

# REVIEW ON THE MECHANISM OF PHYSICAL EXERCISE IMPROVING SENILE DEPRESSION

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## SUMMARY

**Introduction:** Senile depression may lead to the decline of quality of life and increase the risk of cardiovascular disease. At the same time, relevant studies have shown that physical exercise can improve the severity of psychological diseases, so this attempt to analyze the effect and mechanism of physical exercise on improving senile depression.

**Subjects and methods:** 100 elderly people over 50 years old and suffering from depression were selected from China as the research objects, and they were evenly divided into experimental group and control group, with 50 people in each group. In the experiment, the personnel in the experimental group are required to choose one of their favorite sports from running, Taijiquan, basketball, aerobics and other sports, and then carry out the selected sports at least three times a week, each time for no less than 30 minutes. The control group did not receive physical exercise intervention, and the experiment lasted for 6 months. SDS (Self-rating Depression Scale) test should be carried out before and after the sports intervention experiment.

**Results:** There was no significant difference in SDS scores between the two groups before the experiment, but after the experiment, there was significant difference in SDS scores between the experimental group and the control group, and the average score of the experimental group was 52.5, which was 13.2% lower than that of the control group.

**Conclusions:** Physical exercise can indeed play a role in the treatment of senile depression. After consulting the members of the expert group, it is found that the mechanism of this result is that in the process of physical exercise, the patient's body can produce hormones that make the mood and spirit in long-term excitement and satisfaction, and the exercise will divert the patient's attention and give the spirit consumed by the disease a short rest.

**Key words:** physical exercise - senile depression - expert inquiry method - SDS

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## INTRODUCTION

In short, senile depression is the depression of the elderly, which has many characteristics of aging (Papakostas et al. 2020). Senile depression is often manifested as mild depression clinically, but the harm of the disease cannot be ignored. If it is not diagnosed and treated in time, it will lead to the decline of quality of life and increase the risk of psychosomatic diseases (such as cardio cerebrovascular diseases) and death (Lee 2019). There are many types of clinical symptoms of senile depression, and there are some differences with patients with depression of other ages. The former has more cognitive impairment and physical discomfort. The common clinical symptoms of senile depression are described in detail below. Depression is the main symptom of depression patients of all ages. It is characterized by long-term and lasting depression. Patients are often depressed, depressed and live like years, and lose a good impression of their previous personal interests and hobbies. They think that life is boring, boring, boring, unable to lift up their spirit and unhappy. Some patients will also feel desperate, helpless and useless. A considerable number of elderly patients with depression also suffer from anxiety and agitation, tension, worry and restlessness. These somatic anxieties sometimes even mask the symptoms of depression (Duan et al. 2021). The second major clinical manifestation of senile depression is slow thinking, slow thinking Association and slow response. Conscious

brain function is significantly degraded than that when young. In addition, most patients with senile depression have a certain degree of impairment of cognitive function (such as memory, logical analysis, calculation, understanding ability, etc.), showing a relatively obvious decline in memory, which needs to be distinguished from senile dementia, but most of the dementia cannot be recovered clinically, while depression can be improved or even cured with the improvement of emotional symptoms. Decreased will activity is also a clinical manifestation of major senile depression. Patients move slowly, live lazily, don't want to speak (less speech, low intonation, slow speed), don't want to take any action, and even don't want to communicate with people around them. Always feel lack of energy or serious dispersion, general fatigue, and even unable to take good care of themselves in daily life. Some patients have decreased or lost their enthusiasm for life, are more and more reluctant to participate in social activities, and even completely eliminate all social activities and alienate relatives and friends. Suicidal concept and behavior, patients with severe depression are often accompanied by negative suicidal concept and behavior. The risk of suicide in elderly patients with depression is much higher than that in other age groups, especially in patients with depression and physical diseases. Physical symptoms, which are more common in elderly patients with depression, are mainly manifested as: pain syndrome, such as low back pain, headache, neck pain, abdominal pain and chronic pain of the whole body.

Digestive system symptoms, such as abdominal distension, abdominal pain, nausea, belching, diarrhea or constipation. Symptoms of cardiovascular diseases, such as chest tightness and palpitation. Autonomic nervous system dysfunction, such as blushing, hot flashes, sweating, hand shaking, etc. In addition, most people will also show sleep disorders, difficulty in falling asleep, shallow sleep and easy to wake up, early awakening and so on. Obvious changes in libido, weight, etc. Hypochondriac symptoms, patients often pay too much attention to their own health, with physical discomfort symptoms as the main complaint (the digestive system is the most common, constipation and gastrointestinal discomfort are the main symptoms), take the initiative to ask for treatment, but often deny or ignore emotional symptoms, and only think that they are in a bad mood caused by physical discomfort. Patients pay more attention to and feel physical symptoms than the actual severity of the disease, so they show obvious nervousness and excessive worry.

With the promotion of urbanization and economic development in China, the problem of population aging is becoming more and more prominent. In order to find a better treatment for senile depression, experts and scholars at home and abroad have conducted a lot of academic research, as shown below.

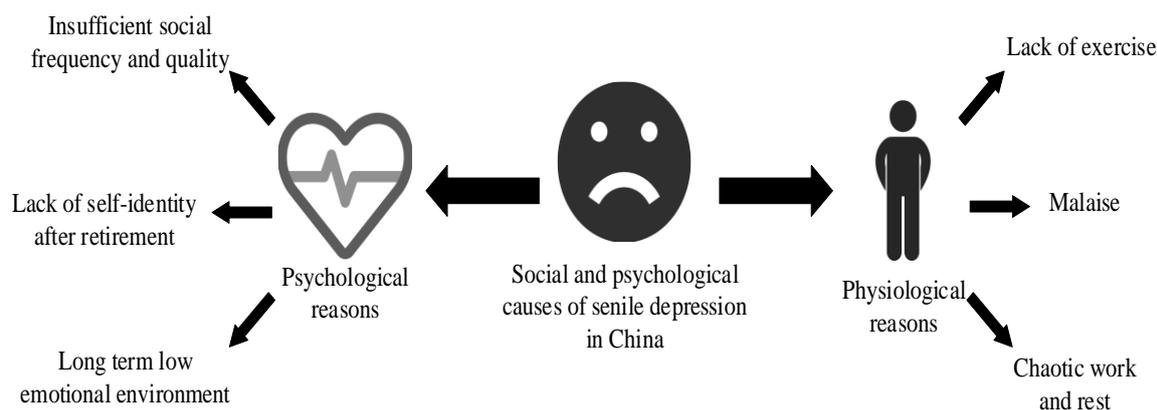
Giulia et al. designed and carried out a social experiment of integrated music therapy aiming at the problem that the effect of drug treatment on Alzheimer's disease and senile depression is not ideal. The experimental results show that on the basis of conventional treatment, integrated music therapy is

helpful to improve the efficacy of treatment scheme on Alzheimer's disease and senile depression (Giulia et al. 2018). Bentham et al. designed and carried out a group social experiment to explore the impact of cognitive behavior intervention on the symptoms of elderly patients with depression and anxiety. The results show that targeted cognitive behavior intervention involving life common sense can alleviate their symptoms, but the effect is small (Bentham et al. 2021). It can be seen that the direction of most studies is to use drugs or psychological counseling to alleviate or cure diseases (Hajduk et al. 2019). There are few literatures on the treatment of senile depression with low-cost methods, and most of them lack the data support conclusion of social experiments (Aoki 2019). This study is to make up for the research gap in this area, try to explore some effective and low-cost treatment methods of senile depression, and understand the mechanism of the new methods, so as to provide some useful references for improving the mental health level of the elderly in China (Goldstein-Piekarski et al. 2018).

## SUBJECTS AND METHODS

### Study setting

After consulting a number of psychology professors, consulting relevant medical literature and sorting, it is found that the physiological and psychological causes of senile depression in China are shown in Figure 1.



**Figure 1.** Social and psychological causes of senile depression in China

As shown in Figure 1, the main psychological reasons are insufficient social frequency and quality, lack of self-identity after retirement, and long-term low emotional environment (Lajambe et al. 2020). Because people are social animals, too little or shallow social level will make people unable to obtain enough happiness and satisfaction from the communication with other individuals in society, leading to depression (Findley et al. 2019). Moreover, some elderly people have been used to their work and working environment. After retirement, they will have some sense of loss and emptiness, resulting in depression (Pinheiro et al. 2019).

Finally, the elderly who have been in a low emotional energy environment for a long time are also more likely to suffer from depression (Yena et al. 2020). Physiological factors are another major reason for the elderly suffering from senile depression, including lack of exercise, physical discomfort and work and rest disorder (Yu et al. 2019). Insufficient exercise will slow the metabolism of the human body, and also make some hormones that can make the body more flexible and emotional more comfortable unable to be secreted normally, leading to depression (Luo et al. 2021). Physical discomfort, especially long-term physical pain,

will keep the brain in a continuous state of tension for a long time, and endocrine disorder will lead to negative emotion, anxiety and depression. Chaotic work and rest will also lead to abnormal metabolism and hormones of the human body, resulting in insufficient rest of various organs and systems, so as to accumulate downward pressure, produce depression, and suffer from depression over time (Wang et al. 2022).

To sum up, from the analysis of psychological and physiological aspects, reasonable exercise, maintaining a good work and rest and being active may play a role in alleviating senile depression. This time, we will focus on the impact of exercise on the latter.

## Design

In order to verify the assumption, put forward in this study, that is, whether sports intervention can help alleviate senile depression, a group treatment experiment is designed. The subjects were 100 elderly people aged no less than 50 and suffering from different degrees of senile depression. The subjects were obtained by responding to the collection of online and offline social experiment volunteers by the research team. Specifically, the volunteers need to be gathered to conduct a centralized SDS (Self-rating Depression Scale) test, and the number of people with a total score of no less than 50 (it is generally believed in the industry that the subjects in this score range can be labeled as suffering from depression) will be selected. Finally, 100 volunteers were selected as the research objects, and the research objects were evenly divided into experimental group and control group, with 50 people in each group. Before the experiment, the two groups of patients were asked to fill in some of their basic information as required, and the difference significance of the basic information was tested. The experiment can be started only after confirming that there is no significant difference in the basic information of the two groups of patients, otherwise the personnel of the two groups need to be adjusted or regrouped. Note that all measurement type features in the study are displayed in the form of mean  $\pm$  standard deviation for *t*-test, and counting type features are displayed in the form of number or proportion of number for chi square test. The significance level of difference is taken as 0.05. Then start the sports intervention social experiment. The personnel in the experimental group are required to choose one of their favorite sports from running, Taijiquan, Baduanjin, badminton, basketball, aerobics and other sports, and then carry out the selected sports at least three times a week. In order to control irrelevant variables and improve the accuracy of the experimental results, the members of the experimental group are required to carry out sports in the designated place, and to further improve the patients' interest in sports. And reduce the physical injury caused by improper operation in sports. The research team provides guidance for the use of each kind of leisure sports, and the coach provides professional sports guidance for patients. In addition, the exercise time of members in the

experimental group shall not be less than 30 minutes each time. The control group did not receive physical exercise intervention, and the experiment lasted for 6 months. Before and after the sports intervention experiment, SDS test should be carried out for the two groups to understand the changes of their depressive symptoms before and after the experiment. Note that in order to ensure the accuracy of the test data, any form of communication between the subjects is not allowed during each SDS test. Therefore, the subjects need to be gathered together and tested separately. The subjects who have completed the test are required to leave the test site immediately, and the treatment filled in should also be collected in time. Then select several psychological experts from China to form an expert group, share the experimental results with the members of the expert group, consult them about the mechanism, and ask the experts to rate the impact degree of each cause on the mitigation effect, and the impact degree is solidified into five categories: no impact, slight impact, general impact, obvious impact and full impact, which are given five integers of 1, 2, 3, 4 and 5 respectively for quantification. After returning the evaluation results of the expert group, the research team needs to sort out and adjust the results, and then send them to the expert group again for comments and evaluation. Repeat these steps until the feedback of the members of the expert group reaches an agreement, and then stop the inquiry cycle. At this time, the output evaluation results have statistical significance. In addition, before the start of expert consultation, the authority of the members of the expert group needs to be tested. If the authority is insufficient, the members of the expert group must be adjusted or even reestablished. In order to improve the efficiency of the experiment, the communication between the research team and the members of the expert group in the process of the experiment is carried out by means of online consultation and telephone consultation. Moreover, the members of the expert group must have at least 5 years of industry experience. It is best to be the current university psychology related course professor, and it is best to have a long-term understanding and exposure to senile depression, rather than having sufficient advantages and authority only in theory and academic qualifications. However, those who do not know enough about the application of psychology or senile depression, or even do not know at all, are included in the expert members.

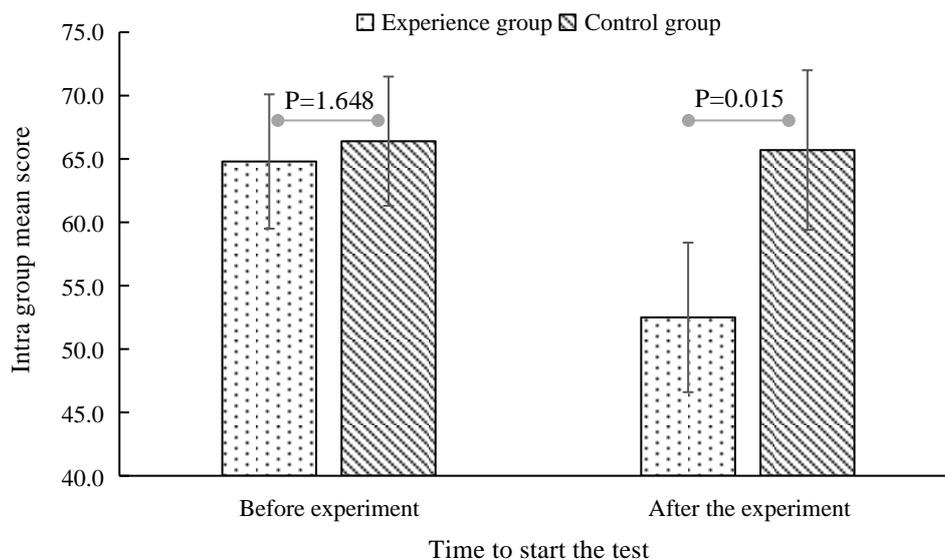
## RESULTS

After the experiment, collect and sort out the effective samples, and then input them into the computer, using Amos23.0 software for statistical analysis to obtain the SDS score data of the two groups before and after the experiment, as shown in Figure 2 note that the calculation method of relative change ratio between different data of two same series is shown in equation (1),

$$P_{a \rightarrow b} = \frac{(x_a - x_b) \times 100\%}{x_b} \quad (1)$$

sample  $b$  in sample set  $X$ , and  $x_a$  and  $x_b$  are the sample values of samples  $a$  and  $b$  respectively.

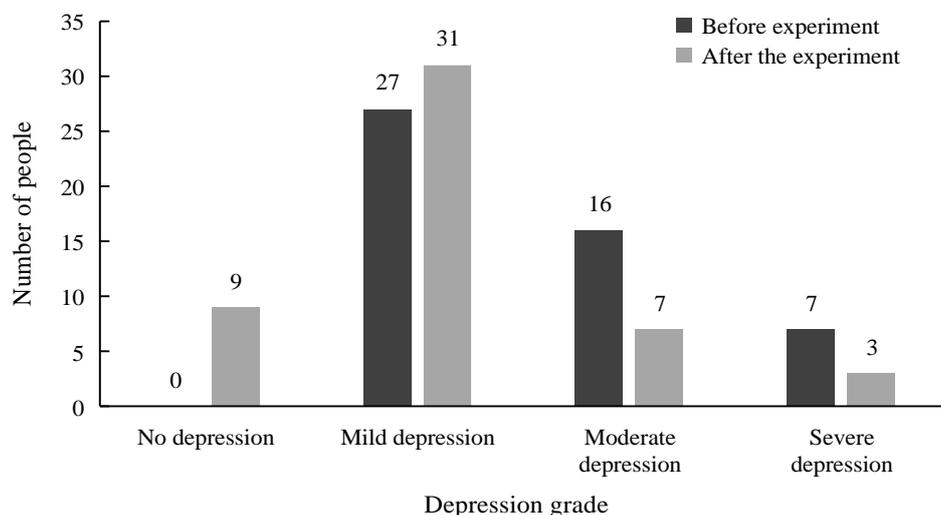
Where  $P_{a \rightarrow b}$  is the change ratio of sample  $a$  to



**Figure 2.** SDS score statistics of the two groups before and after the experiment

In Figure 2, the horizontal axis is used to show the start time of the test, the vertical axis represents the quantitative score of each test, different filling colors represent different groups, and the “I” geometry is used to represent the standard deviation of the data set. According to Figure 2, before the experiment, the  $t$ -test output  $P$  value of SDS score data of elderly patients with depression in the experimental group and the control group was 1.648, which was greater than the significance level. It was considered that the data difference was not significant, which once again proved that the grouping of research objects was reasonable and the data after the experiment was sufficiently comparable. After the sports intervention experiment,

the output  $P$  value of SDS score data  $t$  test of the experimental group and the control group is 0.015, which is less than the significance level of 0.05. It is considered that the data difference is significant, and the average scores of the experimental group and the control group are 52.5 and 65.7 respectively, which is 20.09% less than that of the latter. It shows that appropriate physical exercise can alleviate the symptoms of elderly patients with depression. Then analyze the changes of the number of people in each category of severe senile depression in the experimental group before and after the sports intervention experiment. The statistical results are shown in Figure 3.



**Figure 3.** Changes in the number of people with senile depression at each severe level in the experimental group

The horizontal axis in Figure 3 is used to describe the depression level. The depression level is judged by the total score interval of SDS test. The vertical axis represents the number of subjects belonging to each depression level type, and the columns with different colors represent different test times. Note that in this study, referring to the relevant conventional treatment methods in the industry, the subjects with SDS scores below 50, 50-59, 60-69 and no less than 70 were classified into four categories: no depression, mild depression, moderate depression and severe depression. It can be seen from Figure 3 that after the experiment, compared with before the experiment, the number of people with moderate or above depression decreased significantly, and the number of people without depression and mild depression increased significantly.

Specifically, the number of people in the experimental group with depression level of no depression, mild depression, moderate depression and severe depression were 9, 31, 7 and 3 respectively, which were +9, +4, -9 and -4 respectively compared with the corresponding group before the experiment. Finally, after the consultation of the expert group, the mechanism analysis results of the experts on the above conclusions, that is, the members of the expert group list the main internal causes of physical exercise to alleviate the studied diseases, rate the impact of each cause on the mitigation effect, evaluate it according to five categories: no impact, slight impact, general impact, obvious impact and full impact, and give five integers of 1, 2, 3, 4 and 5 respectively to quantify, so as to obtain Table 1.

**Table 1.** Consultation results of the expert group

| Statistical items           | Divert attention | Promote the secretion of dopamine and other hormones | Increase social   | Occupy free time |
|-----------------------------|------------------|--|-------------------|------------------|
| Average degree of influence | 2.59±0.20        | 4.27±0.15  | 4.55±0.17         | 3.82±0.24        |
| Impact level                | Slight impact    | Obvious influence                                    | Obvious influence | General impact   |

It can be seen from Table 1 that the expert group believes that the mechanisms and reasons for physical exercise to improve senile depression are mainly “diverting attention”, “promoting the secretion of dopamine and other hormones”, “increasing social interaction” and “occupying free time”. The average scores of the influence degree of the above factors are 2.59, 4.27, 4.55 and 3.82 respectively, which are divided according to the corresponding grades. The influence levels of these four mechanisms and causes on alleviating the symptoms of elderly patients with depression are slight influence, obvious influence, obvious influence and general influence respectively. This is because exercise can promote the secretion of a large number of hormones that can make people feel happy and lasting happiness, and reduce or even offset the negative effects of depression. Socializing with individuals with different living conditions and different living backgrounds can enable patients to obtain some satisfaction, social identity and social value, so that patients no longer feel alone, increase the fun of life and change the psychology of losing interest in life. It should be noted that social activities are not directly set in the intervention measures of this study, but this factor appears in the expert consultation. This is because most patients in the experimental group will inevitably obtain more social needs when carrying out their own leisure sports, because sports such as badminton, basketball, football and aerobics generally require more than one person. It is equivalent to indirectly adding social interventions to the experimental group.

Based on the above research results, leisure sports, as a hobby, can alleviate the symptoms of elderly patients with depression to a certain extent, and from the

perspective of mechanism, this effect is mainly to release hormones that can produce positive emotions through the process of sports. Sports will significantly increase the social frequency and depth of patients, and strengthen the connection between patients and society.

## CONCLUSIONS

In view of the increasing trend of the number of patients with senile depression in China, this study designed and carried out a grouping experiment integrating sports intervention. The experimental results show that after the experiment, the number of people with moderate and above depression is significantly reduced, and the number of people without depression and mild depression is significantly increased. Specifically, the number of people in the experimental group with depression level of no depression, mild depression, moderate depression and severe depression were 9, 31, 7 and 3 respectively, which were +9, +4, -9 and -4 respectively compared with the corresponding group before the experiment. Experimental data show that physical exercise can improve the symptoms of senile depression. The expert consultation results show that the main mechanism of physical exercise in the treatment of senile depression is that physical exercise can produce the effects of “diverting attention”, “promoting the secretion of dopamine and other hormones”, “increasing social interaction” and “occupying free time”.

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**Contribution of individual authors:**

Yanzhang Wang: conception and design of the manuscript and interpretation of data, literature searches and analyses, clinical evaluations, manuscript preparation and writing the paper;

Xiao Ren: made substantial contributions to conception and design, literature searches and analyses, participated in revising the article and gave final approval of the version to be submitted.

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# RESEARCH ON INTERVENTION MEANS OF PSYCHOLOGICAL IMBALANCE AND CONSCIOUSNESS DISORDER OF UNIVERSITY ADMINISTRATORS UNDER BIG DATA

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## SUMMARY

**Introduction:** The mental health of university administrators is not only directly related to their physical and mental health development but also affects the administrative efficiency. But part of the staff due to the lack of work enthusiasm, weak sense of responsibility, received a major blow, abnormal family education and other reasons, suffering from psychological imbalance or consciousness disorders, thus affecting the psychological state and behavior of students.

**Subjects and methods:** Select a number of domestic related industry experts to form an expert group. The research team put forward some countermeasures to alleviate the psychological imbalance and consciousness disorder of the research object, and sent them to the expert group, and asked the expert group to evaluate the effect of the countermeasures. In addition, in order to verify the effectiveness of the selection strategies, 60 university administrators suffering from psychological imbalance or consciousness disorder were selected and divided into experimental group and control group. The experimental group underwent intervention based on the strategies summarized by the expert consultation method, while the control group only received conventional psychological treatment. Before and after the experiment, two sets of questionnaires about psychological imbalance and consciousness disorder were conducted.

**Results:** According to the expert inquiry method, "training in social psychology", "training in cognition of social environment", "confide problems to relatives and friends", and "deliberate empathy" had the most significant influence, with the mean scores of influence grade being 4.17, 3.55, 3.82, 4.37 respectively. After the grouping experiment, the scores of psychological imbalance and disturbance of consciousness in the experimental group and the control group were 63.5 and 57.0 respectively, and 77.4 and 73.9 respectively, 13.9 and 16.9 less than the latter.

**Conclusions:** The use of big data technology can play a role in alleviating the psychological imbalance and consciousness barrier of university administrators.

**Key words:** big data - administrative personnel - psychological imbalance - disturbance of consciousness

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## INTRODUCTION

The administrative personnel of colleges and universities have frequent contact with college students, so the words and behaviors of students will be influenced by the thoughts and behaviors of administrative personnel of colleges and universities to a great extent (Irshad et al. 2021). However, at present, some domestic university administrators suffer from psychological imbalance or consciousness disorder due to weak sense of responsibility, careless work, disordered professional ethics and values, lack of work enthusiasm, major blow, abnormal family education and other reasons, which will have a negative effect on the immature students' values (Graupensperger et al. 2020). Consciousness disorder refers to a state in which people's perception of themselves and the environment is impaired, or the mental activities that people rely on to perceive the environment are impaired (Kane et al. 2019). The causes of consciousness disorders can be divided into intracranial diseases and extracranial diseases (Gutland 2021). The former mainly includes localized diseases, diffuse brain diseases, epilepsy, etc., while the latter mainly includes acute infectious diseases, endocrine diseases, exogenous poisoning, physical damage, etc. (Corallo et al. 2019). On the one hand, the

current mainstream treatment methods of consciousness disorders are drug treatment and surgical treatment, and the specific treatment scheme needs to be comprehensively judged according to the cause of disease and the severity of symptoms (Onodera et al. 2019). On the other hand, psychological intervention and other treatment methods have attracted more and more attention in recent years. Psychological imbalance is the manifestation of excessive or insufficient psychological activities and abnormal psychological activities. Psychological disorder includes psychological deviation and psychological disorder (Wang et al. 2020). With the development of economy and the increase of social pressure, more and more teenagers have psychological disorders. Psychological deviation belongs to mild psychological disorder that normal people may have more or less. Psychological disorder is a serious psychological disorder only possessed by mental patients. For example, if someone has a serious mental illness, his psychological disorder is also obvious. Psychological deviation and psychological disorder are different in nature and degree. Under certain conditions, the two can be transformed into each other. Psychological deviation can develop into psychological disorder. After treatment, psychological disorder can also be transformed into psychological