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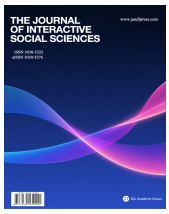

Synchronicity in Generative Art: Empowering Depression Healing

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ABSTRACT

With the deep integration of digital technology and psychological intervention, digital media art demonstrates significant potential in the field of depression therapy. Traditional art therapies may encounter challenges in depression intervention due to audience motivation deficits and high cognitive barriers, limiting their efficacy. This study, grounded in Jung's theory of synchronicity, explores how generative art restores audiences' impaired sense of agency through real-time interactive mechanisms. Two exemplary cases were selected: Fei Jun's Theater of Emotions: A Landscape of the Heart and Mind and Dan Ghenacia's The Alphawave Experience. These were analysed in depth across two dimensions—psychological 'emotional mapping' and physiological 'neuro-regulation'—to reveal the dual pathways through which digital environments alleviate depressive symptoms. The research reveals that generative art, by establishing synchronous feedback between physiological indicators and visual landscapes, effectively disrupts individuals' negative cognitive rumination, facilitating a shift from 'emotional mutism' to 'active reconstruction'. Finally, the article explores ethical challenges in digital healing concerning sensory overload and virtual escapism, proposing future development of personalised adaptive intervention systems with interdisciplinary oversight.

1. INTRODUCTION

1.1 The Deep Integration of Digital Technology and Psychological Intervention

Over the past decade, digital art and virtual reality (VR) technology have undergone transformative development, with their applications expanding from the early entertainment industry into healthcare and psychological intervention domains (Bateni et al., 2024). Virtual reality technology, with its distinctive immersive and interactive qualities, enables the construction of perceptible simulated environments for patients. This allows them to confront and process

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psychological stressors intuitively within a safe, controlled setting (Zhang & Bakhir, 2024). Currently, VR-based exposure therapy, relaxation training, and scenario reconstruction have demonstrated significant potential in the clinical treatment of post-traumatic stress disorder (PTSD), anxiety disorders, and depression (Kim et al., 2021).

1.2 The Efficacy and Limitations of Art Therapy

Existing research indicates that art therapy, as an intervention promoting emotional externalisation and self-integration through artistic creation, has been demonstrated to exert a clear positive effect in alleviating depressive symptoms (Wu, 2024). The aesthetic experiences and symbolic expressions inherent in the creative process assist patients in establishing novel psychological defence mechanisms, thereby improving mood states (Wu, 2024).

However, traditional art therapy faces practical "barriers to entry" when intervening in depression. Patients with major depressive disorder frequently exhibit marked cognitive impairment and psychomotor retardation, manifesting as slowed movements, stagnant thought processes, and profound feelings of helplessness (Northoff, 2021). For such individuals, the subjective perception of time and space as 'heavy' and sluggish often renders conventional creative activities difficult to undertake, potentially exacerbating their sense of frustration.

1.3 Generative Synchronicity Art: An Empowering New Pathway

Addressing the aforementioned challenges, this study proposes centring on 'generative' technologies within digital media art, incorporating Carl Jung's theory of 'synchronicity' as its foundational logic (Boden & Edmonds, 2009; Jung, 1952/2010). Jung posited that synchronicity describes non-causal synchronous connections between subjective psychological states and objective external events (Jung, 1952/2010).

Within the context of digital media art therapy, this 'synchronicity' manifests as 'the instantaneous synchronisation of embodied actions with visual evolution.' Through deep interaction with the installation, the patient's actions are captured in real-time and instantly translated into fluid, aesthetically pleasing artistic imagery. This process establishes an immediate feedback loop where 'action is image, and image is action.' Within this highly synchronised interactive space, patients cease to be passive providers of data. Instead, through autonomous movement, they guide the generation of visual landscapes, thereby reclaiming agency and psychological empowerment through real-time control over artistic form.

1.4 The research approach: Achieving psychological empowerment through a "sense of agency"

The core value of this synchronous generative art lies in lowering the "expressive threshold" for healing. Patients require no artistic skills whatsoever; through low-cognitive-load interactions, they can achieve "creative" acts within the digital domain.

This immediate interactive feedback effectively reawakens the sense of agency—a crucial cognitive process—in individuals with depression. This involves the rediscovery of one's capacity to influence the external world (Wen et al., 2015). When such 'synchronic' feedback is visually manifested, patients transition from passive recipients of treatment to active 'creators of life rhythms,' thereby achieving psychological empowerment.

1.5 Research Objectives and Methodology

This study employs a case analysis methodology, aiming to explore the specific application mechanisms of synchronic interaction logic in depression intervention through an in-depth deconstruction of representative digital media art therapeutic installations. The research will focus on analysing how different cases alleviate patients' feelings of helplessness and enhance their psychological rehabilitation motivation via the 'input-synchronisation-feedback' pathway. Through these analyses, this study seeks to provide theoretical references and practical guidelines for the design of future interactive psychological rehabilitation systems.

2. METHODOLOGY & FRAMEWORK

2.1 Case Selection Criteria: Interactivity, Generativity and Therapeutic Orientation

This study employs case analysis within qualitative research methodology to explore the mechanisms through which specific digital media art installations intervene in depression. To ensure representativeness of the sample, a comprehensive screening framework comprising three dimensions was established:

Firstly, cases must exhibit highly interactive embodied participation (Interactivity). Interactivity constitutes not only a core attribute of digital media art but also the technological foundation for restoring a sense of agency in individuals with depression (Wen et al., 2015). Selected cases require sensitive input capture systems (e.g., motion capture, biosensors) capable of translating patients' physical actions into immediate visual feedback. This high degree of synchrony enables patients to re-establish a sense of control over the external world.

Secondly, the case study must demonstrate algorithm-driven generativity, which is key to lowering the threshold for therapeutic expression. The unpredictable and real-time evolving nature of generative art outcomes allows patients with impaired cognitive function or diminished motivation to participate in "active creation" through simple interactions without specialised training, thereby effectively mitigating the frustration often associated with traditional creative activities.

Thirdly, this study rigorously selects works with explicit healing orientation. These cases are not generic interactive installations but practices designed from conception or applied within contexts specifically targeting interventions for human psychological issues. By analysing how these devices facilitate a shift from passive reception to active creation through visual compensation, this research aims to uncover the underlying psychological empowerment pathways.

2.2 Analytical Dimensions: A Dual Perspective Based on 'Synchronicity Interaction' and 'Proxy Sense Reshaping'

To deconstruct the intrinsic logic of generative art's intervention in depression, this study constructs an analytical framework integrating 'technological logic' and 'psychological mechanisms'. This framework employs Jung's theory of 'Synchronicity' as its horizontal logic, focusing on how the installation achieves real-time synchronisation between embodied actions and visual evolution (Jung, 1952/2010). Within the context of digital media therapy, synchronicity is transformed into a low-latency feedback mechanism. By analysing input data synchronisation rates and the correlation of aesthetic mapping, this study reveals how the installation creates a unified digital field for patients, merging subjective experience with objective representation.

Building upon this, the framework adopts the restoration of a 'Sense of Agency' as its

longitudinal analytical objective. This psychological state—where individuals recognise themselves as initiators of actions capable of producing intended effects—represents a dimension commonly absent in individuals with depression (Wen et al., 2015). This study will examine the degree of alignment between ‘expectations and feedback’ in the case study, exploring how immediate interactive feedback reawakens patients' sense of capacity to influence the external world. Through this dual-dimensional perspective, the research aims to evaluate the practical efficacy of synchronic interactive fields in alleviating psychological inertia and enhancing rehabilitation motivation. Ultimately, it explores how digital media art achieves a profound transformation from visual mastery to psychological empowerment.

3. THEORETICAL MECHANISM & DIGITAL PATH

3.1 Digital Synchronicity: From Psychic Resonance to Real-Time Interactive Mapping

From Jungian psychology's profound perspective, an individual's psychological activity is not an isolated island but is deeply rooted within humanity's shared historical memory and emotional schemata. Jung posited that the collective unconscious forms a transgenerational psychological structure through genetic and cultural transmission, bearing universal archetypes and emotional experiences (Yüceyurt, 2025). The essence of immersive interactive art lies in its capacity to evoke collective unconscious awareness through digital media, enabling individuals to discern profound psychological connections between the self and the collective. This connection finds vivid expression in Jen Lewin's installation The Pool: an interconnected network of 106 luminous pads transforms participants' walking and running into ripples of sound and light, creating a visually striking experience that blends playfulness with collective resonance (Figure 1). This interaction essentially replicates humanity's age-old tradition of sustaining community and conveying emotion through dance. Within the artistic space, participants move freely according to their authentic feelings. Within the intertextuality of collective dance, the shame of dancing alone is dispelled, replaced by a sense of security and belonging rooted in shared cultural foundations (Lewin, 2012).

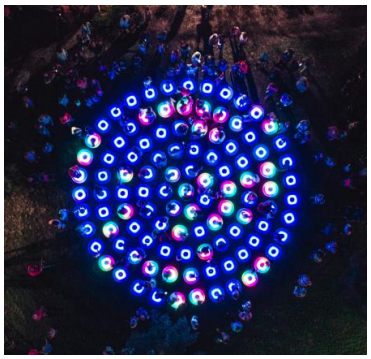

Figure 1. The Pool, an interactive installation by Jen Lewin

Within the digital context, synchronicity has evolved from an abstract psychological resonance into a physical phenomenon of “real-time interactive mapping”. The core of this transformation lies in technology's instantaneous response to human actions – a technologically mediated synchronous feedback mechanism. Huang's (2025) in-depth analysis of the work Rain Room reveals how this ‘rain follows movement’ feedback mechanism grants participants a sense of environmental control rarely achievable in reality. For individuals with depression who endure prolonged feelings of powerlessness and loss of control, the secure emotional projection space created by digital technology can trigger profound dialogue between the body and its environment. This facilitates

the externalisation of internally repressed emotions and enables a form of psychological catharsis. This paradigm shift from static documentation to dynamic ‘digital ecosystems’ transforms artistic intervention from mere spectator appreciation into participant empowerment.

Further analysis reveals that digital synchrony effectively breaks the cognitive loop of depression through the instantaneous multisensory coordination it facilitates. When immersive installations synchronously engage multiple participants' senses and behaviours, they trigger a form of trans-individual ‘emotional resonance’, guiding participants away from negative self-absorption towards active perception of the external environment. The sense of control generated by this ‘synchrony’ is pivotal to psychological empowerment: it demonstrates how precise alignment between action and feedback significantly enhances an individual's sense of efficacy. Building upon this logic, this study proposes that by leveraging interactive technologies to establish deeper logical connections, digital synchronicity can transcend mere sensory experience to become a tool for self-integration. Through algorithmically driven semantic mapping, generative art can surpass simple action-response dynamics to achieve profound psychological restructuring and therapeutic empowerment for individuals experiencing depression.

3.2 Restoring Sense of Agency: How Interactive Technologies Awaken Proactive Motivation

Within the domain of digital media art interventions for depression, restoring a sense of agency depends not only on sensory impact but crucially on the experiential process of communication and interaction between the individual and the designed product. Since its inception in 1984, interactive design has centred on the ‘dynamic’ and “open” nature of systems (Xu et al., 2020). This open system architecture provides individuals with depression a collaborative ‘field of meaning’ for interaction. Through mechanisms operating at three levels, it facilitates a shift from passive aesthetic engagement towards active creative motivation.

3.2.1 Immersive Perception and the Elimination of the 'Threshold of Expression'

Individuals with depression frequently experience impaired cognitive function and diminished aesthetic perception, resulting in exceptionally high ‘expression barriers’ within traditional art therapy. Grounded in the design principle of ‘immersion,’ new media interactive installations serve as ‘perceptual scaffolds’ through audiovisual integration and multisensory coordination, thereby enhancing participants' artistic perception capabilities (Huang & Zhang, 2021).

From an ‘emotional mediation’ perspective, interactive technology facilitates a form of ‘technological compensation’: it simplifies complex artistic techniques into dynamic responses grounded in embodied intuition, thereby bridging the gap between ‘creative intent’ and ‘visual output’ (Shi & Yin, 2025). At the visceral level of affective design, this low-threshold immersive experience rapidly captures patients' attention, alleviating the frustration arising from lack of motivation during the initial creative phase, thereby providing an initial impetus for the awakening of agency.

3.2.2 Non-judgmental Feedback and Proxy Sense Validation at the Behavioural Level

Interaction design defines the form of communication between individuals, enabling mutual coordination and achieving optimal functional outcomes. At the behavioural level, the interactive apparatus functions as a non-judgmental partner, providing patients with a secure experimental environment for exploring a sense of proxy.

Unlike the aesthetic evaluation pressures encountered in traditional social or artistic contexts, each capture and immediate feedback of bodily movements by the interactive system constitutes a faithful affirmation of the 'behavioral efficacy' (Shi & Yin, 2025). When patients discover that their subtle embodied actions can trigger immediate environmental changes, this high degree of 'expectation-outcome' alignment directly validates their identity as behavioural initiators. This instant feedback loop effectively disrupts the 'learned helplessness' commonly observed in depression, progressively restoring impaired agency through interactive experiences.

3.2.3 Integration at the Reflective Level and Motivational Arousal through Emotional Mediation

The ultimate restoration of agency points towards an individual's self-integration. Introducing the framework of 'emotional design' reveals that healing ultimately requires elevation from the behavioural level to the reflective level, focusing on patients' deeper needs and emotional shifts (Huang & Zhang, 2021).

Interactive technology functions as an 'emotional mediator' in this process, transforming inexpressible repressed emotions into observable, perceptible visual symbols (Shi & Yin, 2025). Through multisensory coordination, patients' attention shifts from negative self-absorption towards positive perception of the external environment. This process of emotional externalisation fosters profound psychological empowerment as patients observe the dynamic landscapes they have created. This internalisation—transitioning from a sense of technological mastery to psychological agency—signifies the full awakening of proactive creative drive, completing the role transformation from passive treatment recipient to active creator of life rhythms.

3.3 Paradigm Shift: From Passive Aesthetic Experience to Active Psychological Empowerment

With the deep integration of new media technologies, interactive installations are undergoing a profound paradigm shift in their role within art therapy. Driven by interactive algorithms, these installations have evolved from traditional 'static aesthetic objects' into 'dynamic digital ecosystems' characterised by real-time responsiveness and a sense of vitality (Gao et al., 2025). This transformation represents not merely an upgrade in technical form, but a fundamental shift in therapeutic approaches – from 'passive aesthetic engagement' towards 'active empowerment'.

3.3.1 The Transformation of Media Identity: From Static Object to Dynamic Ecological Field

Traditional art therapy often treats artworks as static, retrospective "mirrors", with patients achieving emotional resonance through observation. However, within the current digital interactive context, interactive installations are no longer isolated aesthetic objects but real-time fields capable of exchanging energy with patients. This shift transforms the therapeutic process from 'the patient viewing the artwork' to 'the patient entering and altering the field.' This 'virtual-physical symbiosis' interaction mechanism significantly enhances immersion, forcibly breaking the cognitive loops common in depression patients. It guides them away from negative rumination towards active perception of the external dynamic environment (Gao et al., 2025).

3.3.2 Reconfiguring Power Dynamics: Psychological Empowerment Through Technological Compensation

Another core feature of this paradigm shift is the 'democratisation of creative agency'. For individuals with depression experiencing a lack of motivation, traditional artistic creation often

imposes high ‘activation pressure’ due to its demands on skill and physical exertion. New media interactive technologies, through algorithmic assistance, instantly transform patients' vague psychological intentions into high-quality artistic landscapes, thereby bridging the ‘skills gap’ (Huang & Zhang, 2021). This role transition from ‘I cannot create’ to ‘I can drive environmental generation’ not only provides patients with immediate achievement but also delivers direct psychological empowerment through restored agency.

3.3.3 Progression from Sensory Experience to Scientific Intervention Pathways

The ultimate objective of this paradigm shift is to transition art therapy from ‘vague sensory experiences’ to ‘scientifically controllable dynamic interventions’. Precise feedback based on interactive data enables the installation to dynamically adjust the colour, rhythm, and spatial logic of visual feedback according to participants' force, frequency, and emotional projection during embodied interaction, thereby constructing a personalised therapeutic closed loop (Malchiodi, 2020).

The efficacy of this scientific intervention has been preliminarily validated in clinical practice. For instance, clinical psychology professor Daniel Freeman and therapist Polly Haselton conducted virtual reality (VR)-based cognitive behavioural therapy for pilot Leslie Channell's acrophobia (She & Ben, 2022). By immersing the patient in a highly controllable 3D virtual environment, this simulated setting provided ‘progressive exposure’ and immediate feedback—challenging to achieve in the real world—ultimately significantly alleviating the patient's pathological fear. This case compellingly demonstrates that this pathway, grounded in digitally synchronised feedback and the reshaping of agency, signifies that digital media art is no longer merely an auxiliary tool for psychological intervention. Instead, it has evolved into an independent therapeutic paradigm capable of achieving self-integration and functional intervention.

4. CASE STUDIES

4.1 Case Study I: Interdisciplinary Art Experiment 'Theatre of Emotions: A Landscape of the Heart and Mind'

As an interdisciplinary artistic experiment collaboration between artist Fei Jun and psychologist Liu Zhengkui, “Theatre of Emotions: A Landscape of the Heart and Mind” presents a highly representative empirical case study for digital media intervention in psychological treatment through the profound integration of art and technology. Visually, the work deconstructs and reconfigures the aesthetic realm of traditional Chinese ink-wash landscapes. Audibly, it incorporates clinically validated therapeutic natural soundscapes provided by the Institute of Psychology, Chinese Academy of Sciences. Together, these elements construct an immersive psychological field where beauty nurtures the mind (Fei et al., 2024). Within the interactive process, participants are guided to specific emotion-sensing stations, where embodied positioning marks their formal entry into the pre-designed psychological intervention space (Figure 2). Subsequently, the installation's embedded artificial intelligence and affective computing technologies begin non-invasively capturing participants' physiological signals and psychological fluctuations. These implicit emotional data serve as the driving core, generating real-time, ‘person-specific’ digital landscape imagery (Figure 3). The intensity of ink tones, the rigidity or fluidity of brushstrokes, and the cadence of soundscapes all undergo unpredictable transformations in response to the participant's fleeting emotional state. This interaction fundamentally constitutes a process where every subtle movement and emotional state of the participant is ‘recorded, responded to, and

amplified' in real time by the system. Consequently, what the audience perceives on the screen is no longer an abstract, objective landscape, but a digital mirror image of their inner state. This achieves, at a technological level, a synchronous resonance within the digital dimension.

This profoundly interactive mechanism elicits significant positive psychological effects among audiences, facilitating a shift from passive aesthetic appreciation to active psychological empowerment. Through this real-time feedback loop, individuals gain a secure, metaphorically charged projection window when confronting emotions that were previously difficult to articulate or deliberately suppressed. When audiences discover that their subtle breaths, movements, or emotional fluctuations can drive the flow and transformation of vast digital landscapes, an immediate feedback mechanism of 'I move, therefore the environment changes' is activated. This effectively repairs and reinforces the audience's diminished sense of agency at the embodied cognition level. Within this interactive context, negative emotions cease to be daunting shadows and instead become dynamic nutrients for constructing magnificent landscapes. This process—beginning with 'confronting emotions,' progressing through 'emotional cognition' and 'dynamic transformation,' and culminating in 'emotional acceptance'—signifies that digital media interactive installations are no longer mere tools for sensory stimulation. They have evolved into an independent therapeutic paradigm capable of guiding individuals towards self-integration and functional self-healing. Within this domain, audiences not only overcome their apprehension towards confronting inner conflicts but also regain a sense of control over their inner worlds through mastering the digital landscape. This process elevates them from passive recipients to active creators of vital rhythms.

Figure 2 & Figure 3. Theater of Emotions: A Landscape of the Heart and Mind by Fei Jun

4.2 Case II: Neurophysiological Intervention Space: Alpha Wave Experience

Compared to Case 1's emphasis on active emotional mapping, multimedia artist Dan Ghenacia's The Alphawave Experience demonstrates how multimedia spaces can achieve functional physiological intervention through "neuro-induction" (Figure 4). Within the specific interactive process, participants enter a state of full-body relaxation whilst reclining, wearing high-performance headphones to achieve audiovisual immersion. With eyes tightly closed, the installation employs a stroboscopic effect mechanism, using rapid, periodic high-frequency light pulses to penetrate the eyelids and stimulate the optic nerves.

To validate the efficacy of this device, Dan Ghenacia's team conducted a specialised experiment entitled 'The Alphawave Experience Neurophysiological Study' under the guidance of neuroscientist Dr Francisco Marques Teixeira (cited from IbizArtGuide, n.d.). This research confirmed that this technique of stimulating the brain with light is an exceptionally efficient form

of neuromodulation. It induces the generation of alpha brain waves—typically observed during sleep or deep meditation—even with eyes closed, triggering ‘psychedelic visual experiences’ composed of geometric patterns and flowing colours. The study's conclusions explicitly highlight the device's significant potential for enhancing cognitive function and improving emotional states. It demonstrates notable clinical value particularly in alleviating stress and anxiety, assisting with addiction recovery, reducing migraine and insomnia frequency, and stimulating creativity. This pathway, based on digital stroboscopic feedback, signifies that multimedia therapeutic spaces have evolved from purely aesthetic media into scientifically controllable neuro-modulation tools, achieving a paradigm shift from ‘sensory experiences’ to ‘precise physiological interventions’.

Figure 4. The Alphawave Experience by Dan Ghenacia

4.3 Comprehensive Evaluation: Analysis of the Efficacy of Technological Interventions in Alleviating Depressive Symptoms

Through deconstruction of the aforementioned two cases, it becomes apparent that digital media technology has established a comprehensive efficacy system for alleviating depressive symptoms, spanning from psychological projection to physiological regulation. On the psychological dimension, depressive symptoms are frequently accompanied by pronounced feelings of personal incapacitation and emotional expression disorders. The interactive logic of ‘recording, responding, and amplifying’ demonstrated in Case I effectively establishes a secure window for emotional externalisation for the audience. This digital mirroring mechanism achieves synchronous feedback in psychological terms, enabling audiences to perceive that their physiological changes can drive expansive digital landscapes. This fundamentally repairs impaired agency. Relevant clinical empirical research indicates that virtual art intervention environments can significantly enhance individuals' self-efficacy and rehabilitation motivation by increasing their engagement (De Giorgi et al., 2023). When audiences perceive control over the external field, their internal sense of helplessness dissipates, thereby completing a psychological transformation from emotional suppression to active acceptance.

Concurrently, digital media technology's intervention at the physiological level manifests as a paradigm shift from ‘neurological dysregulation’ towards ‘state induction’. Addressing the abnormal cortical arousal levels commonly observed in depressed individuals, Case II employs the stroboscopic effect to induce alpha brainwave synchronisation, offering an efficient neuromodulation technique. This physically enforced synchronisation effectively pulls the brain from negative cognitive rumination into a balanced state of deep meditation. Such intervention no longer relies on verbal expression from the recipient but achieves a paradigm shift from external physical stimulation to internal conscious self-healing through precise physiological feedback.

In summary, digital media technology interventions exhibit three core characteristics: real-

time feedback, non-invasive immersion, and personalised generation. It not only provides immediate physiological and psychological mirroring but also reduces defensive psychological barriers in depressed individuals by constructing a non-verbal intervention environment. This intervention has evolved from a static ‘aesthetic object’ into a dynamically generated ‘functional prescription’ tailored to an individual's real-time state, demonstrating broad application prospects in both clinical and public mental health maintenance.

5. CONCLUSION & FUTURE WORK

This study deconstructs digital media art intervention cases to validate the core efficacy of technological media in alleviating depressive symptoms, thereby constructing a comprehensive logical framework spanning psychological projection to physiological regulation. Interactive systems exemplified by Theater of Emotions: A Landscape of the Heart and Mind successfully restore audiences' impaired sense of agency through a feedback mechanism of ‘recording, responding, and amplifying,’ facilitating a transition from emotional mutism to proactive self-reconstruction. Meanwhile, neuro-modulation environments exemplified by Alpha Wave Experience utilise the stroboscopic effect to induce brainwave synchronisation, forcibly interrupting audiences' negative cognitive rumination and providing a scientifically controllable pathway to profound physiological relaxation. Research indicates that the success of digital healing depends not only on technological sophistication, but equally on the precision of artistic translation and the immersive quality of the intervention environment.

However, as digital technology increasingly permeates the individual's mental landscape, we must confront the accompanying ethical risks and safety boundaries. Firstly, the “ultimate immersive experience” pursued by digital art installations presents a double-edged sword for individuals experiencing depression. Intense visual stimuli—such as high-frequency flickering, highly saturated colours, or abrupt spatial distortions—may exceed the audience's “window of tolerance” and induce sensory overload (Siegel, 2020). For audiences with fragile psychological defences, excessive sensory intervention may not only fail to produce therapeutic effects but could instead trigger anxiety, dissociation, or even physiological panic responses. This necessitates establishing a ‘minimum stimulation threshold’ standard for technological interventions, grounded in real-time audience feedback.

Secondly, digital healing confronts an ethical paradox of “virtual escapism” and “detachment from reality”. Digital therapeutic systems often provide momentary solace by constructing a highly idealised, aesthetically refined virtual utopia. For those suffering from depression, however, this extreme illusion of beauty may create an overly jarring contrast with the heavy, complex realities of the physical world. Should the system overemphasise its ‘refuge’ function, it may induce pathological dependency, prompting users to seek emotional compensation within virtual realms while neglecting essential social connections in real life. This risk of ‘digital addiction’ may lead users to experience deeper feelings of helplessness and alienation when confronting real life after the intervention ends, thereby undermining the original intent of supporting functional recovery (Turkle, 2011).

Moreover, the deep extraction of individual biological data by digital intervention systems poses challenges to privacy protection and algorithmic ethics. The leakage of highly private ‘biometric fingerprints’ such as brainwaves, heart rates, and emotional trajectories could inflict irreversible negative consequences upon recipients. Concurrently, when algorithms autonomously

generate therapeutic landscapes within a ‘black box’ state, the invisibility of their internal logic may inadvertently trigger specific psychological trauma symbols in the audience, leading to intervention run amok. Consequently, systems must incorporate risk content alerts and immediate interruption mechanisms to ensure audiences possess absolute informed consent and autonomy over intervention content, thereby preventing technological intervention from evolving into a form of covert algorithmic control.

In response to the aforementioned challenges, future digital art interventions should strive to establish personalised adaptive mechanisms. Systems should not deliver uniform artistic prescriptions but rather incorporate dynamic feedback algorithms that automatically adjust the intensity of artistic output based on the audience's real-time physiological indicators, thereby achieving precise intervention. Concurrently, the principle that ‘artistic design serves as the medium, with medical monitoring as the baseline’ must be upheld. A clinical evaluation system involving collaboration between artists, psychological specialists, and neuroscientists should be established to ensure the scientific rigour of intervention content. Furthermore, designs should incorporate dedicated ‘psychological buffer periods’ or ‘exit pathways’. Through gradual transitions in audiovisual stimuli, these facilitate audiences' safe and smooth return from highly digitalised environments to the physical world, preventing a sense of detachment from reality.

In essence, digital media art's intervention in depressive symptoms represents humanity's tender application of technological means to enhance life's texture. Future digital healing should not merely pursue technological extremes but, while respecting individual emotional boundaries and safeguarding psychological security, contribute to building a more humanistic modern mental health system through deep interdisciplinary integration. This constitutes not only technological advancement but also a profound reconciliation between art and science on the scale of humanity.

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