



# Exploring the Psychological Potential of 3D Holography: from Psychoeducation to Clinical Practice

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## ABSTRACT

This work focuses on the potential opportunities that may arise from applying holographic techniques in general and clinical psychology. Holographic Augmented Reality (HAR), a method already used in medicine, allows for the visualization of three-dimensional images without the need for special glasses and can be employed in psychology for various purposes. The aim of this paper is to provide an overview of the literature on this innovative topic. This technique can be used in the fields of training, psychoeducation, prevention, and stress management. On a more clinical level, this technique may be applied in cognitive restructuring and emotional regulation, in fostering the development of social skills, in cognitive rehabilitation, and as a support in the treatment of various clinical conditions. This technology is still in a phase of limited application and, more importantly, still under development and research. However, the use of 3D holographic projections could, in the not-too-distant future, play a significant role in psychoeducational and training processes, as well as in psychological prevention and clinical practice.

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## Introduction

Holography is a method for recording and reproducing three-dimensional images using a beam of light emitted by a laser. It is a technique that allows the recording and reproduction of 3D images through light interference and diffraction. The result is a hologram—an image that appears to have depth.

Holography was invented by Dennis Gabor in 1947 (earning him the Nobel Prize in Physics in 1971), and he published his theory in 1948 in the Proceedings of the Royal Society [1]. The study of holograms gained momentum with the introduction of the laser, which made it possible to "transform" light into matter, creating holograms—three-dimensional images that reproduce real or imaginary characters, as well as anything else around us: plants, nature, and generally any aspect of both contemporary and historical reality. Holography is therefore a photographic technique that allows the faithful replication of reality. In recent years, holographic techniques have made great strides, and thanks to this method, reality can now be duplicated—or even created from scratch. We can say that a hologram is a form of virtual reality embedded in our world that does not require the use of headsets: it is not us immersing ourselves in virtual reality, but rather virtual reality entering our space—becoming augmented reality.

Holography thus makes it possible to construct highly realistic images, whether they reproduce the real world or are born from imagination. The use of three-dimensional holography

in psychology and neuroscience is an emerging field that is attracting growing interest due to its potential therapeutic and educational applications.

Holographic Augmented Reality (HAR) combines the technology of creating three-dimensional images (holograms) with the ability to overlay them onto the real world, enriching it with digital information. This approach offers a more immersive and realistic experience than traditional augmented reality, in which virtual elements are simply projected onto a 2D plane. There are many examples of HAR applications. One such example is the virtual home robot Azuma Hikari, designed for the homes of the future. This hologram introduces itself as follows: "My name is Azuma Hikari, I'm 20 years old, I'm 158 cm tall, my specialty is making fried eggs, I love donuts, I hate insects, and my dream is to become a heroine who helps people who work hard." Azuma is a highly unique virtual assistant: a holographic, female-appearing virtual home robot. Unlike other virtual assistants, Azuma dotes on her owner—almost like a virtual wife, or more accurately, a virtual geisha. The company Gatebox, which developed Azuma Hikari, defines her as a virtual home robot.

Like all domestic robots, her goal is to perform various functions that simplify life at home (e.g., turning lights on and off, managing appliances, climate control systems, security systems, etc.).

In reality, Azuma Hikari is more similar to AI assistants like Siri

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(Apple) or Cortana (Microsoft), with one key distinction: she is a form of artificial intelligence presented as a hologram. In some sense, she exists—she has a human form, lives inside her box, and tries in every way to please her owner. Azuma Hikari is constantly connected to the internet via Wi-Fi, through which she continuously sends and receives data. This connection allows her to remain in contact with her owner throughout the day, even when they are away from home.

At present, holographic video calls via smartphones are still not available. However, researchers Min Gu and Xiangping Li [2] at the Centre for Micro-Photonics, Faculty of Science, Engineering and Technology, Swinburne University of Technology, in Hawthorn, Australia, are optimistic. They predict a future smartphone with a pop-up holographic display that will allow information to be projected beyond the screen of the device. For now, only a small demo display capable of projecting 1 cm images has been developed.

A more concrete example is the Looking Glass Go portable holographic display by a startup of the same name. This device can transform 2D photos into 3D holograms using sophisticated artificial intelligence (AI) software. Roughly the size of a typical smartphone, it includes a high-precision plenoptic camera, which enables the image to tilt according to the viewer's angle—offering a unique and engaging visual experience.

### Holography in Medicine

One of the non-entertainment and healthcare-related applications of holography lies in the field of telemedicine. A hospital in Texas recently made headlines for becoming what is believed to be the first medical facility to offer virtual consultations with doctors via holograms. Although still relatively new in the healthcare sector, this technology could one day become a standard feature in waiting rooms and other clinical settings.

Crescent Regional Hospital in Texas has partnered with a technology company called Holoconnects, which manufactures devices capable of displaying full-size holographic images. The hospital has installed its first 86-inch holographic display and a video studio. Through this system, a physician in one location can sit in front of a microphone, camera, and monitor, while a life-size holographic image of the doctor appears at a different location—such as in front of a patient. Just like in traditional telemedicine, the doctor and patient can communicate; the doctor can examine a skin rash or observe the patient's gait, for example—but the full-body display allows the patient to see the physician as if they were having an in-person, face-to-face conversation.

The potential of holography in surgery is equally compelling. On February 9, 2021, the first 24-hour International Holographic Surgery event was launched, marking a new era for global healthcare. Organized by Microsoft, the event demonstrated how mixed reality technologies are reshaping modern medicine. Using the HoloLens 2—a lightweight, comfortable, and immersive holographic computer—and Dynamics 365 Remote Assist, it is now possible to enable new scenarios for remote collaboration, real-time visualization of clinical data,

adoption of innovative surgical techniques, and enhanced procedural precision.

The Israeli startup Real View Imaging is focusing on interventional cardiology with its advanced HOLOSCOPE system. This platform is designed to support all interventional stages that rely on 3D imaging, particularly in clinical environments such as interventional suites, hybrid operating rooms, and diagnostic clinics. The system delivers real-time 3D holography, enabling clinicians to view and interact with internal anatomical structures in a more intuitive and precise way.

Holography in medicine offers a wide range of potential uses: it is particularly useful for planning complex surgical procedures, for studying congenital malformations or tumors in greater detail, and for training medical students with highly realistic models of the human body

### Edugram: Holograms and Education

In the rapidly evolving landscape of educational technology, 3D holography is emerging as a transformative tool with the potential to convert traditional learning environments into interactive and immersive experiences [3,4]. Holographic technology, which enables the projection of three-dimensional images into space without the need for specific wearable devices, offers a unique opportunity to engage students in ways that traditional two-dimensional methods cannot [5].

In science education, where understanding complex structures and phenomena is essential, the ability to visualize and interact with concepts in three dimensions can significantly enhance learning outcomes [6]. Visual learning, a cornerstone of educational psychology, has been revolutionized by the advent of 3D visualization technologies. A meta-analysis conducted by researchers at Shanghai University [7] synthesized findings from multiple studies, concluding that 3D technologies generally improve the comprehension and retention of visuo-spatial information.

Student engagement, a critical factor in educational success, has also been positively linked to the use of these technologies. For instance, a 2017 study [8] found that interactive 3D models significantly increased student engagement and motivation, particularly in STEM fields (Science, Technology, Engineering, and Mathematics). Further research into the effectiveness of holographic technology in education has revealed nuanced insights into students' cognitive and learning processes. Additional studies [9] have explored the cognitive load implications of interacting with holographic imagery, suggesting that while holograms may enhance engagement, they also require careful instructional design to avoid overloading students' working memory [10].

A randomized controlled study conducted by Jesus Uribe at the School of Medicine, University of California, compared traditional teaching methods with hologram-based instruction in anatomy courses. The study found that students exposed to holographic imagery performed better on both immediate and delayed retention tests, supporting the Cognitive Theory of Multimedia Learning proposed by Richard Mayer [11].

Today, holographic techniques allow for the projection of presence across vast distances. One can imagine a university professor delivering a lecture simultaneously to students in multiple countries, with a high level of perceived "reality"—students perceive the instructor as physically present in the classroom.

The use of holograms in this context fosters a sense of co-presence between professors and students, between speakers and conference attendees, or among participants in distributed meetings. Such applications enhance the realism and emotional connection in remote learning and professional interactions.

A notable example of non-commercial educational use of holography is at Imperial College London, which began projecting holograms of guest lecturers in Business School courses. The initiative proved so successful that the university expanded the use of holograms across other academic departments. In the domain of anatomical education, students using holograms achieved significantly higher scores, experienced lower cognitive load, and demonstrated greater learning efficiency compared to those using traditional methods. These findings suggest that holographic visualization offers advantages in comprehending complex spatial concepts [12].

The integration of 3D holograms in science education has led to improvements in comprehension and content retention over conventional methods. Moreover, holographic learning environments have been shown to promote peer interaction and collaborative learning, aligning with constructivist learning theories [13].

Despite the promising results of 3D visualization technologies in education, a significant gap remains in the literature regarding long-term learning outcomes. While studies such as those by Joshua J. Gnanasegaram [14] have demonstrated immediate improvements in engagement and understanding, the sustainability of these outcomes over time remains uncertain.

### **Psychology: Clinical Applications in Psychology**

All Various forms of Electronic-Based Therapy and Intervention have been widely adopted for some time, particularly in response to the need to provide psychological counseling and/or psychotherapy to individuals who are unable to travel, live in areas with limited access to psychological services, or require communication in their native language.

The American Psychological Association defines telepsychology as "the provision of psychological services using various forms of communication technologies, including telephones and mobile phones, online platforms for interactive video conferencing, email, chat, blogs and virtual forums, and social media" [15].

In addition to strictly clinical contexts, telepsychology offers promising applications in e-health and interactive healthcare, where it is used to promote health and prevent harmful lifestyles. It is also increasingly applied in organizational psychology and educational psychology. 3D holographic techniques may represent a valuable opportunity for expanding and enriching psychological and psychotherapeutic services across multiple

domains. While screen-based online psychotherapy [16] enables remote access to care, it may render the patient's experience "flattened," as if losing the three-dimensionality of in-person interaction. Some patients report missing the physical setting of the therapist's office, which often represents a "safe space" in the psychotherapeutic journey.

It is also important to consider that younger generations are highly familiar with digital technologies and the multifaceted interfaces of modern devices. This digital fluency has given rise to a phenomenon referred to as Digital Empathy—the capacity to care for others and to express thoughts, emotions, and sensations directly and immediately through digital channels. Unlike traditional social empathy, which relies on physical cues and presence, digital empathy operates within virtual environments.

In online psychotherapy, emotional expression remains central. Interestingly, digital interfaces may reduce the sense of shame some patients experience, as the screen-mediated contact creates a buffer that makes the initial interaction with a therapist less intimidating. This is particularly important for adolescents who may struggle with social anxiety or agoraphobia, and who might find it difficult or distressing to leave home and engage with others in person. In such cases, remote therapy becomes not only a practical solution but also a vital bridge—an entry point to care that might otherwise be inaccessible.

These developments raise critical questions: Can video conference-based psychotherapy preserve the same effectiveness as in-person therapy? Does the lack of physical presence hinder therapeutic outcomes? What are the foundational principles that therapists can rely on to ensure successful therapy through remote technologies? Such questions have prompted a significant body of research in clinical psychology focused on evaluating the efficacy of online therapy. Among the key factors consistently linked to positive outcomes is the therapeutic alliance—the mutual agreement between therapist and patient on goals, clearly defined tasks from the outset of treatment, and the establishment of a bond characterized by trust and emotional connection. The therapeutic alliance is considered essential to therapeutic success, whether the interaction occurs in person or remotely.

Through this alliance, therapist and patient co-create a shared psychological space, which becomes the foundation for emotional investment, cognitive reflection, and behavioral transformation. Within this framework, the introduction of immersive holographic environments, capable of recreating realistic virtual therapy settings, appears to offer a meaningful enhancement to clinical practice. These tools may help bridge physical distances, improve the quality of the therapeutic experience, and ultimately strengthen the therapeutic alliance, which is crucial to achieving meaningful change.

### **Trauma, Phobias, and Anxiety Disorders**

In the treatment of Post-Traumatic Stress Disorder (PTSD), Cognitive-Behavioral Therapy (CBT) focuses on correcting cognitive distortions, addressing appraisal processes, extinguishing intrusive traumatic memories, and desensitizing

the patient to trauma-related stimuli through repeated exposure [17]. This approach integrates multiple components.

In recent years, many psychotherapists have incorporated virtual reality (VR) techniques into cognitive therapy for PTSD. Immersive virtual environments can replicate human reality and "trick" the brain into experiencing the simulated world. For instance, in 2020, Jang Ji-sung in South Korea was able to virtually reunite with his young daughter, who had died years earlier from a severe illness at age seven. This unprecedented experiment digitally recreated the child using artificial intelligence that processed photos, videos, and voice recordings, reproducing recognizable facial expressions and posture. Wearing a VR headset and gloves, the father interacted with what was, for a computer, mere code, but for him, was his daughter in every sense. The journey of the family and researchers behind this project is documented in *Meeting You*. Lee Hyun-Suk, director of the South Korean company Vive Studios, stated that this "cold" technology, when properly applied, can offer almost human warmth and support psychological trauma management.

VR has been experimented with in PTSD treatment for decades. As early as 1997, researchers at Georgia Tech developed the first Vietnam War-themed VR environment to assist veterans who, twenty years after the conflict, still exhibited PTSD symptoms [18,19]. Holographic Memory Resolution (HMR) is a therapy designed to alleviate depression, anxiety, pain, and PTSD. A pilot study assessing HMR's effectiveness in adults with chronic pain and related symptoms found significant reductions in depression, anxiety, and PTSD symptoms, alongside improved vitality, suggesting HMR as a promising biopsychosocial intervention for trauma [20].

Holographic Reprocessing (HR), an experiential psychotherapy developed by Katz, uses the hologram metaphor to reprocess traumatic experiences. A study comparing HR with Cognitive Processing Therapy (CPT) in traumatized adolescent students found both therapies effective in reducing post-traumatic cognitions, especially those linked to self-criticism and guilt, indicating HR as a viable therapeutic option [21,22].

Currently, projecting traumatic memories into a controlled and supervised immersive holographic environment may help patients relive experiences with reduced threat, facilitating emotional processing and treatment. However, more rigorous research is needed to scientifically validate these methods and fully understand their efficacy.

Additionally, holographic techniques could enhance phobia treatment. A very recent study developed a mixed reality application named "HoloPhoByeMR", designed to treat arachnophobia and ophiophobia, compatible with Microsoft HoloLens 2. Preliminary results show a significant reduction in anxiety levels post-intervention, suggesting mixed reality as a powerful tool in phobia treatment [23]. Another study compared a treatment based on immersive 3D stereoscopic videos against a control group receiving only psychoeducation, finding a large effect size in reducing fear of spiders measured by the Fear of Spiders Questionnaire [24]. A clinical trial testing

a treatment for social phobia delivered exposure to feared social situations through computer-generated 3D images, reporting anxiety improvements across all measures, including six months post-treatment [25].

Holographic techniques thus offer the potential to address specific phobias by projecting feared objects or scenarios—such as snakes, airplanes, or social settings—to help patients gradually desensitize. These immersive yet controlled exposures allow patients to practice coping strategies, learn relaxation techniques, and regulate emotions. The realism and controllability of 3D holography enable precise modulation of exposure intensity and duration.

A recent systematic review examined the efficacy of Augmented Reality (AR) in treating various anxiety disorders, reporting high patient satisfaction and a perception of lower aversiveness compared to in vivo exposure. However, further research is necessary to confirm these findings [26].

The integration of these holographic and virtual reality tools with evidence-based structured therapeutic models, alongside their immersive and customizable nature, makes them highly suitable for clinical practice in the study and treatment of trauma-related, phobic, and anxiety disorders.

### **Socio-Emotional Management and Body Image**

Holography could also be employed to visualize emotions in a tangible manner, aiding patients in better understanding their emotional reactions to stimuli and adopting effective emotion regulation strategies. Social-Emotional Learning (SEL) and emotion regulation are intrinsically interconnected, with SEL providing the framework for developing and enhancing emotional regulation skills. Emotion regulation is a fundamental component of SEL, encompassing the ability to recognize, manage, and express emotions effectively. SEL programs aim to equip individuals not only with the skills to identify and understand their own emotions but also to manage them constructively and build healthy relationships.

Virtual reality (VR) has emerged as a promising tool to enhance Social-Emotional Learning in children and adolescents by offering immersive environments that facilitate key competencies such as perspective-taking, empathy, and responsible decision-making [27-30]. VR interventions have demonstrated particular efficacy in improving SEL, especially among children with Autism Spectrum Disorder (ASD), where they contribute significantly to the development of social skills [31,32].

Holography finds further application in affective visualization within virtual reality environments. Studies suggest that it is possible to visually represent users' emotional states in real-time using physiological signals such as heart rate and skin conductance. These visual representations can be integrated into biofeedback therapies for psychological disorders, enhancing therapeutic interaction and efficacy [33].

Augmented Reality (AR) holographic mirrors allow users to engage with a virtual representation of their own body,

facilitating body awareness and supporting positive changes in body image. Such tools can be utilized to improve bodily self-awareness and promote a positive perception of one's body [34].

### Applications in Psychotic Disorders

The standard treatment for patients with schizophrenia typically involves the use of antipsychotic medications combined with psychotherapy and rehabilitation programs, aiming to reduce symptom severity, improve social skills, and enhance quality of life. However, despite appropriate treatment, some patients remain severely impaired due to treatment-resistant symptoms such as persistent auditory hallucinations. Specific Cognitive Behavioral Therapy (CBT) programs have been developed targeting these resistant hallucinations, enabling patients to gain greater control over their experiences [35-39].

A recent advancement in this area is the development of voice avatars for the treatment of auditory hallucinations, representing a significant breakthrough and a revolutionary therapeutic innovation in psychiatry [40]. The integration of Artificial Intelligence (AI) in psychotherapeutic interventions for psychosis is an emerging field, though crucial improvements are needed to design avatars that optimally adapt to individual patients. Enhancing AI capabilities is essential to guide development and improve the quality and effectiveness of these avatars [41,42].

A systematic review examined the use of virtual reality (VR) and augmented reality (AR) in the diagnosis and treatment of psychotic disorders, highlighting the potential of these technologies to improve treatment adherence, patient motivation, and social functioning [43]. Additionally, a study employed VR to simulate auditory and visual hallucinations in university students, aiming to foster empathy toward individuals with schizophrenia. Participants reported increased empathy and more favorable attitudes toward people with schizophrenia following the immersive experience [44].

### Attention Deficit Hyperactivity Disorder

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity, which can manifest in children, adolescents, and adults. These symptoms may interfere with development and functioning across academic, occupational, and social domains. ADHD significantly impairs an individual's ability to perform daily activities and negatively impacts overall well-being.

Augmented Reality (AR) games have been specifically designed to address ADHD-related challenges by enhancing executive functions, concentration, and attention. These gamification techniques offer creative and engaging solutions that help individuals with ADHD manage symptoms and improve overall functioning by leveraging the captivating qualities of AR technology [45].

The utility of virtual reality (VR), augmented reality (AR), and mixed reality (MR) technologies has been investigated for both the diagnosis and treatment of ADHD in children, highlighting

their potential to improve attention, self-regulation, and motivation among ADHD patients [46]. A recent study developed and simulated an augmented reality gaming environment called "AR-Therapist" as an alternative to traditional cognitive-behavioral therapy for ADHD patients. This model harnesses current advancements in augmented reality to engage patients within both real and virtual gameplay settings [47].

3D holography can be employed to modulate attention and promote emotional self-regulation through the controlled use of visual, auditory, and interactive stimuli. This approach enables training of sustained attention on monotonous or prolonged tasks with immediate feedback, assists in frustration management under cognitively demanding simulated conditions, and fosters the development of metacognitive strategies through self-monitoring of performance.

Moreover, 3D holography can support executive function training by designing realistic scenarios where individuals can practice key cognitive skills often impaired in ADHD profiles. These include working memory (holographic activities requiring maintenance and manipulation of information during sequential task execution), inhibitory control (simulations where subjects must suppress impulsive responses in dynamic environments), as well as planning and organization (holographic tasks demanding autonomous management of complex activities, such as virtually packing a school backpack or completing a sequence of simulated household chores).

### Cognitive Rehabilitation

In conditions such as neurocognitive disorders, patients often experience cognitive impairments, including deficits in memory, attention, and planning abilities. Many of these difficulties have been addressed through the use of augmented reality (AR) and virtual reality (VR) interventions, yielding promising results. Three-dimensional holography (3D holography) could represent a significant advancement in the management and treatment of various neuropsychological disorders.

Currently, Virtual Reality (VR) has been employed in the neuropsychological rehabilitation of patients with Alzheimer's disease (AD) [48]. The "MemHolo" study developed mixed reality experiences for individuals with Alzheimer's, utilizing devices such as the Microsoft HoloLens to create immersive environments that stimulate memory and cognitive functions. Results demonstrated improvements in patients' quality of life and social participation [49].

Another study investigated the use of augmented reality combined with 3D holography to enhance mental rotation abilities in elderly participants. Those who engaged in holographic 3D training showed significant improvements compared to those using traditional 2D models, alongside reduced cognitive load and increased motivation toward training [50].

For patients with acquired neurocognitive disorders (e.g., stroke, traumatic brain injury), 3D holography can recreate realistic environments in which impaired cognitive functions—such as memory, attention, language, and executive functions—can

be exercised. When integrated with traditional rehabilitation protocols, holographic interventions may facilitate the transfer of rehabilitated skills to everyday life by projecting patient-specific real-life scenarios.

Holographic interfaces can also deliver motor rehabilitation exercises in more engaging contexts than conventional therapy. These environments might enhance sensorimotor function by leveraging the synergy between action, perception, and cognition in patients with motor deficits secondary to brain injury. Given the principles of targeted neuroplasticity, it is plausible that dynamic holograms could promote cortical reorganization through simulated observation and interaction.

### Prevention and Enhancement

Three-dimensional holography (3D holography) could be employed as part of meditation techniques, enabling patients to practice mindfulness within stimulating yet calming virtual environments. Additionally, 3D holography can be used to create relaxing settings that promote psychological well-being. By simulating natural landscapes, tranquil environments, or pleasant atmospheres, individuals may be immersed in experiences that help reduce stress, anxiety, and improve mood [51].

3D holography is also well-suited for primary prevention in youth, delivered through highly engaging formats capable of overcoming motivational barriers often encountered in younger populations. These technologies can be adopted to foster emotion recognition, reinforce social-relational skills, and facilitate work on self-esteem and emotional regulation. The “LINA” project developed an augmented reality game targeted at adolescents aimed at enhancing social connection, sense of belonging, and psychological well-being through AR [52].

In educational contexts, holographic applications enable the construction of immersive virtual environments where users can explore concepts related to mental health, emotions, risk behaviors, and relational dynamics. This approach encourages deeper intuitive understanding of these topics, active engagement in the learning process, and more effective internalization of preventive content.

In geriatric settings, interactive holographic environments may be used to train cognitive abilities such as memory, attention, concentration, and orientation. By stimulating cerebral functions, this methodology has the potential to slow neurocognitive aging processes and prevent early forms of cognitive decline.

Within occupational environments, the “DiminishAR” study investigated the use of holographic AR displays to reduce visual distractions—such as the presence of smartphones—thereby improving concentration and cognitive performance in work and study settings [53].

### Conclusions

Technology offers the opportunity to increase accessibility to psychological services for clients and patients. Individuals

limited by geographic location, medical conditions, psychiatric diagnoses, financial constraints, or other barriers can access high-quality psychological care through the use of technology.

Among the undeniable advantages of telepsychology are:

- The possibility of establishing or maintaining therapeutic relationships with individuals who, due to external objective conditions (such as during the recent pandemic) or personal circumstances (e.g., withdrawn adolescents or individuals with significant avoidant traits), would find it difficult to access standard treatment;
- Physical distance may facilitate, rather than inhibit, the development of trust in those who struggle with close physical proximity;
- In some cases, video calls and virtual platforms allow for more direct and engaged insights into a person’s life, enabling the observation of novel aspects (e.g., noticing tender stuffed animals in the rooms of rebellious adolescents) and fostering a different kind of intimacy.

3D holography represents an emerging field that could bring significant change to clinical psychology and psychiatry practice by enabling more immersive and personalized therapeutic approaches.

3D holography offers important advantages in psychology, including:

- Immersive learning: enhancing the understanding of complex concepts through interactive three-dimensional representations;
- Cognitive load reduction: holograms can simplify information processing, facilitating learning;
- Emotional engagement: interaction with holograms may increase participant interest and motivation.

The use of three-dimensional holography (HAR) in psychological settings is still in an exploratory phase, but promising studies are emerging that integrate immersive technologies such as augmented reality (AR) and virtual reality (VR) for treating psychological disorders.

Although technological and ethical challenges remain to be addressed, the potential of this technology is vast for the treatment of various psychiatric disorders, improving diagnosis, therapy, and patient rehabilitation.

It is clear that the technology discussed here is not yet fully available for mass use and currently remains confined to laboratories for ongoing refinement and development. Nevertheless, the considerable interest and investments underway suggest that the time is approaching when these tools will be accessible.

Telepsychology, currently relying on text, audio, and video communication as its medium, will see a comprehensive expansion in how clinicians engage with patients.

The application of 3D holography in psychology represents a highly promising area of research and clinical intervention. It is important to stimulate the development of experimental

studies to evaluate its efficacy and clinical applicability, establish standardized usage protocols, promote ethical guidelines, ensure technological accessibility, and provide adequate training for professionals. Clinically, these technologies constitute complementary and innovative tools for cognitive, emotional, and behavioral rehabilitation.

In diagnostic contexts, one can envision a future with a new generation of psychodiagnostic tools featuring significant immersive components. This will require validation and standardization of holographic assessment environments, alongside ethical reflection on virtual stimulus manipulation and data collection.

Holographic technology offers a promising frontier for the development of personalized, ecological, and interactive interventions. It will revolutionize our world, and it is our responsibility as psychologists to begin asking questions about both its impact on individuals' lives and its potential applications within our profession.

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