

Theories and Methods That Have a Profound Impact on the Treatment of Autism

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ABSTRACT

Autism is a widespread developmental disorder that has serious adverse effects on children and affects people's health worldwide. Since the cause of the disease is still unclear, researchers can only conduct exploratory and experimental research. Its core symptoms are social interaction and communication disorders, cognitive impairment, behavioral stereotypes and other characteristics. At present, abnormal neural connectivity hypothesis is a theory that can fully explain its pathogenic mechanism. This article mainly discusses three methods of treating autistic patients: virtual reality technology, computer-assisted technology, and sports game intervention. The three methods have certain effects, but there are also certain problems. This article may provide some suggestions for the treatment of autism.

Keywords: autism, abnormal neural connectivity hypothesis, virtual reality, computer-assisted technology

1. INTRODUCTION

Autism is a disease caused by a brain development disorder, also known as autistic disorder. Its core symptoms are social interaction and communication disorders, cognitive impairment, behavioral stereotypes and other characteristics. The incidence of autism is about 6 per 1,000, but whether its incidence is increasing remains to be studied. Therefore, research on autism is of great significance to society.

In the past, researchers have focused on social factors, family structure, and the effects of parental characteristics on it. At present, the research focus turns to its genetic, neurocognitive mechanism. Nowadays, people have not found a unified theory which could explain the cause of autism and an effective way could treat autism. The pathogenesis of autism is still being studied, but it can be determined that there are various physiological variants in different regions of the patient's nervous system.

In this article, we will summarize the newest discovery about autism, look for existing problems, and propose corresponding solutions, which may provide some reference for the treatment of autism in the future.

2. ABNORMAL NEURAL CONNECTIVITY HYPOTHESIS

Weak central coherence is the current theory that can

more comprehensively explain the co-existence of strengths and weaknesses of autistic individuals. The theory assumes that the cognitive processing of individuals with autism is one-sided. Individuals with autism pay too much attention to the details of things and cannot integrate local information into a meaningful whole. However, for a long time, people did not know its neural basis. A new research result, however, provides a neural basis for weak central coherence, making weak central coherence more than an abstract analogy between psychology and behavior. The main point of the abnormal neural connectivity hypothesis is Autism is present in both the brain nerve "local over connectivity" and "low distant connectivity". This hypothesis believes that genetic abnormalities lead to abnormal brain development in patients with autism, causing changes in the structure and function of the brain, finally lead to the occurrence of autism.

To prove the abnormal neural connectivity hypothesis, the researchers conducted further studies on the brain structure of autistic patients. One study shows newborn autistic babies have no difference in brain size from the average child. But in early childhood, 90 % of the brain volume of autistic people is significantly larger than that of their peers[2]; as they continue to grow into adults, they gradually move closer to normal and finally reach normal. [3] Other studies have shown that autistic individuals have a wide range of abnormal distributions of brain white matter. At an early age, the white matter development rate of autistic children is much higher than

that of normal children. However, after childhood, the white matter of autistic children stops developing, so the brain volume tends to be normal. Even if the brain volume tends to be normal, their white matter distribution has serious defects: there are too many places, and some too few places. The above research results show that abnormal brain growth sequences in autistic individuals: premature early development and premature end of development. This abnormality can seriously damage the brain development of children early in life.

In the letter memory experiment, researchers used functional magnetic resonance imaging technology to explore the brain activation state of individuals with high-functioning autism.[4] They found that although there is no big difference in completion ability between autistic patients and normal people, their activation patterns are different. Individuals with autism have increased activation of low-functioning brain regions, while activation of high-functioning brain regions decreased, lack of cooperation between their brain regions. This result supports the hypothesis of distant under-connectivity.

Abnormal neural connectivity hypothesis provides a new direction for the research of autism, and makes people's understanding of autism more three-dimensional and comprehensive. It also provides a scientific basis for the early diagnosis of autism. However, the investigation of the human brain is too difficult, and the hypothesis is still in its infancy. More evidence is needed to enhance its scientific and authoritative nature.

3. THE EFFECT OF VIRTUAL REALITY TECHNOLOGY ON THE TREATMENT OF AUTISM

With the development of science and technology, virtual reality technology is widely used in all aspects of life. Virtual reality has three characteristics: immersion, interaction, and phenomena. These characteristics make it could help to develop people's thinking, and it is also helpful for the treatment of autism.

The therapeutic effects of virtual reality on autism are embodied in the following aspects. Firstly, in some experiments, virtual reality technology as an auxiliary tool can help researchers reduce their fear of the outside world. It can give them a safe environment, and reduce anxiety in individuals with autism. In comparison, the real world has more uncontrollable factors, which may cause stress responses in individuals with autism. Secondly, virtual reality can provide personalized treatment according to the patient's own situation. Virtual reality technology can design learning plans of different difficulty for different individuals by adjusting the number, type and level of input stimuli. Thirdly, the special brain structure makes the way of thinking of individuals with autism become different and different

from ordinary people, so it may be difficult for them to learn skills like normal children. However, virtual reality can provide autistic patients with a new way of learning by taking advantage of the characteristics of people with autism who are generally good at processing visual information.

In one study, researchers tested the effects of autistic patients' learning in a virtual environment to observe the impact of virtual reality on them. Researchers first let them learn social conventions by talking to virtual characters in the virtual world, and then observe whether they can stick to the conventions. The results showed that their daily behaviors were regulated and greatly helped their lives. In another study, researchers let multiple patients enter the same virtual world and interact. Individuals with autism often find it difficult to obtain information through human facial expressions. However, the results of the study show that more than 90% of patients at the end of the experiment can accurately recognize the facial expressions of virtual characters. This proves that virtual reality is of great help to the treatment of autism, and can even repair potential psychological damage.

In summary, virtual reality technology can effectively improve the language, emotional, and social deficiencies of individuals with autism. It provides a new and feasible way for the intervention and treatment of children with autism

4. THE EFFECT OF COMPUTER-ASSISTED TECHNOLOGY ON THE TREATMENT OF AUTISM

As a machine that can calculate at a high speed, computers are widely used in all aspects of life. In 1793, computers were used for the first time in the field of intervention for patients with autism and proved its feasibility. With the development of computer technology and the improvement of equipment functionality, computer-assisted technology has been widely used in the field of autism treatment. But its potential utility still has a lot of room for development.

First, the computer can provide dynamic and personalized information based on the individual's condition of autism. This can not only greatly reduce the anxiety of individuals with autism[5-6], but also effectively help teachers set up flexible and specific training programs. Secondly, the computer is easy to operate and has complete functions, which can provide autistic patients with opportunities for efficient learning. Thirdly, computer-assisted technology has a good audience and can greatly reduce the cost of treatment intervention. What's more, with the popularization of computer technology and the development of intelligent mobile technology, the use of computers in daily life has gradually increased,

which provides a huge space for the treatment and research of autism.

Language development delays are common in children with autism[5], and computer-assisted technology can help correct their language skills. In order to further explore the effects of computer-assisted technology in the treatment of autism, researchers compare the effect of computer training with traditional training. Studies have shown that children with autism who have undergone computer training can learn more vocabulary and show higher concentration than children who have only undergone traditional training. In another experiment, the researchers found that children with autism can not only recognize the vocabulary that appears in computer training, but also transfer them to classroom training with high stability. These research results show that computer-assisted technology can indeed play a certain role in the treatment of autism. And after comparison, it is found that the effect of the professor and the computer when they train together is much higher than when the computer works alone, but the difference in the effects of their respective functions is not very clear.

In order to further explore the effect of computer-assisted autism treatment, the researchers also calculated its inducing effect in the development of pragmatic behavior. Researchers use computers and keyboards to control the presentation of audiovisual phenomena, and to induce children with autism without language skills. The results of the study show that most of the induced children have more active expressions in society, showing a trend of positive development. However, there is no big gap between high-end computer tools and low-tech tools in terms of training results. In another experiment, researchers used computer software to train the discourse skills of children with autism. The results show that their reading ability has improved, and in the software training, they reflect a higher degree of participation and are more willing to ask for help from others.

Computer-assisted technology also seems to play a role in enhancing the emotional understanding of children with autism. In order to prove this conjecture, the researchers used computer software to train the facial expression recognition ability of autistic children to measure the therapeutic effect. The results showed that the recognition ability of about half of the participants has improved, and the effect is more significant when compared with children who have not undergone software training. Moreover, the treatment methods using both computer technology and virtual reality technology have been greatly welcomed by everyone. Its outstanding immersion provides a huge imagination space for children with autism. The results of the study show that children with autism who have undergone this treatment have learned to feel the influence of subtle facial cues on dialogue.

In summary, computer-assisted technology is of great help to the improvement of the language and emotion recognition ability of children with autism. And it can effectively improve the enthusiasm and participation of autistic patients in the treatment process, and reduce their fear and anxiety.

5.The effect of sport game on the treatment of autism

A large number of studies have shown that sports can promote the positive development of children's mental and physical. The results of the survey show that the physical condition of children with autism is worrying, which is roughly manifested in several aspects such as muscle weakness, low exercise level, poor balance and so on. However, due to the lack of research on the late start, how to carry out sports interventions for children with autism is still unclear.

Due to the physical and mental characteristics of children with autism, general physical activities are not suitable and need to be analyzed based on specific conditions.

In order to verify whether sports games can provide special stimulation to children with autism, the researchers conducted a controlled experiment on a class basis. In this experiment, the daily physical education of children with autism is based on sports games, and this opportunity is used to encourage them to communicate and cooperate with other people. Researchers will provide assistance when they need help. In the course of the experiment, some patients' basic communication behaviors have changed to some extent. For example, the refusal behavior is eased, and simple responses to social communication can be made. Another part of the patients had different changes in problem behaviors before the intervention. The destructive and aggressive behaviors were not improved, but the degree of some behaviors, such as disobedience and non-cooperation, was reduced. These results show that after the intervention of sports games, the avoidance of interpersonal communication among autistic patients has changed. But this change is only limited to interpersonal communication, and has no obvious effect on other aspects.

In order to further develop the intervention and treatment space of sports games for children with autism, the researchers conducted a detailed analysis of its impact. First, the athletic features of sports make it possible to provide endogenous education features for patients with autism. Since endogenous stimuli are not easily rejected by autistic patients, autistic patients show greater coordination in physical exercise intervention. Second, physical activity contributes to the physical and mental health of children with autism. Sports games can not only strengthen the body, but also promote the easing of bad emotions. In addition, the rich sensory stimulation

of sports games can promote the cognitive development and mental health of children with autism. Third, sports games have a certain content plot. In this process, children with autism have explored the surrounding world to some extent, so their stereotypes about the outside world may be alleviated.

In summary, sports games can help improve the physical health of children with autism, and can promote the development of certain aspects of their mental health.

6. CONCLUSION

So far, autism is still a disease that is difficult to intervene on a global scale. The existing theoretical basis is not yet sufficient, and the intervention methods are relatively simple. Regarding the pathogenic mechanism of autism, people are still unclear. Among them, abnormal neural connectivity hypothesis is the one with more sufficient evidence and reasonable explanation. The hypothesis holds that autism is present in both the brain nerve "local over connectivity" and "low distant connectivity".

This article mainly discusses three methods of treating autistic patients: virtual reality technology, computer-assisted technology, and sports game intervention.

Although these techniques or methods have a certain effect on the treatment of autism, there are still some problems. Firstly, although these high-tech methods is effective in the treatment of autism, traditional parts of treatment are still necessary for the learning process. Virtual reality or computer aided technology must under the control of doctors. Second, if there is a lack of clever design, these methods may lack authenticity in implementation. This can cause autistic patients to be unable to transfer what they have learned to real life, which may dampen their enthusiasm. Third, whether the training effect based on these treatment methods is stable and whether it can be promoted is still worth exploring. For example, in this computer software training, researchers were unable to measure the effect of computer-assisted technology alone, and follow-up investigations showed that although some patients' behavior has improved in a short period of time, this situation has not persisted for a long time. Fourth, Fourth, these methods seem to be addictive, and may even have the opposite effect. Because when the needs of autistic patients cannot be met in real life, they may consider these methods as substitutes. But the virtual world or game world cannot be a substitute for real social interaction, and a virtual world that lacks too much authenticity can also make patients lose their enthusiasm.

Although the intervention and treatment of autism are still being explored, future research is still promising. This article summarizes several emerging treatment techniques and methods, and raises corresponding

questions, which may provide some opinions on the treatment of autism.

REFERENCES

- [1] 30 41 Rippon G, Brock J, Brown C, Boucher J. Disordered connectivity in autistic brain: Challenges for the new psychophysiology. *International Journal of Psychophysiology*, 2006, 3:1-9
- [2] 26 Courchesne E, Karns C, Davis H R, et al. Unusual brain growth patterns in early life in patients with autistic disorder: an MRI study. *Neurology*, 2001, 57:245-254
- [3] Frith U. *Autism: Explaining the Enigma*. 2nd ed. United Kingdom: Blackwell publishing, 2003. 185
- [4] 11 16 33 Just M A, Cherkassky V L, Keller TA, et al. Cortical activation and synchronization during sentence comprehension in high functioning autism: evidence of underconnectivity. *Brain*, 127:1811-1821
- [5] Proulx MJ, Todorov OS, Taylor AA, et al. Where am I? Who am I? The Relation Between Spatial Cognition, Social Cognition and Individual Differences in the Built Environment [J]. *Front Psychol*, 2016, 7:64.