



Faculty of Design

2022

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Suggested citation:

Gao, Tanhao, Tian, Jingwen, Zhang, Xiaotong and Zhou, Hongtao (2022) Interdisciplinary Systemic Innovation for Healing and Creating Resilient Communities in the Post-COVID-19 era. In: Proceedings of Relating Systems Thinking and Design, RSD11, 3-16 Oct 2022, Brighton, United Kingdom. Available at <https://openresearch.ocadu.ca/id/eprint/4343/>

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**Relating Systems Thinking and Design
2022 Symposium
University of Brighton, Brighton, UK,
October 13-16, 2022**

Interdisciplinary Systemic Innovation for Healing and Creating Resilient Communities in the Post-COVID-19 Era

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The functioning mechanisms of society are encountered with enormous unexpected extreme problems and unanticipated butterfly effects, which are confronted with increasingly complex global challenges and faced with increasingly uncertain futures. The whole world operating system has been deeply influenced by the widespread COVID-19 pandemic and the ensuing economic, social, and cultural catastrophes, and many individuals have suffered severe psychological pressure. Therefore, exploring systemic innovation to heal residents' emotions, build resilient communities, and foster economic recovery and socially inclusive sustainable development is of great urgent and relevant importance in the post-COVID-19 period, which is challenging to be addressed by an isolated discipline or field. Therefore, this research will attempt to cooperate with uncertainty to reveal the potential for systemic innovation through a multidisciplinary analysis and research.

This research first presents three groups of stakeholders: the general public, vulnerable groups, and healthcare employees, to illustrate the systemic psychological burden of the COVID-19 pandemic on various communities. Then, a multidisciplinary analysis containing psychology, medicine, sociology, and design was conducted to clarify the current approaches, practical impediments, and potential for system evolution. Finally, this research selects Chifeng Road as

an experimental intervention location through a design thinking-oriented interdisciplinary systemic innovation. It then presents an emotional healing system that integrates multidisciplinary perspectives and knowledge to reduce the surrounding residents' psychological stress. And fosters a resilient community that can adapt more quickly to post-pandemic life, while also carrying the potential for future innovation in social systems.

KEYWORDS: interdisciplinary innovation, emotional healing system, post-pandemic design, resilient community

RSD TOPIC(S): Health & Well-Being

Introduction

The COVID-19 pandemic is one of the public health emergencies with the quickest rate of dissemination, the broadest range of infection, the highest difficulty in prevention and control, and the most considerable global impact over the previous century (Pfefferbaum & North, 2020). According to statistics, since about June 5, 2022, the pandemic continued to spread, with 528 million cumulative confirmed cases and 6.3 million cumulative deaths, causing significant harm to the global economy and causing a substantial threat to public physical and mental health. When confronted with COVID-19, residents' original problem-solving systems are challenging to handle and profoundly influence people's sense of security, trust, control, intimacy, and self-esteem, leading to various negative psychological states, such as panic, anxiety, and desperation (Hyland et al., 2020). Therefore, exploring how to reduce citizens' psychological stress, heal community emotions, and establish resilient communities is vital and beneficial. As shown in Figure 1, this research concentrates on the Post-COVID-19 Pandemic period, and the virus has been effectively controlled in the physical space. However, the community still cannot adapt to the new normal life due to a sense of alienation. This research identifies and analyses the bottlenecks and future potentials of several interdisciplinary perspectives, such as design, medical, psychological, and sociological. Then use design thinking to drive interdisciplinary

systemic innovation, discover the "opportunities" that will motivate community members to develop a sense of emotional healing, assist them in gradually adapting to the new normal life, and reimagine resilient communities.

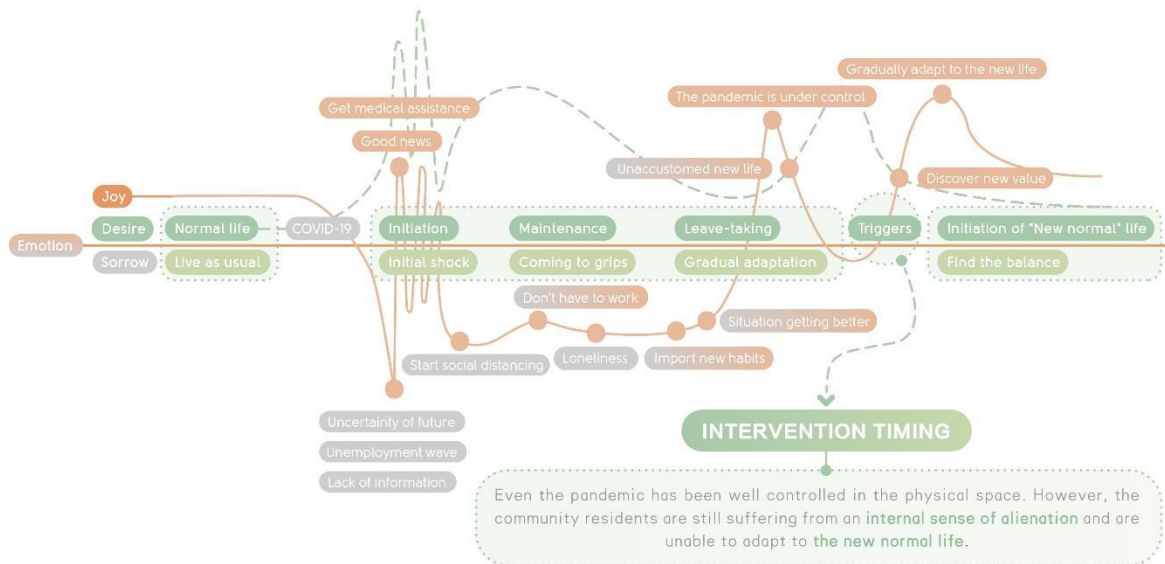


Figure 1. The intervention timing of this research. Source: the author.

The systemic psychological burden of the COVID-19 pandemic on different communities

The psychological burden carried by the general public

Significant public health emergencies are characterised by solid suddenness, uncertainty, and clustering. Such emergencies cause not only direct damage to physical health but also affect social and individual mental health, such as changes in personal emotions, cognition, and behavioural activities, further producing severe negative impacts on society. Feng et al. (2020) utilised the Self-rating Anxiety Scale (SAS), the Self-rating Depression Scale (SDS), the Athens Insomnia Scale (AIS), and the Self-rating Anxiety Scale (SAS) during the pandemic period and investigated 53,427 people in China between February 17, 2020, and March 10, 2020. The survey data were subjected to a one-way ANOVA isometric analysis using SPSS 24.0. The severity of public psychological

disorders increased. In order, they were anxious (97.75 %), with moderate anxiety accounting for 46.11 % and severe anxiety reaching 20.79 %; mild depression got 39.84 %, and severe depression was also 5.25 %; Further analysis found that 69.25% had more severe insomnia during the COVID-19 outbreak.

From February 4 to 14, 2020, Qiu (2020) organised a survey of 13,822 people in 31 provinces. The result showed that 18.6% of the public had varying degrees of acute stress disorder (ASD). As a significant public health emergency, COVID-19 poses a severe threat to the health of individuals. And due to Individuals' lack of experience in dealing with the pandemic, the commonly used crisis management methods and support systems are insufficient to deal with the severe consequences, resulting in psychological imbalance and psychological crisis (Sher, 2020).

Caplan (1974) clarified that a mental crisis is essentially a state of psychological imbalance that occurs with a crisis event. Generally, the individual and the environment are in a dynamic equilibrium, and crisis events are sudden, uncontrollable, and often accompanied by severe consequences. Individuals who do not have experience dealing with things similarly or are not adequately prepared to cope, their previous ways of dealing with the crisis, and their usual support systems are insufficient to cope with the situation. They are likely to experience a state of severe overload of physical and psychological stress reactions. Caplan divided the formation and evolution of psychological crisis into four stages.

- **In the first stage**, the crisis event occurs. The inner balance is broken. The individual feels tension and anxiety and tries to restore the psychological balance with the usual coping mechanisms. In most cases, individuals do not seek help from others and even hate the interference of others in their problems.
- **In the second stage**, individuals find that their usual coping mechanisms cannot solve their current problems, their social adjustment function is impaired or diminished, and they begin to try the wrong ways to solve their problems and become motivated to seek help.
- **In the third stage**, the individual finds that the tried and failed methods are ineffective in solving the problem. Their emotional, cognitive, and behavioural

symptoms are further aggravated, and the tension and anxiety continue to increase.

- **In the fourth stage**, if the individual still cannot solve the problem after the previous three steps, they are likely to develop learned helplessness. They may lose confidence and hope in themselves or even shake the meaning of their whole life. Some individuals may even attempt suicide and have mental breakdowns and personality disorders.

Vulnerable groups under additional pressure

In addition to the public psychological testing data above, many vulnerable groups' mental health was significantly impacted after the pandemic. The chain reaction caused by the city blockade directly affects the shutdown of the system that initially took care of them, making them unable to face the increasingly severe challenges of life. As a result, the disease deteriorates, aggravates the psychological burden, and even produces fear and rejection of the social environment (Xu et al., 2020).

Under the raging environment of the COVID-19 virus, while the hospital implements closed management, the frequency of environmental disinfection and personnel temperature measurement has increased. Some mentally ill patients in the hospital are anxious, uneasy, and afraid due to the sudden interruption of the social support system. There is nowhere to vent. Moreover, the lack of family care for a long time, the quality of life declines, the anxiety and depression that appear, and the emergence of crisis behaviours such as violence, running away, and self-abandonment, are not conducive to recovery from the disease (Druss, B. G., 2020).

For patients with depression who are not hospitalised, the possibility of going out is blocked during COVID-19, so behaviours that need to go out to help relax and restore health are not allowed, aggravating depression feelings and making the condition more likely to worsen. What is more urgent is that the regular treatment trips for patients with depression to seek medical treatment and buy medicines are interrupted. Once the prescribed psychotropic drugs are consumed, the patients will suffer from the pain caused by the disease. In the particular situation of the new crown epidemic, the lives of

patients with depression have been severely impacted, and patients have encountered a severe drug crisis (Ma et al., 2020).

At the same time, the impact of the pandemic is also very prominent among the two vulnerable groups of the elderly and children. There is a significant digital divide between most older people and the online society, and the sudden blockade has made these older people lose their social environment entirely (Heid et al., 2021). In addition, the elderly have relatively weak physical functions and quickly become infected with the new coronavirus, leading to some older people's fear of disease and panic about the outdoor environment.

For children, especially primary school students aged 6-12, during the outbreak, most countries and regions closed schools to slow the spread of the epidemic (Zhang et al., 2020). School closures have disrupted students' academic learning and the lack of non-academic support previously provided by schools, leading to the deterioration of students' academic ability and also affecting students' physical and mental health. Neece et al. (2020) showed that 85.7% of parents reported changes in their children's emotional state during school closures, with common symptoms being inattention, boredom, irritability, irritability, and nervousness.

The overwhelmed healthcare workers

During COVID-19, medical staff, as the core force of emergency rescue in public health emergencies, have to undertake long-term, high-risk, and often high-intensity work without sleep for many consecutive days, resulting in heavy tasks and excessive fatigue (Chen et al., 2020). Colossal pressure is difficult to relieve and release. At the same time, facing the inability to treat more infected people and feeling helpless, it is easy to generate anxiety and depression. These emotions will cause different psychological problems through long-term accumulation.

Bohlken et al. (2020) found that 81.80%-92.68% of frontline nurses might have negative emotions due to high work intensity and little experience responding to public emergencies. At the same time, the detection rate of anxiety and depression symptoms of medical staff who have received and cared for suspected or confirmed cases of COVID-19 virus is significantly higher than that of other groups. Negative emotions can

also reduce the work quality and job satisfaction of medical staff, thereby affecting the treatment outcomes of patients.

From the above research and analysis, the outbreak of the COVID-19 pandemic has caused varying degrees of threat to the public's mental health. Therefore, it is very urgent to pay attention to the research on the psychological healing of the public. Many disciplines are trying to solve the psychological trauma caused to people after the epidemic. This research also explores the construction of a systematic design framework from multi-dimensional thinking and coordinating multi-disciplines to alleviate practical problems.

Identify realistic system bottlenecks and development potential through multidisciplinary analysis

Psychology

Today's Internet is so convenient and developed that it is saturated with videos, audio, and articles on various psychological stress manuals and psychological therapies (both professional and self-intervention). The information overload on search engines and social media makes it impossible for the general public to determine whether these methods are consistent with the operation and repair of the nervous system in the human brain (González-Padilla & Tortolero-Blanco, 2020). Therefore, only a comprehensive understanding of the principles underlying the psychological interventions used can ensure each psychological intervention method's practical and creative application.

Emotion-Operating System (EOS) concept is based on experimental studies of animal nervous systems (Panksepp, 2004). EOS is a neural circuit that regulates electrochemical impulses. It contains seven dynamic command systems: Seeking, Care, Lust, Play, Fear, Rage, and Panic. Van der Hart et al. (2006) categorised the action systems into three primary categories: the action system of daily living, the action system of stress, and the action system of recovery and self-care according to the different functions and performance. Those three action systems are effective, cooperative, and balanced to improve individuals' psychological health development.

In addition to one-on-one communication between psychologists and patients with mental disorders, establishing emotional healing communities and mutual help among patients can provide them with positive and meaningful support (Rehman & Lela, 2020). In these communities, psychologists can act as coordinators and provide targeted knowledge dissemination and resource organisation. The COVID-19 pandemic is more painful for autistic and other psychologically vulnerable groups, as well as physically impaired groups, who are more likely to generate negative emotions (Benfer & Wiley, 2020). Psychological support communities can provide these groups with clear and timely information to trigger positive changes in their physical and mental health.

In conclusion, the psychology field's approach to helping residents transition to a new normal life in the post-COVID-19 era consists of 1. Providing professional and accurate information about their psychological status; 2. Guiding residents with suboptimal psychological health to vent their emotions appropriately and accept the current situation with a positive mindset; 3. teaching Promoting the proper way to cope with psychological crises. However, the bottleneck is that citizens must first recognise that they are trapped in a psychological subhealth state and willing to seek professional medical help. However, due to the difficulty of identifying and evaluating the psychological subhealth state and the negative social prejudice, the majority of mental-subhealth individuals will choose to restrain themselves and suffer terrible psychological pressure alone.

Medicine

The vaccination and the health care provider are the two most essential components of the medical system to combat COVID-19, although both have certain practical limitations. Typically, an effective vaccine takes several years or even decades to produce and passes extensive clinical testing. Instead, the COVID-19 vaccine researchers decided to overlap and combine the Phase I, Phase II, and Phase III trial phases, condensing significant steps and then accelerating the small-scale clinical trials. Governments also appropriately simplified regulation and evaluation, leading to emergency use authorisations worldwide (Bok et al., 2021). The World Health Organization (WHO) also established the COVAX vaccine system, which has reached over 100 countries, including 60 of the world's least-developed countries, to aid global

populations in overcoming the crisis (Lancet, 2021). However, the COVAX vaccine system has to confront supply chain issues, including supplier delays in production, permission for vaccine utilisation, and import/export approval, all of which might limit the vaccines' availability (Tatar et al., 2021). There are also many variations in the vaccine distribution process. Some countries have vaccination rates of less than 10%. In contrast, other countries have vaccine stocks several times the population, which is related to a variety of factors, including the country's vaccine production capacity, population, economic power, and geopolitical discourse. (McAdams et al., 2020).

During the COVID-19 pandemic, the mental health of medical professionals, as the backbone of the front line of pandemic prevention, is related to not only themselves but also the patient's health. Pandemic control requires the efforts and cooperation of the entire social system (Walton et al., 2020). The healthcare system should assist medical professionals in establishing social support and assuring adequate protective supplies. For frontline emergency workers, it is necessary to implement a system of obligatory rest and work time limits. Simultaneously, isolate them as much as possible from information on pandemic prevention during their rest period so that they can temporarily release their work responsibilities and avoid being unable to relax due to overwhelming social obligations. Meanwhile, offer them psychological intervention systems to assist them in overcoming emotions of exhaustion and alienation more easily (Spoorthy et al., 2020).

In conclusion, the COVID-19 pandemic will be gradually controlled in the physical environment as global vaccination rates keep increasing and healthcare workers keep working hard. However, residents will keep living with the COVID-19 pandemic for the foreseeable future. Worse still, the increasing number of studies reveals that a substantial proportion of COVID-19 survivors will be accompanied by neurological complications and experience other negative feedback from "Long-Covid" (Callard & Perego, 2021). And the healthcare community's growing weariness and self-doubt regarding the endless prevention and control of the pandemic. It is urgent and highly relevant to create an emotional healing system that could include most communities and help them out of the emotional quagmire.

Sociology

A social system refers to the main series that make up a society. The main series of the community include economic, political, and cultural sequences. If further subdivided, there will be a series of social economy, politics, culture, education, health, science and technology, law and discipline, and military (Parsons&Shils, 2017). The so-called comprehensive understanding of the epidemic prevention and control of the social system, the sub-series composed of the previous significant societies, is indispensable and must be taken seriously. No matter which country or region, people should try to understand the main sub-series of its social composition to see the fundamentals of epidemic prevention and control and social governance as a whole. In the end, the various series within society, internal and external, reach a state of circulation and operation, and an excellent social cycle is formed. It is continuously improved in the cycle process to better cope with social changes or emergencies.

Among the studies related to the sociology of response to epidemic control, Parsons and Shils (2017) conducted a sociological analysis of disease and the role of physicians in modern society and opened up the medical and sociological research field. The sociological study of epidemics and epidemic control is increasingly becoming a concern for sociologists. Timmermans and Haas (2008) discuss the relationship between epidemics and society and calls today's society a "medicalized society."

In general, the measures taken by various governments in the last two years to prevent and control the Neoplasia epidemic have all been based on a sociological perspective, with a top-down approach that integrates all social systems to obtain the most comprehensive and scientific solutions. The practice of COVID-19 pandemic control has shown that it relies on many social prevention and control tools to highlight the importance of the sociology of epidemic control. Therefore, in the system design, the macro-control ability of sociology is used to coordinate the self-operation of each system and promote the healthy internal circulation of the whole society.

Design

In architecture and urban planning, healing environments have long been discussed. Ulrich established the relationship between human emotions and the natural environment with his Stress Recovery Theory (SRT) (Ulrich et al., 1991), which proposes that controlled spaces, positive design, leisure possibilities, and social support can relieve stress. Simultaneously, Kaplan developed the Attention Recovery Theory (ART), which emphasises using natural surroundings, adequate spatial scope, and attractive design to fulfil psychological expectations and alleviate psychological stress (Kaplan & Kaplan, 1989). The American Landscape Architecture Association (ALSA), which has a strong interest in developing healing landscapes, established the Professional Practice Group on Health and Therapeutic Design in 2004 and regularly provided academic seminars on this topic. Community emotional healing has considerable potential and can be adapted to a broader environment (Huisman et al., 2012). It could promote a more inclusive and empathetic design, concentrate on the living standard of psychologically sub-healthy communities, and explore the harmonious balance between public space and community more flexibly and comfortably (Dijkstra, 2009).

The origins of recovery environments research could be traced back to professional institutions, such as psychological hospitals, with the primary objective of assisting with the treatment of patients. And then, the applicability has extended to encompass a broader range of people, and the purposes have shifted from aiding physical recovery to fostering social and emotional well-being. Although the recovery intervention areas were expanded beyond medical institutions to many other buildings and parks, they remained relatively limited and unable to help more urban inhabitants with mental disorders. Consequently, in post-COVID-19, it is increasingly necessary to establish a comprehensive, inclusive, and acceptable emotional healing intervention system that can be dispersed around the city to create resilient communities.

Design thinking stimulates interdisciplinary systemic innovation for community emotional healing

The COVID-19 pandemic is a painful reminder that society has to face increasingly complex global issues and an uncertain future, with unanticipated extreme crises and unforeseen domino effects that will pose enormous challenges to the functioning mechanisms of the whole society. Spatial distances have never been as short as today, and human connections have never been as extensive, fragile, and fleeting. In the post-COVID-19 era, it is crucial for organisers, practitioners, and change-makers to reduce the vulnerability of systems and establish resilient communities. This research demonstrates community emotional healing by examining existing methodologies, real-world bottlenecks, and the development potential of psychology, medicine, sociology, and design, then driving interdisciplinary system innovation to help society back on the right track.

Most contemporary places of community emotional healing are centralised healing hospitals or healing parks, which indicates that residents must first recognise their mental illness and be willing to seek assistance at these institutions. However, only a fraction of people actually take action, and the vast majority of residents endure severe psychological stress alone. From an urban planning and design perspective, public art installations, which are also dispersed across the city, have the potential to act as emotional touchpoints for the community. As shown in Figure 2, this research chooses Chifeng Road as an experimental emotional healing intervention location, discovers the fragmented area around the road, and then subtly implants emotional healing installations without interfering with inhabitants' usual life areas. The intervention designs are supported by medical and psychological research. From a sociological perspective, a healthy psychological state and an empathetic community atmosphere can adequately protect against periodic extreme crises and stimulate the potential for additional social innovation.



Figure 2. The emotional healing intervention on Chifeng road. Source: the author.

Figure 3 illustrates a series of leftover spaces on Chifeng Road. The design team extracted elements from the surroundings to connect the newly intervening emotional healing installations and the original environments in terms of shape, structure, interaction, material, and colour.

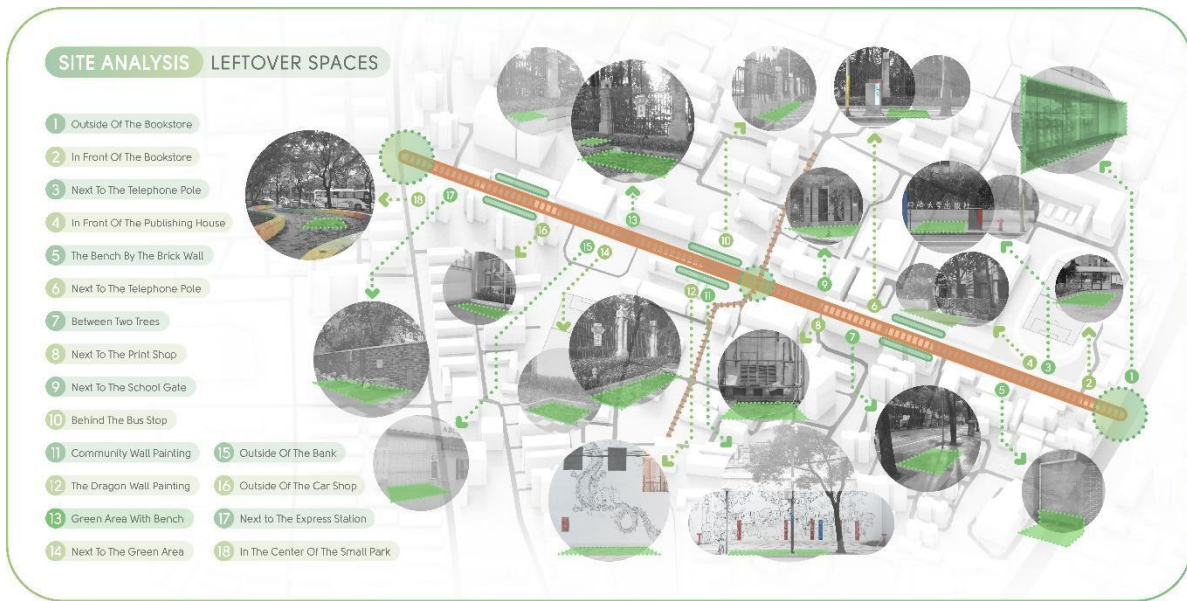


Figure 3. The leftover spaces of the surroundings. Source: the author.

There is much colourful linear graffiti on the utility poles and distribution boxes on Chifeng Road, in six colours: red, orange, yellow, green, green, and blue. Therefore, when implanting the new community emotional healing public art installation, the colours can interact and echo with the existing pole graffiti.

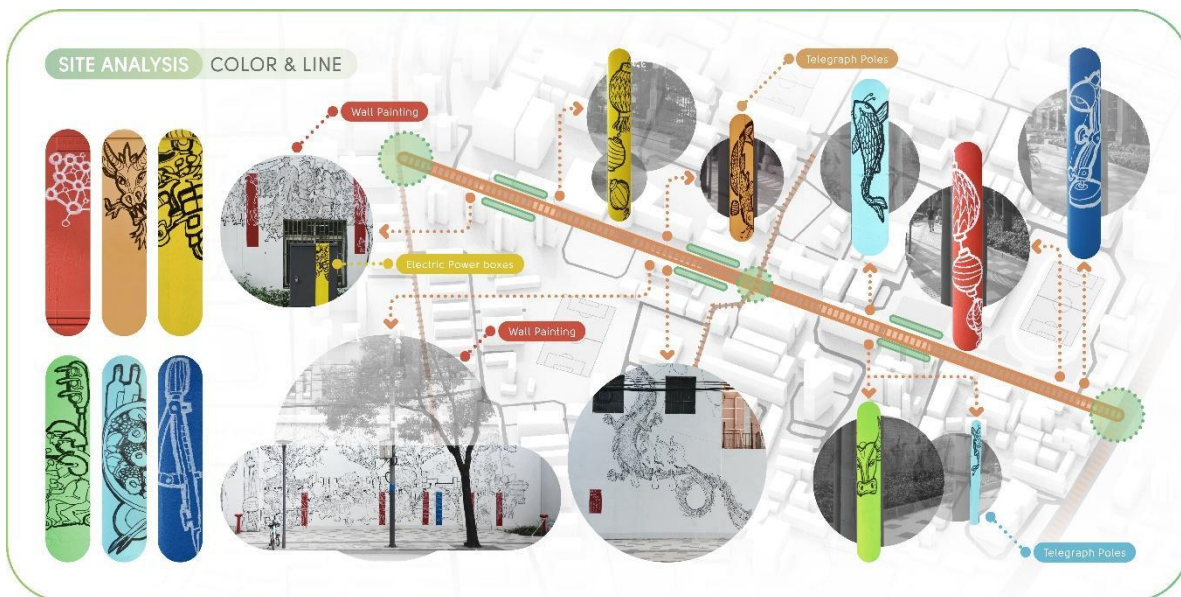


Figure 4. Linear graffiti and colour analysis of the surroundings. Source: the author.

Spring Butterfly Installation

More specifically, we chose the spring butterfly installation located in the middle section of Chifeng Road. The colour echoes the green graffiti on the side poles, and the texture on the bottom platform reflects the butterfly installation and the overall atmosphere of the street. The interactive method lets the neighbouring residents pass their feet through the hollow area of the butterfly wings and drive the butterfly through the swaying. Meanwhile, the generated mechanical energy will further make the butterfly wings flap, increasing the instant interactivity of the installation.

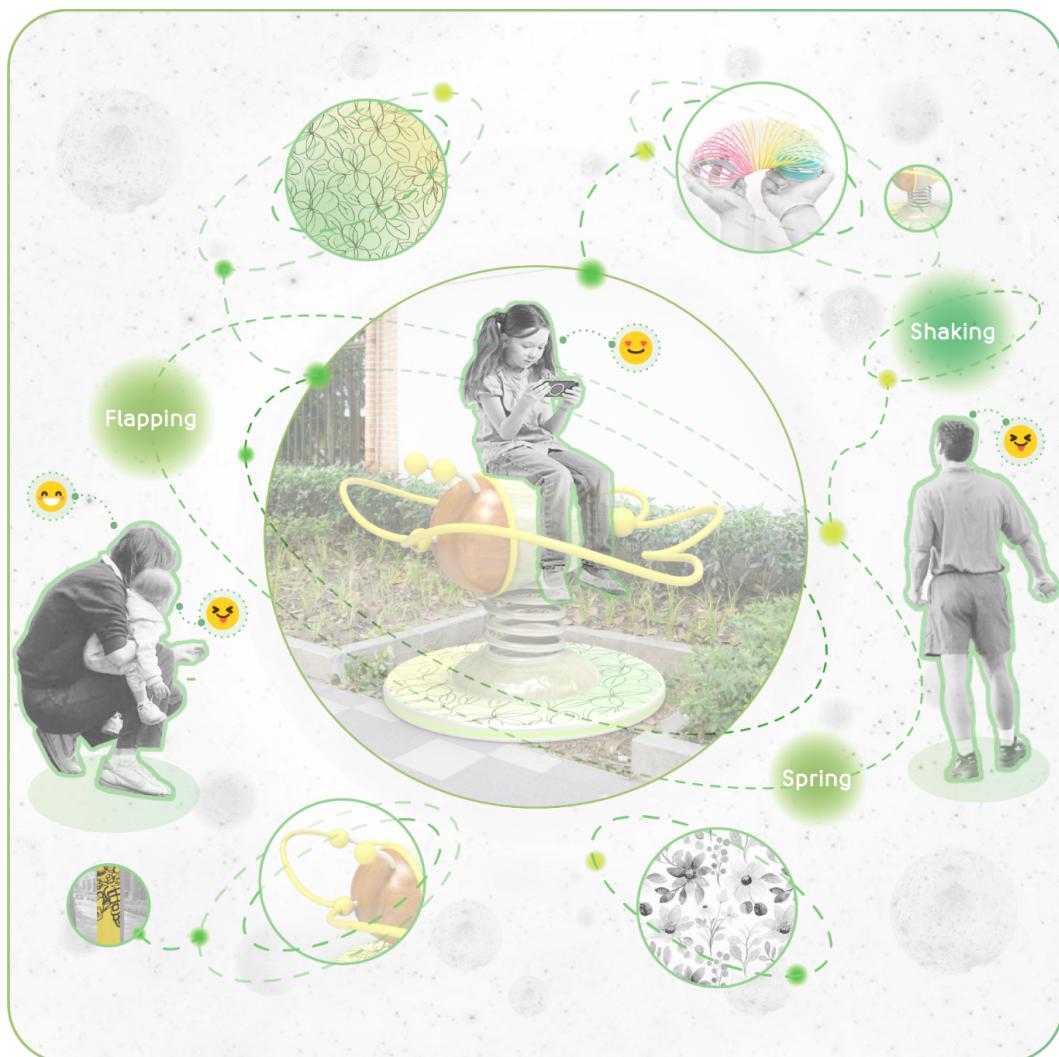


Figure 5. Spring Butterfly installation. Source: the author.

Constellation Orbit Installation

This healing installation lies at the intersection of Chifeng Road and Miyun Road. Richly coloured mosaic tiles surround the area, so we place a colourful installation in the centre while maintaining human movement on both sides. The structure is inspired by the starry night, where people used to make wishes on the vast and profound sky, holding simple and beautiful wishes. The bottom platform is textured with concentric circles, echoing the rotating interaction. Residents and children can push the green planets on both sides, and the generated mechanical energy will drive the entire galaxy.

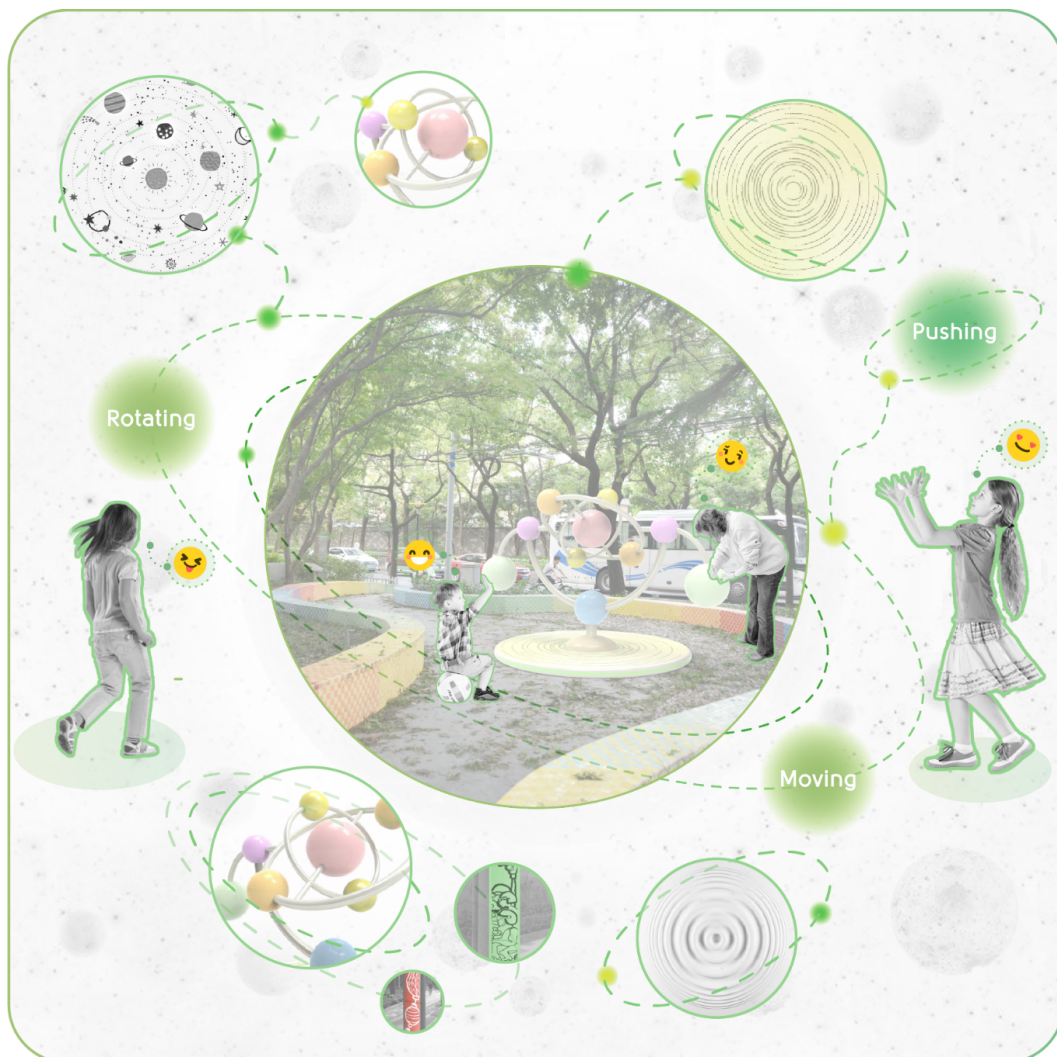


Figure 6. Constellation Orbit installation. Source: the author.

Conclusion

This research investigates the capabilities and constraints of multidisciplinary fields such as design, medicine, psychology, and sociology in the post-COVID-19 pandemic. Then connects several related disciplines to drive multiple innovations, incorporating design elements such as interactive installation design, empathy design, and inclusive design, as well as relating them to social fields such as public mental health, resilient society, community interaction, and social emergency response. From the spatial component linked with design and sociology, the emotional healing intervention system has efficiently exploited the "forgotten places" of the city, thereby making the surrounding areas more appealing and fostering the growth of resilient communities. From the medical and psychological aspects, by interacting with the installation in the outdoor space and experiencing the emotional healing journey, the surrounding residents could heal the psychological alienation, better adapt to the post-pandemic life, and jointly promote a more resilient, flexible, inclusive, and sustainable society.

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