Application of Virtual Reality Technology in the Health Field Based on the Background of Big Data

Yizhou Li¹, Kesui Deng² *

¹School of Humanities, Jiangxi University of Traditional Chinese Medicine, Nanchang, Jiangxi, 330103, China
²School of Humanities, Jiangxi University of Traditional Chinese Medicine, Nanchang, Jiangxi, 330103, China
*Corresponding author’s e-mail: liyizhou@jxzyldhrwhy999.onexmail.com

Abstract. With the development of big data and artificial intelligence, virtual reality technology has penetrated into every aspect of daily life. Among them, the application of virtual reality technology in the health field is of great significance. Virtual reality technology can assist clinical medicine in the treatment of patients, and can also simulate the physical feelings of panic disorder and some disabilities to induce emotions similar to patients, produce empathy effects, enhance normal people's understanding of patients, or improve health The effect of dissemination. This article discusses the current status of the application of virtual reality technology in the context of big data, and analyzes how virtual reality technology can promote health communication, disperse pain, treatment of psychological disorders, and begin to provide services for the elderly, which has great social and practical significance. This article reviews and compares the recent applications of virtual reality technology in the health field at home and abroad, and analyzes its prospects and shortcomings.

1. Introduction

With the rapid development of modern society, the "Kang China Strategy" and the concept of "Great Health and Health" have been widely spread. At the same time, with the continuous advancement of information technology, big data, artificial intelligence, and virtual reality technologies are also booming. These technologies Widely used in the field of health. It is to call on all sectors of society to pay attention to the prevention of mental illness. With the development of big data, virtual reality technology and the popularization of 5G transmission technology, the connection between virtual reality technology and the health field is getting closer and closer. Research proves: The application of virtual reality technology to medical and health care research has achieved certain results, especially in the fields of pain dispersion, evaluation and treatment of mental disorders, and health communication. However, there are still big differences between domestic research and foreign research. Virtual reality technology originated in the 1960s. It is a technology that uses computer technology and sensor technology to produce a three-dimensional environment and mobilize the various senses of users to create a more immersive experience. It is a new way of human-computer interaction. The Market of virtual reality products is expanding, and the scale of the industry continues to expand, and the technical level is constantly improving. However, in general, it is still in the initial stage of development, and there are still some problems, such as: the equipment is inconvenient to use and the effect is not good. Such circumstances have a negative impact on the
experience; the overall network speed cannot keep up with the huge amount of data; applications in the military and scientific research fields are more, and applications in the fields of education, medical treatment, and industry need to be strengthened. Too fast commercialization and lack of sufficient research have kept some virtual reality products at the stage of conceptual hype and overdraft industry development. The investment boom in the domestic capital market has been surging, but the homogeneity of products is serious. In this regard, it is necessary to strengthen cooperation between industry, university and research and open up different application areas of virtual reality technology.

2. Application of virtual reality technology in the field of health

![Data sources & virtual Reality in Analytic Platform](image)

2.1 Virtual reality technology helps health communication

Susan Persky et al. studied the response of overweight women to virtual doctors receiving genomic information about their weight, and what is the difference when using distributed Internet and VR devices. Different forms of virtual doctors convey information to participants about the relationship between genes and obesity, and the relationship between behavior and obesity. It mainly considers the effects of different devices on participants’ health actions and self-efficacy in weight management. The impact and the interpersonal feelings of interaction with the avatar clinician who provided genetic information. The results show that VR devices have significantly improved healthy behaviors and self-efficacy than the Internet, but their role in improving interpersonal communication and communication satisfaction is not great. Subsequent research can explore what is missing between VR devices and face-to-face communication. In addition, virtual reality technology simulates the physical feelings of panic disorder and some disabilities to induce emotions similar to those of the patient, and the empathy effect can enhance the sympathy of normal people to the sick.
2.2 Virtual reality technology as a means of dispersing pain

Virtual reality pain dispersion is an alternative to anesthesia and an auxiliary means of surgery. At the beginning of the 21st century, many research results have proved the effectiveness of non-drugs in reducing pain. The types of pain mainly include experimental pain, burns, and pain after surgery. Recently, based on previous studies, Mosso Vasquez and others evaluated the difference between the use of desktop head-mounted displays and mobile VR in 44 outpatients requiring lipoma resection, and further tested the best intervention for pain dispersion. Level of commitment. In addition to pain, in the treatment and examination of non-general anesthesia, patients may also suffer from mental trauma or poor treatment effects due to bad mood and psychological state. In "The Impact of Virtual Reality Technology on the Mental State of Patients Undergoing Gastroscopy", Hu Baoying and others played 3D video clips during the examination to reduce the anxiety and horror of patients during gastroscopy, and improve the quality of examination and patient experience.

2.3 Virtual reality technology for the treatment of psychological disorders

2.3.1 Virtual reality technology to treat phobias

Exposure therapy used to imagine or play movies, show real objects and other means to allow patients to face the feared things directly to assess and treat psychological disorders such as specific phobias. The immersive and real experience provided by virtual reality technology has made extensive attempts in the treatment of specific phobias. Suso-Ribera et al. tested the effects of three different exposure therapies: in vivo, virtual reality and augmented reality on small animal phobias, and proved that there is no significant difference in the therapeutic effects of the three methods. Virtual reality and augmented reality can be used as a tradition. Alternatives to in vivo experiments. Tardifet et al.’s research on spider phobia based on virtual reality further evaluated the therapeutic effects of virtual reality technology experience that adds tactile and tactile stimuli (actually crushing the spider's feeling) and the visual experience brought by traditional virtual reality. Whether there is a significant improvement. Participants were randomly assigned to three groups that presented only visual stimuli, visual + tactile stimuli, or visual, tactile + tactile feedback stimuli. Although from the data point of view, tactile and tactile stimulation do not have significant advantages, they also provide new ideas for the use of virtual reality technology in exposure therapy.
2.3.2 Virtual reality technology in the treatment of anxiety, bulimia and binge eating disorder

In addition to phobia, virtual reality technology exposure therapy has also been proven to be effective in dealing with anxiety, bulimia nervosa and binge eating disorder. In a study of patients with social anxiety disorder, Felnhofer et al. exposed participants to a virtual environment and asked them to complete three social tasks (ordering drinks from the waiter; responding to strangers' requests; responding to provide fake drinks). The relationship between existence and anxiety observed in the research seems to be mainly based on the attention component of social existence, coexistence and mutual attention are rooted in cognitive processes closely related to attention. Research has proved the effectiveness of virtual exposure therapy, and that social presence may be a more appropriate indicator of virtual social experience than physical presence. In the treatment of body weight and diet-related diseases, there have long been studies to prove the effect of virtual reality technology exposure therapy. Ferrer-Garcia et al. randomly assigned patients with bulimia nervosa and binge eating disorder to one of two other treatment methods: exposure therapy based on VR cues and additional cognitive behavioral therapy. After six months of follow-up, both therapies reduced symptoms, and the overall effect of virtual reality technology therapy was better than traditional behavioral cognitive therapy. This research provides strong support for virtual reality technology as a more efficient treatment method.

2.3.3 Virtual reality technology helps the health of the elderly

The aging of the population structure has become an unresolved issue in many developed countries. Many researchers began to apply virtual reality technology to the elderly, hoping to improve the living standards of the elderly through this technology. Gamito and others designed virtual reality training related to activities of daily living to train patients in different cognitive fields. 25 participants from 65 to 85 years old were evaluated before and after treatment, during which the patients received 12 times Intervention. In both assessments, neuropsychological measures (visual memory, attention, and cognitive flexibility) improved significantly. A set of seven randomized controlled trial studies (RCTs) tested a variety of techniques for enhancing memory, performing reasoning, and processing speed. Studies have shown that with the continuous advancement of technology, a series of games based on virtual reality technology has great potential in improving and enhancing the effectiveness of patients' cognitive functions, even for the elderly who are not familiar with such technologies.
3. Discussion on the application prospects of virtual reality technology in the health field

3.1 Limitations of the application of virtual reality technology in the professional medical field

Existing research has made great breakthroughs in the application of virtual reality technology in the medical field, but most of them are pilot experiments and are difficult to put into use on a large scale. First, the high cost of virtual reality equipment and the high cost of virtual reality content production will limit their use in clinical practice. Second, although research has confirmed the effectiveness of virtual reality technology in the field of healthcare, it can replace traditional treatment methods. It is difficult to draw the conclusion that virtual reality technology is better than traditional treatment to a certain extent; again, most of the existing researches that combine virtual reality technology with health are aimed at a certain diseased group, while the research applied to the elderly is focused on Cognitive level and rehabilitation with the help of virtual reality technology. It is difficult to prove the substitutability and universality of virtual reality technology for the existing medical technology by researching only for a particular situation.

3.2 The prospect of virtual reality technology interfering with the mental health of the elderly

The "Blue Book on Aging: Survey Report on the Living Conditions of the Elderly in Urban and Rural China (2018)" issued by the China Center for Research on Aging shows that although the overall health of the elderly has improved and the income of the elderly in urban and rural areas has increased steadily, there are many elderly people in China today. The problem of loneliness is particularly prominent, and some even suffer from depression and dementia. This is caused by factors such as the elderly living alone and the smaller and smaller social circle after retirement. A single life, a sense of disconnection from the current society, etc., will cause the elderly to have negative psychological feelings such as depression, inferiority, loss, and worthlessness. As an emerging technology, virtual reality has not yet widely entered the lives of the elderly. Whether this technology can really give the elderly a good experience, stimulate their positive emotions, and promote their physical and mental health, there has not been enough research to give the answer. In the field of psychological intervention for the elderly, nostalgia therapy has been widely recognized and confirmed at home and abroad. Nostalgia therapy refers to the review of past events, emotions, and thoughts to induce awareness of their importance to their family and society, thereby inspiring the empty-nest elderly’s sense of usefulness, enhancing self-worth confidence, helping individuals increase their sense of happiness and improve their lives Quality and adaptability to the existing environment. And virtual reality technology can enable people to break through the limitations of time and space, to recall and experience the past more truly; it can also enable people to break through physical limitations and feel the unreachable distance. These features can allow the elderly with inconvenient legs and feet and not so strong to break through the shackles and see the larger world without leaving home without regrets. We believe that bringing new technologies to the elderly, allowing them to experience the freshest content in the current society, can also create a sense of connection with the society, thereby reducing the psychological state of alienation and worthlessness.

4. Summary

The development of VR products has improved, investment in domestic and foreign capital markets has increased rapidly, and the scale of the industry has continued to expand. The future is bright, but related scientific research cannot keep up with the pace of practical applications, which will cause some chaos. While technology continues to advance, more empirical research is needed to lead. About VR immersion abroad, There are abundant empirical studies on the role of medical treatment, but there are still few domestic related studies. We believe that more empirical studies will help attract more attention and promote the development of this field.
References
[1] Tang, Q.Y., Liu Q. (2020) VR + health: the application and prospects of virtual reality technology in the field of health. J. Educational Media Research, (01): 40-42.
[2] Wu, M.S., Wang, W, Sun J.Y.(2019) A balance ability training system for the elderly based on virtual reality. J. Electronic Measurement Technology, 42(21): 163-168.
[3] Wu, Y., Y, L. (2020) Research on the application of virtual reality technology in the field of elderly group fitness. J. Beauty and Times (Part 1), (10): 101-103.
[4] Liu, Q.Y., Yang L., Zhong X., Zhao Y.P., Liu Y.(2019) Application of VR technology in the treatment of depression. J. Journal of Science Education (Mid-term), (03): 60-61.
[5] Wang, H., Liu S.C.(2018) Auxiliary treatment system for depression based on virtual reality. J. Information Research, 44(06): 36-39.
[6] Yang, Y. (2016) Discussion on the effect of virtual reality technology on the treatment of mental illness. J. Tomorrow Fashion, (13):294.
[7] Liu, Q.Q. (2020) Research on the design of artificial intelligence robot system for the spiritual needs of the elderly. J. Intelligent Computers and Applications, 10(08): 192-193+198.
[8] Qian, Y.Q. (2020) Research on functional design and development of elderly care robot based on artificial intelligence. J. Intelligent Computers and Applications, 10(07):292-293+296.
[9] Zhang, Y., Geng, Y.(2020) The application of artificial intelligence in home care under the background of "Internet +". J. Information and Computer (Theoretical Edition), 32(12): 131-132.