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Emancipating the Healing Potential: Interdisciplinary Innovation Promotes Optimal Healing Environments During the Recovery and Transformation Phase

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Abstract: The rapidly spread Omicron variant of COVID-19 has triggered a global health catastrophe, forcing society to seek strategies to alleviate the psychological pressure of citizens and rebuild the healing environment. During the recovery and transformation phase, the Optimal Healing Environment (OHE) framework developed by the Samueli Institute presents an integrated vision for healing that holds enormous potential. And this vision required multi-disciplinary innovation to overcome the pandemic's obstacles. We clarified the definitions and characteristics of the OHE framework and related four environments (internal, personal, behavioral, and external). Then we use the interdisciplinary innovation methodology to take a comprehensive literature review spanning various disciplines, including design, medicine, neuroscience, environmental science, psychology, and behavioral science, to understand the practical obstacles. Therefore, we promote interdisciplinary innovation to discover more effective healing-oriented strategies, reduce citizens' psychological pressure, and motivate a more sustainable, inclusive, welcoming, and emotionally resilient environment.

Keywords: Optimal Healing Environments, Interdisciplinary Innovation, System innovation, Transformational design

1. Introduction

COVID-19 has had devastating global effects as a highly contagious virus. Social distancing measures and guidelines have been implemented locally and globally to combat the pandemic, which has led to a shift in living, and working patterns as information and telecommunication technologies have become more heavily relied upon, creating a "new normal" lifestyle. The complexity and unpredictability of public health challenges, as demonstrated by COVID-19, require a rapid and effective response. However, the pandemic also brings significant psychological impacts on individuals, such as panic, anxiety, and hopelessness, highlighting the need to establish healing environments to reduce psychological pressure.

The Samueli Institute introduced the Optimal Healing Environments (OHE) concept to address this need in 2004. The OHE framework (Figure 1) is a conceptual framework that can be applied to health professionals, patients, their families, healthcare institutions, and healthcare systems. The framework is based on three dimensions: people, place, and process, and includes three characteristics: wellness, efficiency, and sustainability. The wellness characteristic aims to achieve balance and wholeness in body, mind, and spirit. Efficiency emphasizes quick and acceptable care, while sustainability emphasizes environmentally friendly architecture. This framework is gaining recognition and promotion from public health organizers, researchers, and medical educators as a potential solution to improving healthcare systems and addressing public health challenges.

Hyland (2020) also emphasizes the urgent need to explore multiple perspectives in reducing psychological pressure on citizens during the pandemic. The OHE framework provides a valuable starting point for achieving this goal by creating environments that support the inner healing capacities of patients, families, and caregivers.

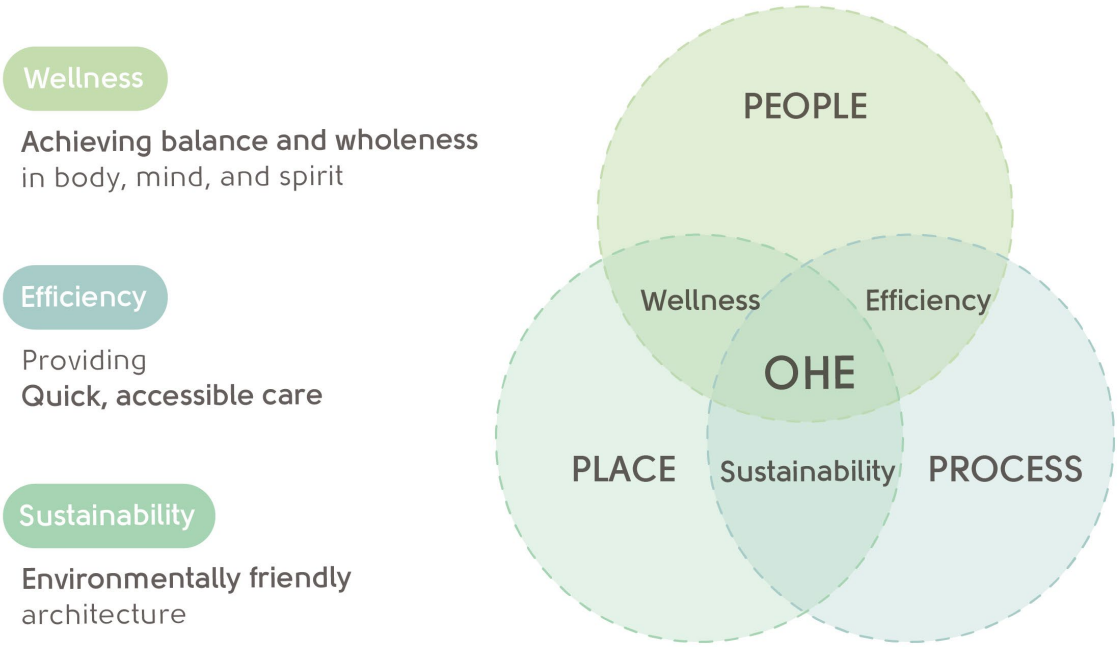

Figure 1. The OHE framework. Source: (Sakallaris et al., 2015), graphic recreated by the author.

Especially in the post-pandemic recovery period, the OHE framework provides a comprehensive vision of healing, which requires interdisciplinary cooperation and practice for its realization. In order to facilitate residents' transition to the post-COVID era and achieve comprehensive self-healing, it is crucial to redefine the OHE framework and use healing-oriented strategies to drive interdisciplinary innovations in design, medicine, psychology, and pedagogy. Such collaborative efforts will improve internal, interpersonal, behavioral, and external environments, thereby reducing the psychological pressure on citizens and establishing a healing environment during the post-pandemic transition.

The OHE framework has the potential to provide a broader influence on rehabilitation. We use the 5W1H analysis (Lasswell, 1948) to provide more precise information.

- **WHEN:** A "new normal" life in which society has to accept coexistence with the Omicron virus while reflecting on preventing future public health crises and promoting social recovery.
- **WHY:** The pandemic was a painful warning because it caused many residents in a psychologically sub-healthy state and caused severe economic losses. Therefore, in the post-pandemic era, it is imperative and essential to discover strategies to reduce psychological stress and establish adaptive social systems to confront future public health crises.
- **WHAT:** The OHE framework, originally a theory of inpatient rehabilitation, presents a holistic vision of healing in the "new normal" period that cannot be accomplished by a single discipline and requires interdisciplinary collaboration and practice.
- **WHERE:** The OHE framework can extend its influence beyond the hospital to the broader community, promoting more sustainable, inclusive, accessible, and emotionally resilient communities.
- **WHO:** The primary stakeholders are community members with psychological pressure, including various ages, positions, educational and cultural backgrounds, and the collaboration of government, universities, and non-profit social organizations.
- **HOW:** We propose an interdisciplinary innovation methodology, using healing-oriented strategies to drive innovation across design, medicine, psychology, sociology, and other related fields, constituting design strategies that enhance internal, interpersonal, behavioral, and external environments. Some specific practical strategies will be elaborated in Chapters 3 and 4.

2. Definition and Features of the OHE Framework

The OHE framework is an evidence-based organizational framework that attempts to optimize treatment processes for patients, families, caregivers, and organizations, thereby improving multiple environments and promoting overall health (Sakallaris et al., 2015). Figure 2 shows that the OHE framework integrates four environments (Internal, interpersonal, behavioral, and environmental) to support the healthy state. The Samueli Institute considers healing as a progressive process of optimizing beneficial changes to the body, mind, and spirit, ultimately leading to harmonious cohabitation with themselves, others, and society. The OHE framework encourages individuals to explore and practice all aspects of health to form a comprehensive and healthy lifestyle, which aligns with the positive psychology principles that emphasize the importance of promoting emotions, engagement, relationships, meaning, and achievement for optimal happiness. Overall, the OHE framework attempts to raise healing and health creation to the same importance as disease identification and treatment, which represents an innovative way to optimize the health system by prioritizing total health and well-being, as well as a potential route for promoting complete health in diverse situations (Jonas et al., 2014).

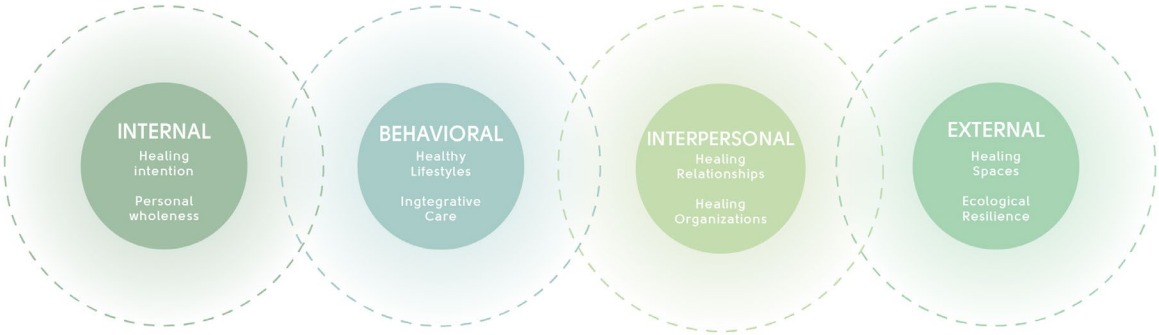

Figure 2. The OHE framework integrates four environments (Internal, interpersonal, behavioral, and environmental) to support a healthy state. Source: (Sakallaris et al., 2015), graphic recreated by the author.

Firstly, it is essential to recognize that therapy and healing represent two distinct but interrelated medical concepts. Therapy could be defined as eliminating diseases and symptoms through medical interventions (Allan et al., 2015). By contrast, healing concentrates more on the inner emotional journey and plays a crucial role in scenarios where no treatment is possible, such as hospice care and terminal cancer (DuBose et al., 2018). Although therapy and healing can emerge independently, their synergistic cooperation is essential for optimizing the possibility of overall health. Emerging fields such as psychoneuroimmunology and mind-body medicine demonstrate that the interaction between these dimensions is increasingly valued in healthcare. In addition, a growing number of research indicate that physical environmental variables such as buildings and public places significantly impact the individual's health (Cleveland, 2014). The OHE framework provides a comprehensive health and well-being approach emphasizing teamwork and integrated thinking. The following paragraphs discover deeper on elaborating the definitions and characteristics of the four environments (Gregory et al., 2022).

2.1 The internal environment

The OHE framework begins with the individual's internal environment, including various cognitive elements such as ideas, intentions, emotions, expectations, and beliefs that are indispensable in influencing their desires and perceiving the world's complexity. Comprehending and appreciating the interplay between diverse elements is crucial for promoting health and recovery. The healing intention is "a conscious and positive purpose to improve health." Individuals with chronic conditions frequently have low healing expectations. However, healthcare providers could consciously cultivate expectations, intentions, and beliefs for patients that create a more positive emotional state, even in realistic situations where a comprehensive cure is not achievable.

Taking the research conducted by Duran et al. (2022) as an example, they carried Randomized, single-blind control trial with three parallel groups to examine the therapeutic efficacy of Trial-Based Cognitive Therapy (TBCT), Mindfulness-Based Health Promotion (MBHP) and Positive Psychotherapy (PPT) on a sample of 135 adults aged 18 to 60 who had post-traumatic stress disorder (PTSD) due to direct or indirect exposure to COVID-19. Researchers evaluated the impacts on various outcome measures, including quantitative assessments of symptoms related to depression, anxiety, and guilt, as well as the enhancement of subjective well-being and positive affect.

Some literature reveals the positive impact of hopes, expectations, and beliefs on pain, performance, mental status, and mortality, which is most significant in placebo literature (Kaptchuk, 2002). The patients' sense of completeness and well-being derives from the actual healing experience instead of the physical treatment. In the post-pandemic era, when vast populations of inhabitants

suffer psychological disorders, it becomes increasingly important to focus on their internal environment and assist them in obtaining a positive emotional experience (Karol & Smith, 2019).

2.2 The interpersonal environment

The interpersonal environment focuses on creating relationships between individuals and others. Establishing positive emotional relationships is a sustainable method for promoting recovery, providing assistance, and preserving health. Positive emotional relationships are influenced by trust, effective communication, and mutual understanding (Weijs-Perrée et al., 2020). An effective interpersonal environment can help develop a sense of belonging, which are crucial for sustainable health development. Many types of research have proven that family, friendship, and community support significantly affect mortality and morbidity (Kotzer et al., 2011).

Bennington et al. (2016)conducted a survey demonstrating communication's power. They chose phenomenological observations and unstructured interviews with eight elderly visitors at an Art museum in California and analyzed the qualitative data. They found two factors that help promote interpersonal environments: 1. The opportunity to explore emotions, thoughts, and memories safely; 2. Social connection and support.

A positive interpersonal environment involves effectively delivering information, actively listening, providing comments, and guaranteeing mutual understanding. The COVID-19 pandemic and its derivative precautions, such as keeping social distancing, have left community residents physically and emotionally exhausted, resulting in their inability to adapt and return even though the outbreak comfortably has been contained to an acceptable level. Therefore, society should strive to create an inclusive environment where community members can express their purposes and concerns, remain calm and compassionate while supporting them through challenging situations, and assist them in escaping emotional dilemmas.

2.3 The behavioral environment

The behavioral environment, which encompasses individuals' actions for themselves or others, is essential in establishing and sustaining a healthy lifestyle. It can be further described as some self-care behaviors that encourage sustainable lifestyles, alleviate chronic diseases, and lower the future medical disorders risk (Davies et al., 2016). A positive behavior environment includes balanced eating habits, regular physical activity, diverse leisure activities, sufficient sleep, practical stress management abilities, and maintaining a delicate balance between work and entertainment. The OHE framework offers education, training, and support for healthy lifestyle choices. Creating a supportive environment that allows patients to feel comfortable and engaged in a healthy lifestyle is as important as the treatment plan (Kabat-Zinn et al., 2011).

For example, (Bräuninger, 2012) illustrates the healing potential inherent in behavior. They use a randomized controlled trial design. 162 participants were randomly assigned to a wait-listed control group (WG) or a dance movement therapy (DMT) intervention group. The experiment was conducted by 11 dance therapists at different locations in Germany. The findings proved that the DMT intervention group improved more effectively in psychological stress reduction than the non-treatment group. Dance behavior was utilized as a creative, body-oriented form of psychotherapy, incorporating behavior, dance, and verbal interventions to facilitate individuals' emotional, cognitive, physical, and social integration.

2.4 The external environment

The external environment forms the final area of the OHE framework that includes constructing healing places and sustainable ecology, integrating the physical environment where residents work, live, and relax from the micro level, and impacting the entire ecosphere from the macro level. Design considerations for healing environments include light (Liberman, 1990), sound (Kang & Schulte-Fortkamp, 2016), and temperature (Nagib & Williams, 2017). It has been demonstrated that incorporating nature through healing gardens could reduce stress and improves mental cohesion (Uwajeh et al., 2019). Furthermore, designers are supposed to take music (Li et al., 2020), art(Bennington et al., 2016), color(Marberry & Zagon, 1995), and fragrance interventions to create a comfortable environment.

Take the study of Kotzer et al. (2011) at Children's Hospital of Denver as an example. They analyzed 434 Therapy staff and 67 Families on inpatient units through Pre-post descriptive survey and unstructured interviews, then proposed that 1. Natural light; 2.Improved layout of the patient room; 3.Enhancing aesthetics; 4. Quiet places are beneficial for healing the external environment. In a "new normal environment" where society is forced to coexist with the COVID-19 pandemic for prolonged periods, it's growing necessary to create a positive external environment to alleviate residents' psychological stress, encourage them to engage in outdoor social activities and assist in the reconstruction of more emotional resilient communities with various stakeholders.

3. Interdisciplinary Innovation Methodology

Figures 3 and 4 illustrate an Interdisciplinary Innovation Methodology. In Phase 1, based on the professional backgrounds of the research team, we conducted searches using databases mainly focused on medicine, psychology, sociology, and design. Furthermore, we explored literature from related fields such as environmental science, behavioral science, education, and neuroscience. The search engines we utilized included PubMed, PsycINFO, Web of Science, ScienceDirect, SpringerLink, Taylor & Francis Online, and Wiley Online Library. The search was conducted between 1990 and 2023. We also utilized Google Scholar to include conference proceedings and other relevant sources to ensure detailed results and avoid ignoring valuable literature. The inquiry was performed from the inception to March 15, 2023.

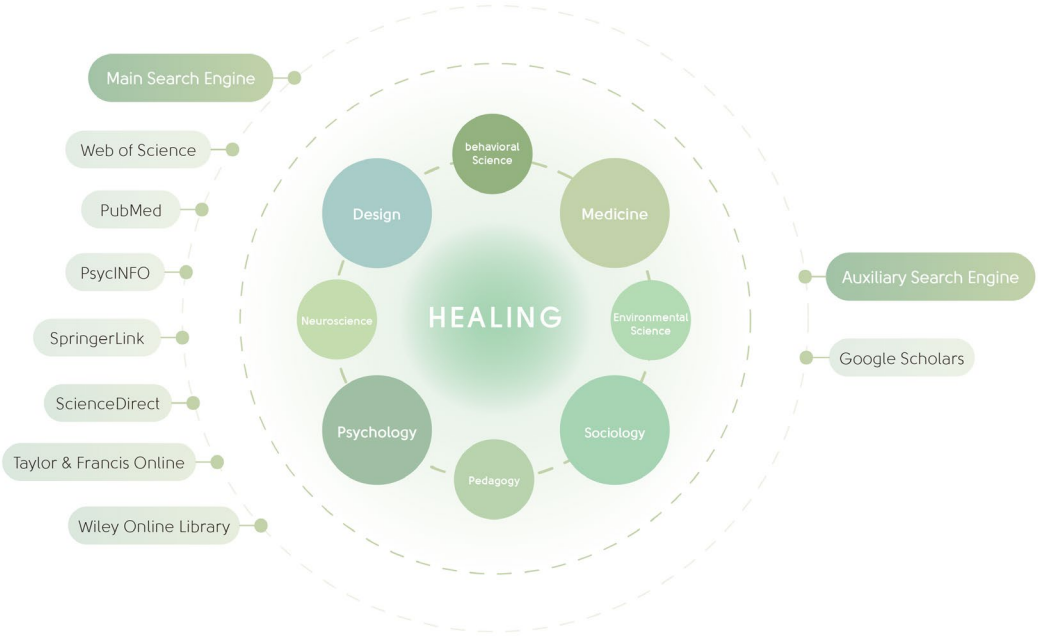

Figure 3. Phase 1 of the Interdisciplinary Innovation Methodology. Source: the author.

The following key terms were used in the search, including various combinations of Boolean operators: TI=(Emotion OR Psychological OR Mental OR Stress) AND TI=(Healing OR Therapy OR Curing OR Recovering OR Rehabilitation OR Treatment OR Relieve) AND TS=(Intervention OR Environment OR System OR Organization OR touchpoints OR Strategy) AND SU=(Medicine OR Psychology OR Design OR Society).

In Phase 2, we conducted a comprehensive examination between the literature and the OHE framework (internal, interpersonal, behavioral, and external environments). The circle size in Figure 4 represents the scale of related literature we found. This analysis also reflected how different disciplinary knowledge contributes to the healing environment. Meanwhile, there were various directions within each discipline. For instance, the "Design" category encompassed inclusive design, behavioral design, service design, sustainable design, healing environment design, etc. Further details will be illustrated in Chapter 4.

Moreover, we conducted an in-depth analysis of the factors influencing each environment and carefully considered the therapeutic facilitation roles of different disciplinary knowledge within each environment. Then we developed healing-oriented strategies that can be effectively implemented. This methodology promotes integration and collaborative innovation across disciplines.

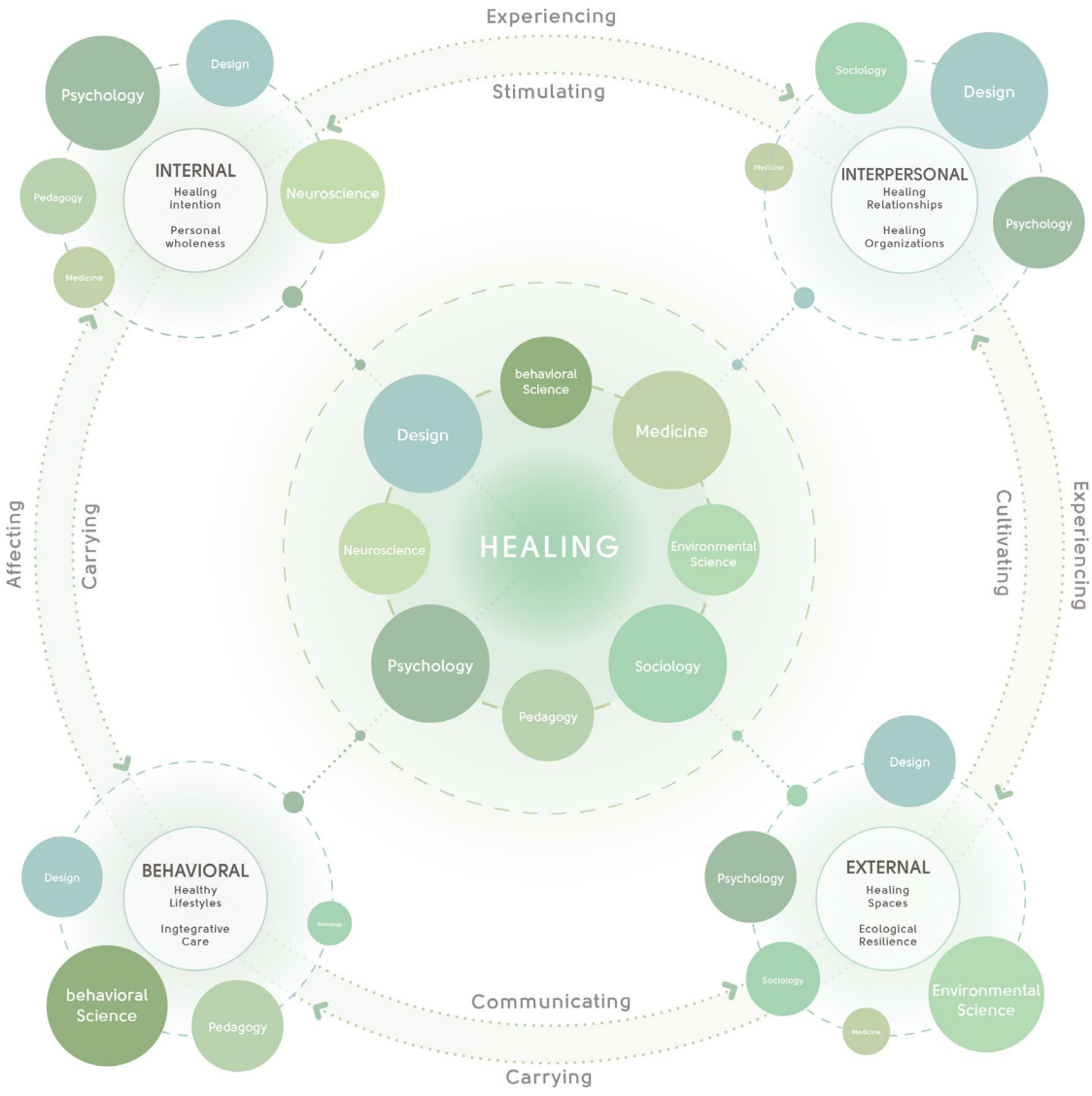

Figure 4. Phase 2 of the Interdisciplinary Innovation Methodology. Source: the author.

4. Driving interdisciplinary innovation with healing-oriented strategies

4.1 Healing + Internal

Medicine, education, psychology, neurology, and user experience design exhibit a strong association with the internal environment, according to the retrieval results of the Phase 1 Framework. Medicine and education can advance medical professionals' ability to help patients develop positive cognitive and emotional regulation (Densen, 2011). Psychology can assist individuals in understanding and controlling their emotions, thoughts, and beliefs. For example, cognitive behavioral therapy can help people recognize their negative thoughts to reduce psychological stress and anxiety (Dobson et al., 2019). Mindfulness can help individuals learn to observe, accept, and control their internal environment, thereby reducing negative emotions and increasing psychological resilience (Creswell, 2017). Furthermore, cross-disciplinary design psychology can optimize the individual environment by considering emotional experiences (Ho & Siu, 2012); enhancing users' feelings of self-worth (Goodwin & Goodwin, 2016); providing more inclusive and empathy guidance (Hardy et al., 2018); and offering personalized program support (Zhou et al., 2013).

Neuroscience research can provide a better understanding of how the internal environment affects the brain and body to better aware and cure neurological disorders such as Alzheimer's disease (Ozben & Ozben, 2019), chronic pain (Louw et al., 2016), behavioral and cognitive disorders (Horowitz et al., 2018), and their derivative internal individual environments. To be more specific, Neuroscience can help optimize multiple aspects of the individual's internal environment, including understanding and regulating emotions (R. E. Martin & Ochsner, 2016), promoting self-awareness and identity (Asma & Greif, 2012), improving sleep to reducing anxiety (Grandner & Fernandez, 2021), and comprehending the neural mechanisms of healthy circulation (Eisenberger & Cole, 2012).

In the case study School Design for Visually Impaired Groups, for instance, the expert approach of user experience design is used to obtain insight into the therapeutic requirements of blind children through user interviews, observation, and other methods. Additionally, groups may suffer from scientifically based theoretical backing in psychology, education, and neuroscience (see Figure 5). The new facility was conceived to provide a unique learning environment to equip all students with fundamental skills beyond the school’s gate for future livelihoods. Sound specialists made binaural recordings of various environments to stimulate students’ perception of the world. The lighting is designed to exercise and promote visibility in low-vision children. The floor is embedded with braille tactile letters, Thai, English, and numbers for basic braille introduction. Children are taught to generate an internal environment to heal and grow up independently with the intervention of different disciplines like medicine, education, and psychology.

Figure 5. School Design for Visually Impaired Groups. Source: https://www.gooood.cn/classroom-makeover-for-the-blind-by-creative-crews-ltd.htm.

4.2 Healing + Interpersonal

Community interaction and development are the main concerns while improving the interpersonal environment, which strongly correlates with sociology, psychology, and design. Sociology provides a valuable perspective on the social behavior of individuals and groups, which is essential for improving the interpersonal environment. For example, vulnerable individuals may experience social anxiety and discomfort in social situations, which can be better understood through the lens of sociology. The "low social pressure cost" theory offers guidance for facilitating social interaction without causing undue stress or embarrassment, leading to unexpected happiness (Baltacı, 2019). Psychology provides a framework for understanding the direct psychological connections established between people during interpersonal communication. This understanding can guide the development of strategies to improve interpersonal relationships and promote healing (Heider, n.d., 1982). The design also plays an essential role in improving the interpersonal environment, providing insights into the relationship between various stakeholders. Bitner (1992) proposes the servicescape framework and highlights the importance of the environmental dimension in eliciting cognitive, emotional, and physiological responses from customers and employees, which can influence their social interactions. Design studies advocate for participatory design methods to promote communication and cooperation between designers and stakeholders, leading to greater interpersonal understanding and healing effects (Arnstein, 1969).

As shown in Figure 6, the "Social Network Factory" case is an art installation that activates public space. It is located on the grounds of The Sea World Culture and Arts Center in Shekou, Shenzhen. The installation is about six meters high and consists of four sets of surrounding "pipe horns" intertwined in a spatial grid. The design of the horn has given birth to different activities, such as the small horn allowing people to talk to each other, whisper, or shout. Meanwhile, the loudspeakers define the boundaries of a place and provide shelter for social activities. And the intertwined pipes are the telescopes to facilitate the gathering of people. It uses the co-create method to encourage

everyone to participate in this installation. Meanwhile, it is an instrument for discovering new and unexpected ways of aural, visual, and physical interaction. Thus, combining sociology, psychology, and design creates an interpersonal atmosphere for people to enjoy and heal.

Figure 6. Social Network Factory. Source: https://www.gooood.cn/social-network-factory-pao.htm.

4.3 Healing + Behavioural

The improvement of the Behavioral environment is closely related to various disciplines such as praxeology, pedagogy, and interactive design. Praxeology is the study of human behavior and has proposed a systematic methodology, including observation, survey research, and experimental design methods (Cozby et al., 2012). Fogg (2009) proposes a Fogg Behavior Model (FBM) in praxiology for understanding human behavior, which states that behavior is the product of three factors: motivation, ability, and triggers, each with subcomponents. These three factors should occur simultaneously, or the behavior will not happen. The FBM framework has significantly improved people's healing behavior and understanding of behavior. Pedagogy can play a crucial role in helping individuals correct their behavior and establish an active and healthy lifestyle through education and motivation, such as encouraging guests to change their lifestyle behaviors(Frost et al., 2004). For instance, lifestyle education is a critical first step in managing diseases like high blood pressure. Understanding patient, provider, and access predictors can help design better interventions to improve physical conditions. Integrating the perspective and interaction design methods into design science can significantly enhance human healing behavior environments. Interaction design, defined as "to design interactive products to support the way people communicate and interact in their everyday and working lives" (Preece, J., Sharp, H., & Rogers, Y., 2015), includes iterative approaches to design and testing human behavior during the decision-making process.

Figure 7 illustrates a case called "Handshake emoji in urban villages.” Densely distributed buildings give rise to a typical architectural form in urban villages, nicknamed "handshake buildings" because of the narrow corridors. However, they seem to contrast with the increasing social alienation in cities. Designers seek inspiration from pixelated emoji elements and create hand gesture-based

installations to activate the surrounding environment. With the help of symbols that are well-known to the people living in the surrounding community, the "Handshake emoji" encourages the integration of the community atmosphere and behavioral environment. Among them are string games extracted from childhood memories and gesture languages popular nowadays. They are expected to awaken the vitality and create an artistic atmosphere in neighborhoods.

Figure 7. Handshake emoji in urban villages. Source: https://www.gooood.cn/handshake-emoji-in-urban-villages-china-leaping-creative.htm.

4.4 Healing + External

Urban renewal disciplines, including architecture, landscape, and interior design, are highly related to building external healing environments, according to the literature review in Chapter 3. When considered from an interdisciplinary perspective, environmental science can assist designers in comprehending regional and cultural distinctions, the influence of human activities on natural ecosystems, and proposing eco-friendly design solutions appropriate to the local environment and culture (Nesshöver et al., 2017). Psychology studies human behavior and emotions, which can help designers recognize people's reactions and demands inside the environment. For instance, psychological research demonstrates that natural landscapes can stimulate relaxation and reduce stress, which can be applied to healing gardens and public spaces (Tsunetsugu et al., 2013). Sociology can also be utilized to promote a more attractive external environment. Policymakers can investigate the motivations, barriers, and approaches of community participation to encourage residents to participate more actively in the external environment to increase their identification and further promote community cohesion (D. Martin et al., 2015). Designers could investigate the connection between social inequality, environmental justice, and the impact of ecological practices on various communities to create a more equitable external environment (Nettleton, 2020).

Understanding cultural diversity can also promote a more inclusive, harmonious, and sustainable external environment (Pilgrim & McCranie, 2013).

As shown in Figure 8, "Jin Well-being County" is a high-quality retirement community. As more and more aging societies emerge, the community rethinks how to build a city for everyone to live meaningfully after retirement. The Jin Well-being County has become Thailand's first senior-oriented mixed-use development comprising residences, commercial units, and hospitals. After using the design methods, including user interviews, Service Safari, designers integrated healthcare concepts into the landscape design, making the "Community in the Ravine Forest" a reality and contributing to the health and longevity of the elderly. Furthermore, they integrate the urban renewal disciplines to develop better external healing environments.

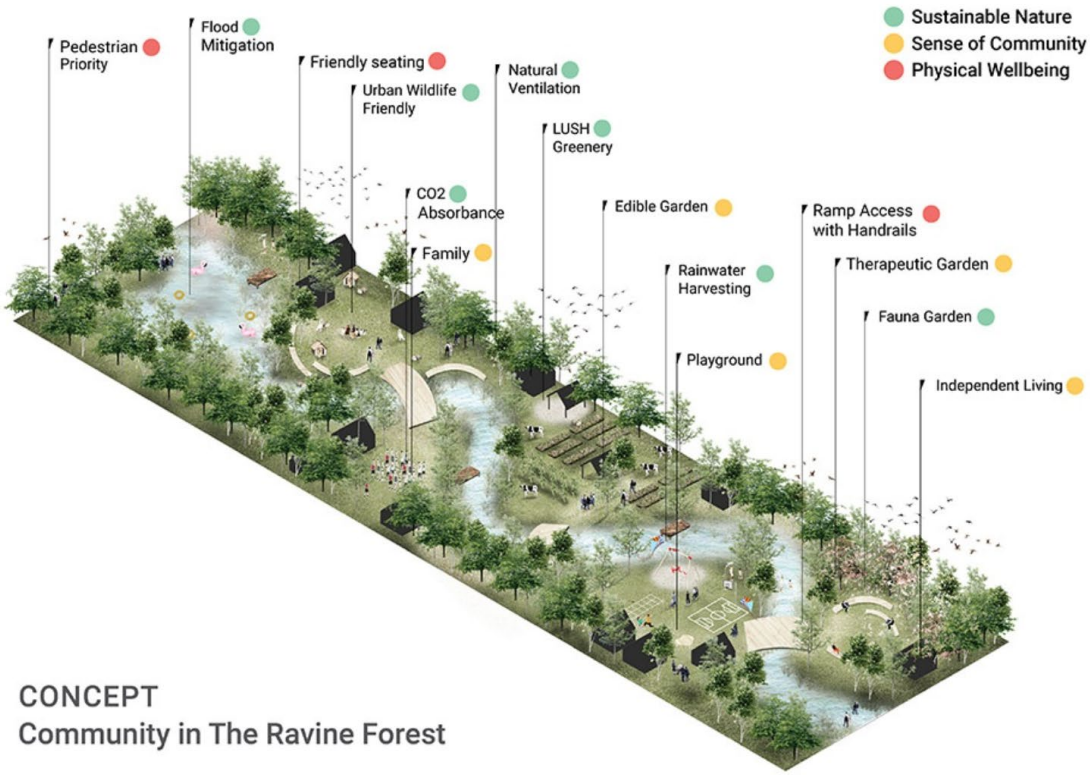

Figure 8. Jin Well-being County. Source: https://www.gooood.cn/jin-wellbeing-county-by-shma.htm.

5. Conclusion

In conclusion, the Omicron variant of COVID-19 has unleashed a global health crisis that has profoundly impacted individuals' psychological well-being. Society should adopt multi-disciplinary approaches to alleviate residents' stress, letting communities thrive physically, emotionally, and psychologically. The OHE framework presents an integrated vision for healing that requires interdisciplinary innovation to overcome the pandemic and derived practical obstacles. By clarifying the OHE framework and related four environments, we can appreciate the complexity and interconnectedness of the elements required for effective healing. We are supposed to leverage insights from various fields, including design, medicine, neuroscience, environmental science, psychology, and Praxeology, to achieve healing-oriented strategies. Through interdisciplinary collaboration and innovation, we could discover integrated solutions that address diverse practical challenges and create more sustainable, inclusive, adaptable, and welcoming environments during the recovery and transformation phase.

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