MULTI SENSOR'S EMPECT IN PROMOTING THERAPEUTIC ENVIRONMENT EMOTIONAL CARENESS

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ABSTRACT
The purpose of this study was to explore the effect of mental wellness research-oriented spatial design on job performance in urban white-collar workers. The samples were 414 electronics and information manufacturing employees. The questionnaire was administered to collect the data, adopting purposive and convenient sampling methods. Structural equation modeling was employed for data analysis. The result indicated that the multi-sensor could significantly reveal the mental stress level, influencing working performance. This study concludes with setting the "multi-sensor rest room" to improve working performance among the employees in the organization. This research aims to examine the influence of multi-sensor-oriented on mental stress through interior and VR space design.
Keywords: Emotion Carenes, Multi Sensor, Ecology Interior

INTRODUCTION

Mental health has recently played an important role in driving the national economy and society's well-being, However, Mental health concerns in China are still in their nascent phase. There is a lack of independent mental health facilities and public gathering areas for relaxation. The healing space design can contribute to environmental restoration and therefore improve mental health. There are two visual interaction space restrictions, one relating to technology and the other to application. Collaboration among artists, scientists, and theoretical specialists is essential for exploring aesthetics, values, principles, methodologies, tools, applications, scenarios, economics, and industry-integrated development in order to ascertain the correct direction for the proposed project.

Indeed, the project of interior design discussed in this article was executed in Shanghai, China. Based on the findings, this study is expected to significantly enrich the existing knowledge on the implementation of virtual reality and multi-sensory engagement techniques in the development of therapeutic environments. The project's innovative design approach will lead to the establishment of state-of-the-art therapeutic spaces featuring advanced interactive virtual reality systems. This study will enhance our understanding of how specific components promote emotional wellbeing. It may serve as a blueprint for future initiatives aiming to foster emotional health in diverse contexts. Additionally, the research highlights the importance of the environment for individuals' emotional promotion, which may have positive social implications for those who benefit from it. To understand their role in promoting emotional well-being, examine the theoretical foundations and contemporary studies related to multisensory interaction, virtual reality, and therapeutic interior design.

This research aims to explore the theoretical foundations and existing research on multi-sensory interaction, virtual reality, and therapeutic environments to establish their role in promoting emotional wellness.

LITERATURE REVIEWS

Introduction to Emotional Wellness in Therapeutic Environments

Emotional wellbeing pertains to positive outlook, reliance, confidence, self-growth, self-assurance, and emotional expression. It is subject to influences from one's physical, intellectual, mental, social, and environmental health, thereby resulting in a fluctuation of one's emotional wellbeing. The study entitled "Daily Emotion Regulation and Emotional Well-being: A Replication and Extension in Egypt" highlights the correlation between emotion regulation (ER) strategies and emotional well-being (Eldesouky, 2023). It suggests that the most effective engagement strategies, including reappraisal, positive reframing, and acceptance, are associated with higher emotional well-being levels. Avoiding subjective evaluations and maintaining an objective tone, this study provides valuable insights into the importance of emotion regulation for achieving greater emotional well-being. Proper use of technical term abbreviations, logical flow of information, and consistent language throughout the text enhance its overall academic writing quality. Most aversive cognitive preservation strategies, such as rumination and venting, and specific disengagement strategies, such as suppression and denial, are associated with lower emotional well-being. Conversely, confronting emotions may have emotional benefits for Egyptians, while focusing on the negative or dodging emotions may have emotional drawbacks. Furthermore, resiliency traits pertinent to psychological well-being and successful ageing could alleviate the onset of depression and suicidal thoughts, and reduce depression severity in later life. (Emma O'Brien B. A, 2023)

Table 1 VR Technology Application

Type	Name	Year
VR Technology to improve experimental Memory	Guderian et al.	2015
VR Technology to improve experimental procedures	Rodriguez et al.	2015
VR Technology to improve experimental Emotions	Menezes et al.	2017
VR Technology for behavioral assessment	Rizzo group	2018

Source: Researcher (2023)

The interrelation between physical wellbeing and environmental health can be explained by the impact of the physiological environment on mental health and the living conditions' influence on overall physiological health. In Western thought, psychology focuses on the correlation between the spiritual aspect and the internal bodily environment. Alternatively, traditional Chinese medicinal principles posit that human sentiments are interconnected with bodily organs. Emotions are psychological processes that reflect the desires and requirements of the individual (Kleinginna & Kleinginna, 1981). They relate to people's behavioural reactions towards objective stimuli. Establishing a calming and pleasant therapeutic atmosphere is advantageous in regulating one's emotions. Emotions are conscious displays triggered by a particular stimulus or object. (Norman, 2005) A person's good mood induces greater cognitive flexibility, enabling them to solve complex problems. Conversely, when the brain experiences feelings of sadness and anxiety, cognitive function is impaired (Han, 2020). Emotional factors hold significant weight in numerous cases where perceptual knowledge outweighs rational analysis in decision-making (Norman, 2005). Positivity boosts participation and social enthusiasm (Xu, 2021). Accordingly, the following three hypotheses derived for this study:

H1: Therapeutic Environments influenced the Emotional Wellness.

The Relationship between Emotional Wellness and Therapeutic Environments

The use of virtual reality technology has broadened the scope of research in environmental psychology. It is imperative to maintain a high level of external validity and experimental control in environmental design. Additionally, one must consider the characteristics of immersion, interaction and imagination during the design process. Virtual environments can impact the human experience by creating a feeling of physical presence, which is perceived as "being there" in mediated settings (IJs Edelstein et al., 2000). A comprehensive examination of research findings indicates that treatment results for Post-Traumatic Stress Disorder (PTSD), Autism Spectrum Disorders (ASD), and other emotional wellbeing support programs can be positively influenced through research methods centred on olfaction as a variable in a multi-sensory VR exposure therapeutic program (Aiken & Berry, 2015). The environment is perceived through the information obtained from sensory systems. As most of this information is acquired through the eyes and ears, it is unsurprising that research in virtual reality (VR) systems has traditionally been focused on the development of audio and visual displays for the realistic presentation of three-dimensional images and surround sound. The role of visual, auditory, and haptic stimulation in VR systems has been well-established in literature (Rothbaum et al., 2001; Difede & Hoffman, 2002; Josman et al., 2008). In contrast it is considered essential (Chen, 2006). The sense of smell has played a relatively insignificant part in both research and applications of virtual reality (VR). In line with the section, The Promise of Virtual Reality, a standard VR environment has been constructed to enhance concentration and immersion during sessions. There is also a novel approach to help individuals suffering from Treatment-Resistant Post-Traumatic Stress Disorder (TR-PTSD) called the Multi-modular Motion-assisted Memory Desensitization and Reconsolidation (3MDR) intervention. Crucial for enhancing the validity of results, particularly for subtle interactions. A reliable psychophysiological relationship exists between olfaction, emotion and memory. Smell can

impact emotional states (Vermetten et al., 2007) and aid the recollection process (Larsson, 1997; Chu & Downes, 2000).

H2: Multisensory design-oriented influenced the working performance.

Relationship between Multisensory Design and Emotion

Virtual reality has been found to enhance presence, in-session attention, and facilitate memory retrieval. Personalization of this experience can be achieved through incorporation of multi-sensory inputs such as pictures and music. Although introduced a little over a decade ago to treat specific anxiety disorders, virtual reality (VR) is now increasingly being adopted to aid in the treatment of PTSD. In the treatment of phobias, virtual reality enables gradual and direct exposure to feared stimuli, including spiders (Powers, 2008; Shiban, 2015). The perception of presence is a complex and multi-dimensional experience that arises from the interplay of raw multi-sensory data and various cognitive functions. The term 'multi-sensory' refers to the involvement of all sense modalities, including vision, audition, touch, and even olfaction. Alongside the concept of presence, the notion of self-presence is also a relevant consideration. (Aiken & Berry, 2015) Although haptic feedback may be useful in some scenarios, it is essential to comprehend eye gaze and physiological responses when recognizing emotions because both have been proven to provide crucial information about the emotion recognition procedure (Liu, 2008; Ruble, 2007). Virtual reality environments are advantageous for children with ASD because they have the capability to replicate real-life experiences in a secure and monitored setting (Parsons, 2011; Josman, 2011). The use of VR-based systems in ASD intervention provides numerous benefits such as controlled stimulus presentation, unbiased and predictable conditions, and gaming features that encourage task completion.

H3: Therapeutic Environments influenced the Emotional Wellness.

Relevant Research Within The Country And Abroad

VR technology can serve as a reliable and efficient tool for inducing emotional arousal. By simulating real-life situations that are typically inaccessible, dangerous, or difficult to control, it is possible to awaken various emotions among subjects in a laboratory setting. This approach enhances the feasibility and ecological validity of experiments in a more cost-effective manner. Traditional treatments for Post-Traumatic Stress Disorder utilise imagery techniques, on-site therapy, and interoceptive stimuli delivery. Conversely, VR therapy can generate computer-simulated sensory experiences associated with past traumatic events (Motraghi et al., 2014), creating the sensation of returning to the scene of the trauma. VR technology has been used in a variety of psychological research fields and has gained significant attention in the intersection between psychology and advanced technology in recent years. The future vision for VR technology aims to reduce user discomfort, enhance their experience of presence, simplify device operation, provide more reliable evidence regarding its reliability and validity, and integrate VR assessment and treatment with other cutting-edge technologies. (Zhang, Lian & Xu, 2020).
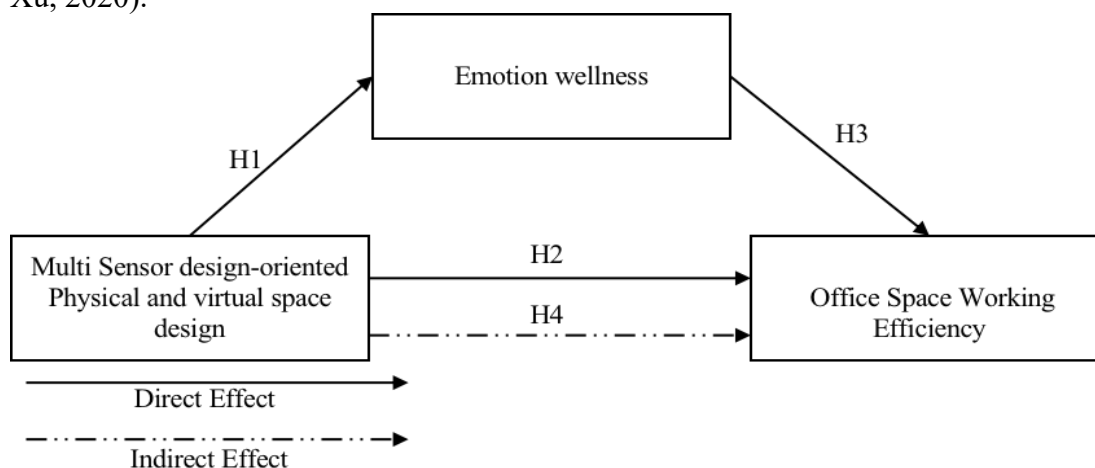
Figure 1 Conceptual framework

RESEARCH METHODOLOGY

This study employs a mixed approach study method. The quantitative research involves a sample of 414 individuals, comprising white-collar workers aged between 24 till 27 years old. Stratified random sampling was utilized to collect data on critical variables, and Excel software was used for subsequent analyses. The qualitative research portion will utilize small group interviews (two individuals, four groups) and focused discussions (four people) to obtain in-depth information. The key interviewees will comprise proficient experts, nearby blue-collar workers, and designers. Employ a triple judgment sampling approach. Subsequently, the correlation between emotions and sensory experiences, such as sight, sound, and smell, will be examined to enhance interior space comfort. The design procedure will commence from conventional interior space and progress into interactive design. Qualitative research method: Participation and observation, In-depth interview, Focus group discussion, small group discussion. This research is based on "The results of the result Questionnaire about the Multi senses application in stress reduction meditation space in Shanghai area". Through literature review, questionnaires, interviews, and other forms, on-site research and focus group interview were used for the current situation of emotional wellness in the Shanghai area. In-depth interviews were conducted on the site information, interior design, and vital elements of traditional emotional wellness on the current situation of traditional interior design.

Regarding the quantitative research, the researchers' research and analysis steps are as follows: firstly, conduct qualitative design research, and then complete quantitative design verification. Secondly, establish a model of three cultural space renewals in Shanghai based on a multi-sensory interaction system, collecting data on the positive benefits of five sense designs used in environmental design, such as sight, hearing, and smell. Later, gather information on the mental wellbeing of white-collar workers through literature review, interviews, questionnaires, and other means. Develop a primary database of the current situation. Ultimately, this study gathered primary data on traditional emotional wellness design in Shanghai. It then used this data to develop a guide for emotional wellness interior design, covering both physical building design and virtual reality space design. The researchers employed Arduino technology to produce a visual representation of emotional language. The study also identified and analysed emotional factors and user needs and visualized the research data digitally.

RESEARCH RESULTS

Most respondents were female, comprising 57.25% of the total (237 individuals), while male respondents made up 42.86% (177 individuals). In terms of age range, the highest proportion consisted of people aged 24-27, totaling 61.11% (or 254 individuals). Those aged 25-26 had the highest percentage at 28.98% (or 120 individuals), followed by those aged 21-24 at 14.98% (or 62 individuals). The proportion of individuals aged 30-33 and 27-30 was 5.56% (or 23 individuals) and 15.22% (or 63 individuals), respectively, which is relatively small. The proportion of individuals younger than 21 years and older than 33 years was 2.17% (or nine individuals) and 0.97% (or three individuals), respectively. Concerning the place of residence, we can make the subsequent conclusions: 51 individuals (representing 12.32% of respondents) elected the Pudong area of Shanghai as their primary workplace. Shanghai Puxi was cited as the primary workplace of 140 people (33.82%), while 152 individuals (36.71%) selected Shanghai and surrounding cities as their primary workplace. Additionally, 65 people (or 15.7%) chose Shanghai and overseas as their primary place of work. The remaining respondents (1.45%) opted for other locations as their primary workplace.

Regarding work pressure, 83 individuals (or 20.05%) perceived the level of work pressure as high, while 142 individuals (or 34.3%) perceived it as very high. Additionally, 105 individuals (or 25.36%) perceived the work pressure as high but manageable, whereas 53 individuals (or 12.8%) rated it as average. Finally, 31 individuals (7.49%) reported no work pressure and found their work to be straightforward. In summary, most individuals (79.71%) experience a certain level of work pressure, with a significant proportion (54.35%) expressing that they feel it. In

contrast, 25.36% stated that they could cope with this pressure. Only a small minority (20.49%) reported low or no job stress.

The study on VR restroom design indicated that the two main factors of interest were vision and hearing in terms of synesthesia design space. The language was objective, formal, and free from errors and filler words. Quotations were clearly marked and citation and footnote styles were consistent throughout the text. The combination of visual and auditory VR (Sight et al.) was favored by 31.4% of respondents, followed closely by the combination of visual and VR technology (Sight VR) at 29.47%. Smell was the third most significant factor, attracting the interest of 24.15% of respondents. Technical terms were explained when initially introduced and sentences were clear and concise to reflect a logical flow of information. The combination of Vision, Hearing, and Olfaction (Vision et al.) holds particular allure in synaesthetic design spaces; Touch and temperature sensations are comparatively less captivating in such spaces. In summary, the aspects that garner most interest in synaesthetic design spaces are sight and sound. In summary, the aspects that garner most interest in synaesthetic design spaces are sight and sound. Vision, Hearing, Olfaction and Touch VR attracted 8.7% of individuals, while Vision, Hearing, Olfaction, Touch and Temperature VR drew only 6.28%. In summary, the aspects that garner most interest in synaesthetic design spaces are sight and sound. Based on prior literature research and responses to a questionnaire regarding colour, material, and spatial form, a particular design has been proposed.

The sample size of this study was 414 people, the Satisfaction survey topic number of projects was 10, and the coefficient of Cronbach.α was 0.917. Cronbach.α coefficient is a common internal consistency test index used to evaluate the reliability of measurement tools. The coefficient is usually between 0 and 1, with the closer to 1 the more reliable the measuring tool. In this study, the coefficient of Cronbach.α is as high as 0.917, indicating that the measurement tool has high reliability. Therefore, it can be considered that this measurement tool is effective in this sample and can be used for subsequent data analysis and research.
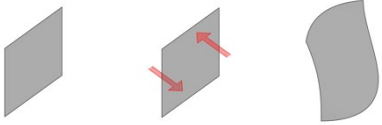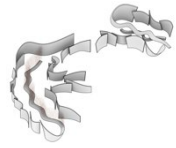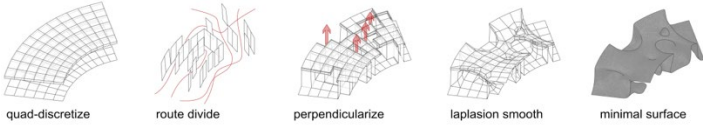
Table 4 Result about the satisfaction survey
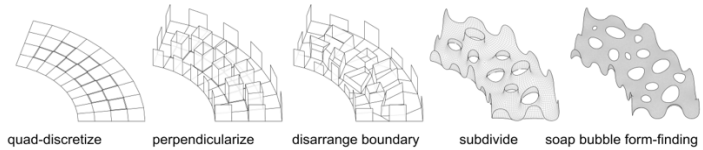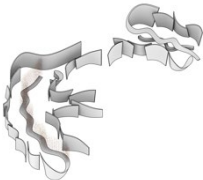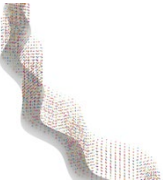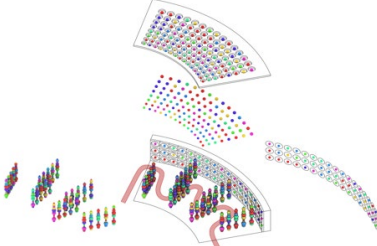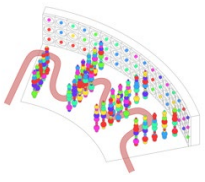
Sample	Average	S.D	Average
414	Healing Feeling	0.95	3.81
414	Color Preference	1.14	3.85
414	Interaction	1.25	3.83
414	Interactive Device	1.08	4.08
414	Comfortable	0.99	3.96
414	Operation	0.89	3.84
414	Stress Reduction Effect	1.0	4.05
414	Sense Of Security	0.94	3.83
414	Plant Healing Effect	1.15	3.84
414	lighting design	0.88	3.84

Source: Researcher (2022) * $p<0.05$ ** $p<0.01$

According to the survey, color is the area that requires the most improvement, with 38.16% (or 158 people) indicating so. This may indicate that participants considered the color choices in design to have potential for growth. Material is the second area for improvement, with 23.19% (or 96 people) of respondents suggesting that there is still room for improvement in material selection in design. Space layout and movement planning, which account for 18.84% (or 78 individuals) and 12.8% (or 53 individuals) respectively, are also identified as areas requiring improvement. This suggests that survey respondents perceive shortcomings in the organization and arrangement of space, as well as in the planning of movement, within the design. On the other hand, scale is the least identified area, with only 7% (or 29 individuals). This may indicate
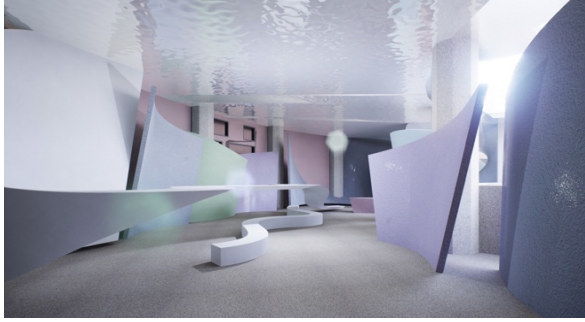
that respondents are content with the current scale and perceive small room for improvement within the design. In conclusion, based on the feedback of the participants, the areas requiring the most improvement are color and material, while there is also potential for enhancement in space layout and moving line planning. Scaling improvements are deemed relatively unnecessary. The evaluation scores of the participants for this design are distributed as follows: 1 score receives 59 individuals (equivalent to 14.25%), two scores receive 101 individuals (equal to 24.4%) of the proportion, three scores receive 147 individuals (equivalent to 35.51%) of the proportion, four scores receive 79 individuals (equivalent to 19.08%), and five scores receive 28 individuals (equivalent to 6.76%).

Table 2 Virtual Reality Space Design of the Building

Functional Area	Design Process		Axonometric View
Step 1			
Step 2	quad-discretize · route divide · perpendicularize · laplasion smooth · minimal surface		
Step 3	quad-discretize · perpendicularize · disarrange boundary · subdivide · soap bubble form-finding		
Step 4			
Rest room 1			

Source: Author (2023)

Table 3 VR Rest Space Renderings

Location	Time	Renderings	Key Word
Rest Room 1	2023 1F		Virtual Reality
Rest Room 1	2023 1F		Virtual reality
Rest Room 2	2023 2F		Virtual reality

Source: Author (2023)

DISCUSSION & CONCLUSION

The Multi-Sensor design aims to offer a public healing space within the office building, based on environmental psychology, to alleviate emotions experienced by office workers. The project includes three public areas: the entrance courtyard, the central space, and the lecture area. These three parts facilitate group communication and diminish the feeling of solitude. Environmental psychology research suggests that the design of the overall office space should extract factors that positively influence individuals through light, color, material, vegetation, sound, and play, generating an emotional response of pleasure, happiness, and relaxation.

The study on mental well-being in Shanghai shows a general limit on its effect. The aim of the author's design principle is to introduce the cultural importance of VR spaces with a layout that mixes liminal space exhibits, experiences, habits and leisure. The inside decor is sorted into three main phrases: Ecology, Multi-Sensor, and Emotion Carenes. The aim of the author's design principle is to introduce the cultural importance of VR spaces with a layout that mixes liminal space exhibits, experiences, habits and leisure. The project has possible implications for future research regarding the culture of virtual reality space and its importance. It also provides chances to investigate how entertainment cultures can be incorporated into the planning of recreational and cultural places.

Emotion Carenes' main research is directed at people who struggle with anxiety. Indoor greenery helps in this case. This project links stress-reducing behaviors, activities, and spatial

immersion. Its purpose is to provide a sanctuary for decompression meditation, benefiting individuals experiencing mental illness and high levels of societal pressure. The aim of this project is to enhance users' spiritual relief and psychological decompression through the space design, while also promoting a sense of belonging. It introduces a new model for stress-relieving spaces, enabling people to escape the hustle and bustle of the city, embrace natural tranquility, and foster a harmonious community environment.

However, there are several restrictions that must be considered and could possibly result in a better future for this study. Since this study focused on using a quantitative approach, the research approach's limitations were first considered. Therefore, future research might make use of different research methodologies, such qualitative notions. It may be feasible to acquire a deeper understanding of how corporate language might support the relationship between relationship-oriented cultural difference acceptance and communication effectiveness by using in-depth interviews, focus groups, and other qualitative data gathering approaches. Another potential problem is that only one industry was chosen, making it unable to extrapolate the findings of the study to other industries. Future research may also extend the study to other industries and use comparison analysis among them, based on the discussion. The incoming results will presumably show that communication effectiveness has improved. Finally, the significant variables used in this study might be one of the potential drawbacks. Other deciding elements, like organizational behaviors, the atmosphere at work, the agile culture, and others, appear to be trending towards creating effective communication.

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