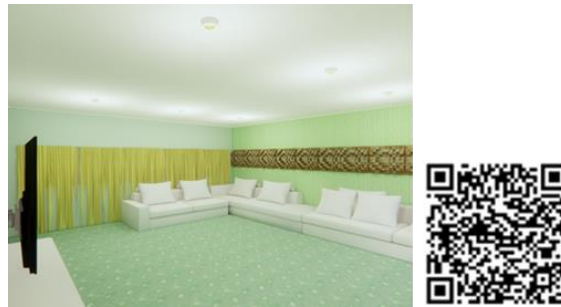
Figure 8. Modeling of Karaoke Room Prototype

The karaoke room takes advantage of natural lighting and natural ventilation (cross ventilation). It can use artificial light as an alternative if sunlight is not possible. The walls are given a pastel green color, as in the group therapy room, to provide a calming effect. Because it uses natural ventilation, the sound from the room can be heard outside the room. Therefore, the location of the karaoke room must be far from individual therapy rooms and occupational therapy rooms and close to parks or gardens with lots of vegetation because it can reduce noise. Space elements, such as floors and chairs, can utilize fabric materials to absorb a little sound and provide a calming effect on patients.

3.3.6. Occupational Therapy Room

The occupational therapy room consists of a sewing room and a handicraft room. These rooms are therapy places for patients who have calmed down enough to prepare themselves before returning to normal life. Based on the results of the ergonomics analysis, the room standard can be used for sewing processes and making handicrafts. It contains furniture used in sewing rooms and handicraft rooms, such as chairs, traditional sewing machines, tables for sewing without tools, storage cabinets for sewing rooms and such as tables, and storage cabinets in handicraft rooms.
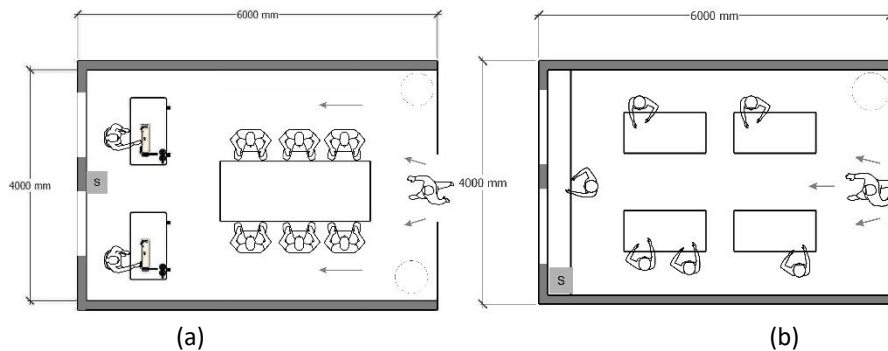

(a)   (b)

Figure 9. Analysis of subject's Ergonomic Efficiency (Occupational Therapy Room)
(a) Sewing room, (b) Handicraft room

Figure 10. Modeling of Occupational Therapy Room Prototype

Based on the results of the neuroarchitecture analysis, the room must be able to increase the quality of the therapy process. Its implementation is by raising the ceiling (3 meters or more) to increase the patient's creativity. The use of color in the elements of space also needs attention. Walls use pastel green with some other features or decorations in warm colors like orange or yellow to increase feelings of happiness. The occupational therapy room uses natural lighting as the main light. If the sun is not possible, then the alternative is to use artificial light with bright lights that can provide visual clarity. In providing thermal comfort, you can take advantage of natural ventilation by applying cross ventilation so that the air in the room continues to change and can minimize unpleasant odors. Speakers are needed in the occupational therapy room to increase patients' enthusiasm for doing therapy. The music played in the occupational therapy room has simple harmonies, predictable rhythms, and fast beats. In the sewing room, we can use ceramic floor material because it can increase enthusiasm and eliminate sleepiness.

3.3.7. Toilet

Toilets must be easily accessible from all occupational therapy rooms without the need to go through certain rooms.

4. CONCLUSION

Based on the analysis and discussion results, the conclusion is that the occupational therapy room divides the room into several types. Those are the Garden Area, Sports Area, Individual Therapy Room, group therapy room, karaoke room, occupational therapy room, occupational therapy room, occupational therapy room, occupational therapy room, and toilets. To make it more optimal, you need to pay attention to the dimensions and placement of the room, visual, thermal, odor, audial, and texture of the room elements.

In every activity in the therapy room, each therapist supervises 2-3 patients. The results of this study can be considered by doctors or health experts in making interior design guidelines for mental occupational therapy rooms for health facilities in Indonesia, especially mental hospitals. Architects can also view this research in designing occupational therapy rooms in mental hospitals. Empirical testing is needed to validate the research results. The occupational therapy room prototype is a good solution for health facilities that accommodate patients with mental disorders.

REFERENCES

[1] PUSAT DATA DAN INFORMASI KEMENTERIAN KESEHATAN RI, *Info Datin Kesehatan Jiwa*. 2019.

[2] A. Maha Mahmoud Ibrahim, "The Integration of Interior Design and Neuroscience: مجلة ال العدد رابع عشر والفنون العمارة Towards a Methodology to Apply Neuroscience in Interior Spaces", doi: 10.12816/mjaf.2019.25813

[3] P. Rumah *et al.*, "The Role of Mahogany Mental Hospital in Restoring the Social Functions of Ex People with MentalDisorders," 2020. [Online]. Available: http://jurnal.umsu.ac.id/index.php/JISP

[4] F. Rinawati *et al.*, "ANALISA FAKTOR-FAKTOR PENYEBAB GANGGUAN JIWA MENGGUNAKAN PENDEKATAN MODELADAPTASI STRES STUART," *Jurnal Ilmu Kesehatan*, vol. 5, no. 1, 2016.

[5] S. Gunarsa and dkk, *Psikologi Olahraga Teori Dan Praktik*. Jakarta: PT. BPK Gunung Mulia, 1998.

[6] M. P. Drs. Kuntjojo, "PSIKOLOGI ABNORMAL," 2009.

[7] J. Smucny, D. C. Rojas, L. C. Eichman, and J. R. Tregellas, "Neural Effects of Auditory Distraction on Visual Attentionin Schizophrenia," *PLoS One*, vol. 8, no. 4, Apr. 2013, doi: 10.1371/JOURNAL.PONE.0060606.

[8] M. Kohn, D. Hitch, and K. Stagnitti, "Better Access to Mental Health program: Influence of mental health occupational therapy," *Aust Occup Ther J*, vol. 59, no. 6, pp. 437–444, Dec. 2012, doi: https://doi.org/10.1111/1440-1630.12005.

[9] J. McQueen, "Creek's occupational therapy and mental health, 5th edition," *British Journal of Occupational Therapy*, vol. 77, p. 634, 2014, [Online]. Available: https://link.gale.com/apps/doc/A394685519/AONE?u=googlescholar&sid=bookmark-AONE&xid=7bdb6af7

[10] K. Wright, T. Armstrong, A. Taylor, and S. Dean, "'It's a double edged sword': A qualitative analysis of the experiences of exercise amongst people with Bipolar Disorder," *J Affect Disord*, vol. 136, no. 3, pp. 634–642, 2012, doi: https://doi.org/10.1016/j.jad.2011.10.017.

[11] J. Barton and J. Pretty, "What is the Best Dose of Nature and Green Exercise for Improving Mental Health? A

Multi-Study Analysis," *Environ Sci Technol*, vol. 44, no. 10, pp. 3947–3955, May 2010, doi: 10.1021/es903183r.

[12] M. Matoso, "Neuroarchitecture: How Your Brain Responds to Different Spaces," May 26, 2022.

[13] I. H. Marysa and A. W. Anggraita, "Studi Pengaruh Warna pada Interior Terhadap Psikologis Penggunanya, Studi Kasus pada Unit Transfusi Darah Kota X," 2016. [Online]. Available: http://www.slideshare.net/AndhikaFrancisco/donor-darah-ppt

[14] F. Birren, *Colour Psychology and Colour Therapy.* . New York: University Book Inc., 1961.

[15] B. Tao, S. Xu, X. Pan, Q. Gao, and W. Wang, "Personality trait correlates of color preference in schizophrenia,"
Transl Neurosci, vol. 6, no. 1, pp. 174–178, Jul. 2015, doi: 10.1515/tnsci-2015-0018.

[16] P. Satwiko, *FISIKA BANGUNAN*. 2008.

[17] J. M. Walch, B. S. Rabin, R. Day, J. N. Williams, K. Choi, and J. D. Kang, "The Effect of Sunlight on Postoperative Analgesic Medication Use: A Prospective Study of Patients Undergoing Spinal Surgery," *Psychosom Med*, vol. 67, no. 1, 2005, [Online]. Available:https://journals.lww.com/psychosomaticmedicine/Fulltext/2005/01000/The_Effect_of_Sunlight_on_Postopera tive_Analgesic.22.aspx

[18] C. von Castell, H. Hecht, and D. Oberfeld, "Wall patterns influence the perception of interior space," *Quarterly Journal of Experimental Psychology*, vol. 73, no. 1, pp. 29–54, Sep. 2019, doi: 10.1177/1747021819876637.

[19] J. P. McGann, "Poor human olfaction is a 19th-century myth," *Science*, vol. 356, no. 6338. American Association for the Advancement of Science, May 12, 2017. doi: 10.1126/science.aam7263.

[20] "Place Advantage Applied Psychology for Interior Architecture (Sally Augustin, Neil Frankel, Cindy Coleman)(z-lib.org)".

[21] T. Matsumoto, H. Asakura, and T. Hayashi, "Effects of Olfactory Stimulation from the Fragrance of the Japanese Citrus Fruit Yuzu (Citrus junos Sieb. ex Tanaka) on Mood States and Salivary Chromogranin A as an Endocrinologic Stress Marker," *The Journal of Alternative and Complementary Medicine*, vol. 20, no. 6, pp. 500–506, Apr. 2014, doi: 10.1089/acm.2013.0425.

[22] A. Haehner, H. Maass, I. Croy, and T. Hummel, "Influence of room fragrance on attention, anxiety and mood,"
Flavour Fragr J, vol. 32, no. 1, pp. 24–28, Jan. 2017, doi: https://doi.org/10.1002/ffj.3339.

[23] B. Goldstein and L. Cacciamani, *Sensation and Perception*, 11th ed. Cengage Learning, 2021.

[24] Volpe U *et al.*, "Acute Effects of Music Therapy in Subjects With Psychosis During Inpatient Treatment. Psychiatry.," pp. 218–227, 2018, Accessed: Jul. 27, 2022. [Online]. Available: 10.1080/00332747.2018.1502559.

[25] S. Koelsch, "Brain correlates of music-evoked emotions," *Nature Reviews Neuroscience*, vol. 15, no. 3. pp. 170–180, Mar. 2014. doi: 10.1038/nrn3666.

[26] E. C. Sulistyowati, "PENGARUH TERAPI MUSIK TERHADAP PERUBAHAN PERILAKU PADA PASIEN SKIZOPRENIA DENGAN PERILAKU KEKERASAN DI RUMAH SAKIT JIWA DAERAH SURAKARTA," 2011, Accessed: Jul. 27, 2022. [Online]. Available: https://lib.ui.ac.id/file?file=digital/2016-11/124781-Endang%20Caturini%20Sulistyowati.pdf

[27] A. A. WICAKSONO and TISNAWATI ENDAH, *TEORI INTERIOR*. 2014.

[28] V. Presta *et al.*, "Posture and gait in the early course of schizophrenia," *PLoS One*, vol. 16, no. 1 January, Jan. 2021, doi: 10.1371/journal.pone.0245661.

BIOGRAPHIES OF AUTHORS

Brigitha Priskila Watuseke	Young architect and researcher at PT. Vastu Cipta Persada