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Exploring the implications of the metaverse: opportunities and challenges for dance movement therapy

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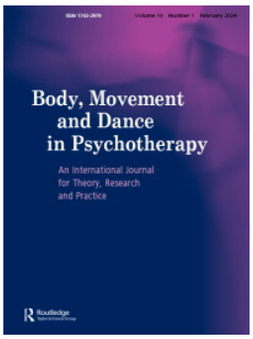

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Exploring the implications of the metaverse: opportunities and challenges for dance movement therapy

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ABSTRACT

This paper explores the integration of emerging technologies, specifically the metaverse and virtual reality (VR), into the field of dance movement therapy (DMT). The metaverse is conceptualised as a unified, immersive 3D virtual environment that transcends the limitations of the physical world. The author includes vignettes illustrating the practical application of VR in therapy and relaxation as used currently and speculates about the potential future applications of multi-sensory virtual environments. The paper reflects on the concept of embodiment in VR and its potential implications for DMT, discussing the convergence and divergence of principles. The paper concludes with a discussion on the ethical considerations, highlighting privacy, data security, informed consent, accessibility, inclusivity, psychological impact, therapeutic boundaries, cultural sensitivity, efficacy, evidence-based practice, and ethical development and deployment.

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KEYWORDS Technology; metaverse; embodiment; virtual reality; artificial intelligence; dance movement therapy

Introduction

Since the advent of the internet in the 1990s, technology has continually evolved. This evolution has seen the creation of various computer-mediated virtual environments, such as social networks, video conferencing, virtual 3D worlds (Lee et al., 2021). These environments, though transient and disconnected, have ushered in significant levels of digital transformation. The

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concept of the 'metaverse' has emerged, aiming to enhance this digital transformation across all facets of our physical existence.

The metaverse represents a concept widely regarded within the computer industry as the future evolution of the internet: a unified, continuous, and immersive 3D virtual environment where human experiences transcend the limitations of the physical world.

The term was first introduced by Neal Stephenson in his cyberpunk novel 'Snow Crash' and describes the metaverse as a network of interconnected virtual worlds where users can explore, socialise, trade, and interact through avatars, which represent them in the digital environment (Stephenson, 2008). The foundational technologies that would enable an internet based on virtual reality have been in development for many decades. A vast, interoperable network comprising real-time rendered 3D virtual worlds, accessible concurrently and continuously by a virtually unlimited number of users. Each user experiences a unique sense of presence within these worlds, maintaining continuity across various aspects such as identity, history, entitlements, objects, communications, and payments (Ball, 2022).

It is anticipated that a range of developments and applications will stem from this expansive concept. The World Economic Forum has defined it as a future persistent and interconnected virtual environment where social and economic elements mirror reality. Users can interact with it and each other simultaneously across devices and immersive technologies while engaging with digital assets and property (Defining and Building the metaverse, 2022). Additional highlights focus on the metaverse as an open, immersive, and interactive 3D virtual world which can break through the constraints of time and space in the real world (Wang et al., 2023).

At its core it comprises a convergence of seven core technologies VR/AR, artificial intelligence and machine learning, blockchain, internet of things, brain computer interfaces, 3D reconstruction and 5 G connectivity (Dwivedi et al. 2023). At its heart, the metaverse envisions an immersive internet – a vast, unified, enduring, and communal space (Figure 1).

Potential of the metaverse

Researchers have and continue to explore use cases in the field of healthcare, including mental health with much literature developing methodologies for diagnosis and treatment for mental wellbeing and effective psychotherapy (Riva et al., 2017). These findings suggest that the metaverse, when combined with physical or virtual in-person therapy, could offer significant opportunities for trauma treatment (Blum, 2021). Enterprises are already developing applications that train coping mechanisms for anxiety, phobias, and PTSD and other forms of driving

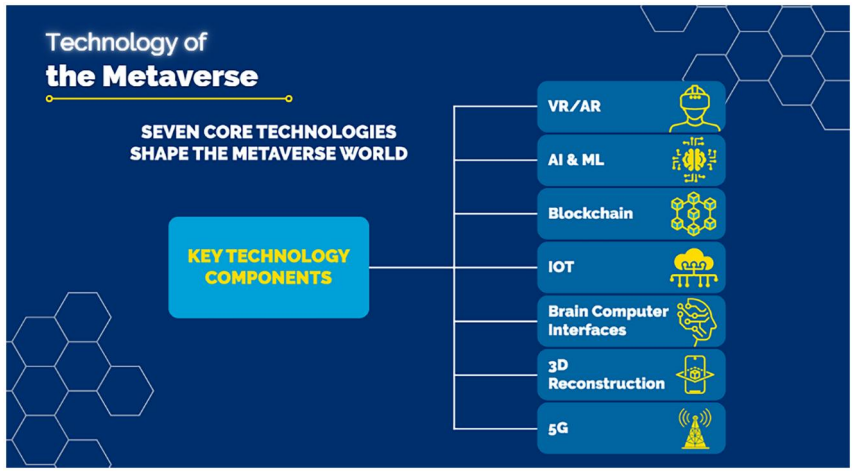

Figure 1. Seven core technological components that comprise the full vision of the metaverse.

behavioural change through emotional connection in virtual experiences. For example, researchers have seen results in addressing post-traumatic stress disorder (PTSD), as evidenced by research conducted at the Virtual Reality Research Centre, University of Washington (Rizzo et al., 2009). Furthermore, a study involving 9/11 survivors reported a 90% decrease in PTSD symptoms following a six-hour virtual reality (VR) session (Difede & Hoffman, 2002). Additionally, in a study involving Iraq War veterans, 16 out of 20 participants no longer met the diagnostic criteria for PTSD post-VR treatment (Rizzo & Hartholt, 2021).

As we delve deeper into the transformative potential of virtual reality within therapeutic contexts, it becomes evident that this technology may offer novel approaches to treatment and well-being. The following vignettes illustrate practical applications of VR in enhancing mental health care, each highlighting an integration of technology and therapy.

Vignette 1: Multisensory virtual reality as a tool for therapy and relaxation

The integration of multisensory elements in VR therapy sessions has shown promise in offering a comprehensive sensory experience (Gill, 2023). In a specially designed VR sensory room, individuals can select from a variety of headsets and engage in activities tailored to their therapeutic needs. The room features advanced VR technologies, including augmented reality, which brings static images to life, and an interactive wall that responds to voice and music. The highlight is a multisensory VR gaming chair, equipped with headtracking and haptic feedback, allowing for a hands-free, immersive experience. This approach to therapy caters to individual sensory preferences and can accommodate small groups for a shared therapeutic experience.

Vignette 2: Embodied therapeutic intervention delivered remotely

Anomie software is an innovative initiative that integrates VR technology with therapeutic practices, particularly focusing on enhancing mental health care (Salomons, 2023). Originating during the pandemic and co-designed with creative art therapists, Anomie aims to address the mental health crisis by leveraging the potential of VR in new therapeutic contexts. The concept was inspired by the successful use of VR in prisons, where it significantly reduced self-harm and suicidal thoughts among inmates. Anomie explores VR's role in therapy beyond traditional verbal communication, providing an alternative means for individuals who struggle with conventional methods of expression. Anomie represents a shift in therapeutic practices, offering a platform for remote embodied exploration in VR.

Vignette 3: Exploring embodied experience through soul paint: an intersection of art, technology, and therapy

Soulpaint is an interdisciplinary project at the intersection of immersive technology, neuroaesthetics, and healthcare, aiming to explore the complexities of the embodied human experience. It engages participants in a process of self-exploration and expression through 3D drawing and movement, facilitating a journey into personal and collective experiences.

The project utilises interactive technology to promote new forms of embodied insight, encouraging reflection on human experiences at both individual and global levels. Soulpaint's application extends beyond personal exploration, as it is intended for use in cultural institutions and is expanding into healthcare and research settings. The project exemplifies the potential of integrating artistic expression with therapeutic and research applications, highlighting its significance in understanding, and enhancing the human condition through a synthesis of art, technology, and healthcare (Ticho, 2023).

Vignette 4: Expanding therapeutic reach in schools through remote DMT

Kabuni metaverse has started to reshape educational practices in schools by offering immersive learning experiences that transcend traditional boundaries, providing students with innovative tools for enhanced engagement and learning (Mrvcic et al., 2023). This presents a potential avenue for delivering therapeutic interventions within school environments, even when therapists cannot be physically present. This technology allows DMT practitioners to conduct remote sessions within a secure 3D virtual world, providing students with opportunities to engage in therapeutic movement and expression, regardless of their physical location. By leveraging this platform, therapists can offer valuable support to students, promoting emotional well-being and addressing mental health needs within the school setting, while also adapting to the growing trend of remote interventions in education. This could serve as a valuable tool in enhancing the accessibility and effectiveness of therapeutic interventions within schools.

Virtual reality; simulation of the senses

Sensory perception in VR is of paramount importance and involves tracking and monitoring the body. VR's sensory-rich virtual environments immerse individuals in novel experiential digital contexts (Slater & Sanchez-Vives, 2016). The concepts of immersion, presence and embodiment blurs boundaries between the physical and virtual, fostering a psychological sense of 'being there' in the virtual world (Witmer & Singer, 1998).

Immersion in virtual reality (VR) refers to the extent of sensory engagement experienced by users when interacting with a virtual environment (Slater, 2009). Achieving this level of immersion involves a combination of technological factors and design principles and the current state of technology is such that the technology required to facilitate this yet does not exist as a comprehensive singular experience but are being developed in labs and research departments as independent components of a metaverse experience. Each of the five senses contributes to the immersive experience:

> Sight: Visual fidelity in VR is achieved through high-resolution displays, accurate rendering of graphics, and rendering techniques that mimic the real world (Koulieris et al., 2019).
>
> Sound: Auditory immersion complements the visual aspect by providing spatial audio cues. Sound design in VR enhances the sense of presence and realism, enabling users to locate and identify sounds in the virtual environment (Kern & Ellermeier, 2020).
>
> Touch: Physical immersion involves incorporating haptic feedback and tactile sensations into the VR experience. This can be achieved using haptic devices such as controllers, specialised gloves, or full-body suits, which provide users with a sense of touch and force feedback (Yin et al., 2020). Additionally, technologies like sonic waves can be introduced to simulate textures (Serafin et al., 2018).
>
> Taste and smell: Efforts are also underway to develop technologies for incorporating taste and smell into VR experiences, although they are still in the early stages of development (Ranasinghe et al., 2011). Furthermore, the potential future integration of Brain-Computer Interfaces holds promise for stimulating the senses in VR (Slater et al., 2009).

In the future, by integrating these sensory components, metaverse technology aims to create an immersive experience that closely resembles real-world interactions, offering users a sense of presence and engagement within the virtual environment.

Reflections on embodiment in VR

Embodiment in VR encompasses the feeling of ownership and agency over an avatar or digital representation that represents the user in the virtual

world (Slater et al., 2009). This is achieved through the integration of various sensory cues and feedback mechanisms that create a coherent and convincing bodily experience. The goal is to create a seamless connection between the physical body and the virtual representation, allowing the user to perceive and interact with the virtual environment as if it were the user's own body. Proponents consider that VR facilitates new forms of embodiment, allowing users to inhabit virtual avatars, sensing and feeling as digital beings and offers the opportunity to alter physical self-perception (Kilteni et al., 2012).

The central embodiment within VR and DMT frameworks (Meekums, 2002) reveal both convergent and divergent philosophies. As we move forward, it may become necessary to critically engage with these similarities and differences, to guide the integration of VR into DMT practices. Reflecting on these complexities can help ensure that the integration of VR respects and enhances, rather than dilutes or distorts, the fundamental principles of DMT.

Glimpses into the future

Dancing with pixels

The metaverse, is a collective virtual shared space, offers unlimited potential for interactions, allowing us to 'dance with pixels'. It provides immersion and presence but extends further, offering persistent, shared experiences (Dwivedi et al., 2022). Even more recent developments, in the world of VR and immersive technologies, researchers have coined the compelling analogy of The Extended Verse (XV) introducing 'atoms versus bits' to elucidate the paradigm shift (Mann et al., 2022). The change in thinking is based on the concept that we are evolving from a world bound by physical atoms to one defined by digital bytes. The introduced term offers a comprehensive alternative to the concept of the metaverse, understood more deeply as a social or shared reality of atoms (organic) and bits (computer generated).

This concept incorporates not only the immersive technology but also the broader expanse of shared perceptual experiences such as shared experiences, visceral movement, non-verbal communication, and emotional resonance. This suggests an expansive, collaborative sensory realm, which mirrors the vast potential of shared experiences within the dance therapy room. In the context of DMT, the XV's shared digital environment can broaden the scope of therapeutic experiences. No longer confined by geographical barriers, individuals can engage in shared, collective dance experiences from any location (Ferrari et al., 2016). Moreover, users in shared virtual space can benefit from using their bodies as a direct interface to communicate with each other. Through full body tracking, their interactions

in the digital environment become like face-to-face communication in the offline world, making it easier and more natural to connect and express emotion in the digital medium. This includes the ability to mirror their expressions and actions in social VR, as well as employ nonverbal methods of communication, such as using body movements to convey messages, through gestures like fist bumps, high-fives, poking, and shoulder touches, (Maloney et al., 2020).

However, this transformation is not without its challenges. In the XV, the physical body's sensory experiences—central to DMT—are rendered differently. The body must learn to understand, interpret, and connect with a digitally mediated world (Gorisse et al., 2017). As we 'dance with pixels', questions around authenticity, presence, and the nature of embodiment while in relationship with others in this new realm become pertinent.

Artificial Intelligence

Body data + enhancing virtual experiences

In the immersive synthetic world, human data tracking takes on a whole new level of significance (Ruiz Mejia & Rawat, 2022). These data points offer valuable insights into human behaviour and responses. Physiological data can be captures via wearable devices, such as eye tracking, facial recognition, galvanised skin response, heart rate and other biometric signals from the body (Heller, 2020).

These human data points tracked within the metaverse paint a comprehensive picture of human behaviour, emotions, and cognitive responses. This information fuels advancements in user experience design, content personalisation, and the creation of virtual environments that adapt and respond to users in real-time. It holds the potential to enhance the quality of interactions, deepen emotional connections, and create more immersive and meaningful experiences within the metaverse.

These data points can then be formed to support the development of Artificial Intelligence (AI) that enhances metaverse experiences by simulating intelligent behaviour and adaptive environments (Russel & Norvig, 2020). AI may facilitate personalised therapeutic experiences refining interventions based on an individual's therapeutic needs and progression using physiological data (Silver et al., 2017) (Figure 2).

The integration of VR, the metaverse, and AI may present profound implications and presents important considerations for DMT. Embodiment in VR and the metaverse can heighten body awareness, providing novel insights (Slater & Sanchez-Vives, 2016).

Moreover, the dynamic, responsive environments facilitated by AI may foster a greater sense of connection and engagement. These new,

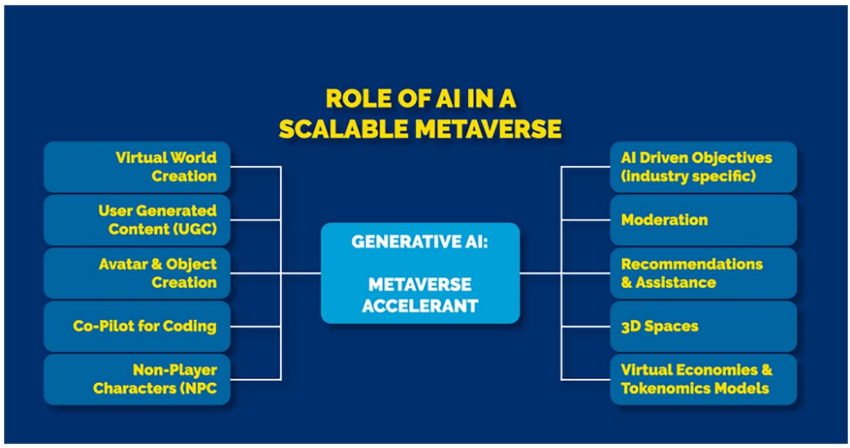

Figure 2. Artificial Intelligence has a significant role in the development of the metaverse.

emerging technologies could significantly augment the effectiveness of DMT. However, as our bodies dance in this digital landscape, we must critically examine the psychological, physiological, and ethical implications of these technologies (Madary & Metzinger, 2016).

Further considerations

The intersection the metaverse offers exciting new horizons. However, it demands critical, interdisciplinary research that prioritises ethical considerations and the needs of individuals receiving therapeutic interventions. As we move forward, further investigations should aim to understand the long-term psychological and physiological effects of embodiment in digital realms.

When considering the use of the metaverse and VR in DMT, several ethical considerations arise:

Privacy and data security: The use of VR and the metaverse involves the collection and processing of sensitive personal data, including biometric information. It is crucial to ensure that this data is securely stored and protected from unauthorized access or breaches, respecting client confidentiality and privacy.

Informed consent: Clients should be thoroughly informed about the nature of VR and metaverse interventions, including potential risks and benefits. Consent should be obtained with a clear understanding of what the therapy entails, how data will be used, and the option to withdraw at any time.

Accessibility and inclusivity: There should be a focus on making VR and metaverse-based DMT accessible to a diverse range of clients, including those with disabilities. This includes considering the affordability of technology and ensuring it can be adapted or customized for various needs.

Psychological impact: The immersive nature of VR can have intense psychological effects. Therapists should be trained to recognize and address any adverse reactions, such as disorientation, motion sickness, or emotional distress. The potential for VR to create a disconnection from reality should also be monitored.

Therapeutic boundaries and professionalism: The immersive and potentially anonymous nature of the metaverse might blur traditional therapeutic boundaries. Maintaining professionalism and clear boundaries in virtual spaces is essential to uphold the therapeutic alliance and ensure client safety.

Cultural sensitivity: Content within VR and the metaverse should be culturally sensitive and appropriate. Therapists should be aware of the cultural contexts of the virtual environments and content they use and ensure that they are respectful and relevant to the client's background.

Efficacy and evidence-based practice: Therapists should rely on evidence-based practices when integrating VR and the metaverse into therapy. Ongoing research and adherence to established therapeutic models and standards are important for ensuring the efficacy and safety of these interventions.

Ethical development and deployment: The development of VR and metaverse applications for DMT should involve ethical considerations at every stage, including user testing and feedback. This includes ensuring that the technology is developed and deployed in a way that prioritizes the well-being and needs of clients.

In summary, the integration of DMT with emerging technologies like the metaverse and VR marks the beginning of a transformative era in therapeutic practices. This convergence challenges conventional boundaries and significantly broadens the scope of what is possible in the realm of therapy and self-exploration. By blending the expressive and healing potential of DMT with the immersive and interactive capabilities of modern technology, a novel therapeutic landscape is being crafted—one that promises a future where digital and physical realms harmoniously intersect.

This innovative amalgamation not only enhances the therapeutic toolkit available to practitioners but also offers clients new pathways for healing and self-discovery. In this digitally augmented therapeutic space, individuals can 'dance with their pixels'. a metaphorical expression for engaging with one's digital avatar in a manner that reflects and influences their physical and emotional states. The experience transcends traditional therapy, allowing for a unique exploration of the self through a blend of movement, virtual interaction, and creative expression.

The possibilities are vast and varied, ranging from exploring virtual environments that evoke and process emotions, to engaging in rhythmic and expressive movements that are reflected and amplified in the virtual world. These experiences promise not just an escape but a deep dive into the self,

offering new perspectives and insights that might be difficult to access through conventional means.

Furthermore, this evolution underscores a vital aspect of human experience in the 21st century—the seamless integration of technology. As we move forward, it challenges us to redefine the understanding of physical and digital expression of human communication and connection.

Disclosure statement

No potential conflict of interest was reported by the author.

Notes on contributor

Nina Jane Patel, holding an MA in Dance Movement Therapy, integrates her therapeutic expertise with her interest in technological research and innovation. Her academic work, informed by her practical experience, delves into the complexities of digital interactions and its impact on humanity. Advancing her studies with doctoral studies at the University of Reading, Patel serves as the President of Research & Safety at Kabuni, offering her insights and knowledge to the field of emerging technologies.

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