Research on the Prevention of Mental Illness of College Students by Health Education under the Background of Big Data

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Abstract. With the arrival of the big data era, the public's way of life and thinking habits have undergone great changes, but also brought new opportunities and challenges to society. At the same time, college students are influenced by work, life, emotions and so on. These combined factors cause an increasing number of college students to have different degrees of psychological problems. The traditional health education of college students is mainly carried out according to the teacher's personal experience. This method is not timely and targeted, which leads to the mental health problems of college students that can not be effectively solved. This paper, combined with the characteristics of the background of the big data era, after analyzing and integrating the data obtained by WeChat , QQ , Microblog and other social platforms, uses the FCM algorithm to cluster the data, analyze and evaluate the the psychological status of students in time, predict the psychological problems of college students, and test through systematic music prevention method on the basis of clustering results. According to this process, when students have psychological problems, they can intervene as soon as possible, protect students' mental health, prevent the occurrence of psychological problems in advance, and promote students' physical and mental health. The health education proposed in this paper plays a very important role in the prevention of mental illness of college students under the background of big data. Through investigation, it is found that this educational method has an obvious effect on the majority of college students.

Keywords: Big data；Health education；Mental disease

1. Introduction

In recent years, malignant events caused by college students' mental health problems are ordinary, so the analysis of college students' mental health has become a hot spot in academic circles[1].

In order to improve the psychological quality and physical and mental health of college students, domestic and foreign research experts and related scholars put forward a lot of suggestions. For example, Some scholars have proposed the methods of facial emotion recognition for college students, using the combination of shape characteristics and movement characteristics to select and extract the amount of features, to monitor students' mental health in real time[2]. Use BP neural networks to organize students' mental health data to improve response efficiency in psychological crisis prevention[3]. Big data technology can provide students with virtual communication platforms, create social language situations similar to the real environment, so that students can train and improve their interpersonal and emotional responses.In routine psychotherapy, relaxation therapy is mainly used to relieve psychological stress.

However, there are many problems with mental health education in colleges and universities, which need to be adjusted according to the current situation[4] . Some experts use measurement, statistics and other methods to analyze the psychological situation of students, so as to guide students' psychology[5].In view of this, this study uses the FCM algorithm to cluster the social data of college students and intervene with different psychological conditions of students, so as to effectively improve the psychological quality of college students.FCM algorithm is a fuzzy

clustering algorithm based on objective function . It is theoretically mature, widely used, has outstanding contributions in multiple research fields, and is an excellent clustering algorithm[6].

2. Mental Health Intervention Model for College Students

2.1 College Students' psychological Clustering Based on Social Data

Information entropy is mainly used to measure the ordering of information. There is a reverse correlation between information entropy and system ordering, that is, the higher the value, the lower the system ordering[7].The FCM algorithm mainly uses objective function iteration to classify data. Information entropy is introduced into the objective function to realize the Gaussian distribution of sample membership function, so as to effectively avoid the adverse impact of noise data. The calculation model of information entropy under the condition of multidimensional variables is shown in Formula (1) [8].

$$H(x) = -\sum_{i=1}^{r} p(a_i)\log p(a_i)$$

$$H(x) = -\sum_{x_i \in X}^{r} ... -\sum_{x}^{r} p(a_1, a_2, ..., a_n)\log p(a_{1,}a_2, ..., a_n) \tag{1}$$

Suppose the number of sample points is n,which is represented by $x_1, x_2, ..., x_n$ respectively, and it is divided into c classes, $Y_j = \{x_i | x_j \in y_j\}$ is j class set, so the information entropy of class j is $s = \sum_{j=1}^{c}\sum_{x_i \in y_i} p_{ij}\ln p_{ij}$. The information entropy difference between sample states is $s_j - s_{j-1}$, that is, the jump value of information entropy, and the difference of entropy jump value is $\left|(s_{j+1}-s_j)-(s_j-s_{j-1})\right|$, which is the transition value of information entropy.When $\left|(s_{j+1}-s_j)-(s_j-s_{j-1})\right|$ is the minimum value, the stability of the data set is the minimum, and the class data will not change.On the basis of introducing information entropy, we need to combine the class merging algorithm.The main algorithm processing process is as follows. Suppose that the sample size n is divided into c segments, each segment has d points, which satisfies $d = n/c$ and the corresponding merging calculation process is shown in Formula (2) [9].

$$f = \sum_{x=1}^{c}(d_x - d) \tag{2}$$

The median value of sample points is represented by $\frac{c*d}{2}$.When $f \leq \frac{c*d}{2}$, the classes are merged. On the basis of introducing information entropy and class merging algorithm, attribute weighting algorithm is introduced. The weight of the j attribute is represented by w_j, and it conforms to $\sum_{j=1}^{s} w_j = 1$. Therefore, the definition of compr ehensive FCM algorithm is shown in Formula (3).

$$J(u, v, w) = \sum_{i=1}^{c}\sum_{k=1}^{n}\sum_{j=1}^{s} u_{ik}^{m} w_j^{\beta}(x_{kj} - v_{ij})^2 \tag{3}$$

Formula (3) satisfies $\sum_{i=1}^{c} u_{ik} = 1$, the number of clusters is represented by c, and the weight index is expressed by β After the algorithm model of clustering analysis is constructed, it is necessary to cluster the mental health of college students. The data used in clustering comes from social data obtained from wechat, QQ and microblogs using Python. There were 4162 groups of cluster data after relevant processing. The detailed FCM clustering analysis process is described below. Firstly, the corresponding samples are input according to the data characteristics. Secondly, the psychological data of college students is standardized, and the fuzzy factor and the iteration

condition are set. The fuzzy factor is set as 2 and the iteration condition is set as $I = 1e-6$. Again, assume that the initial cluster center range is $[c_{min}, c_{max}]$, and set $c_{min} = 2$, $c_{max} = \sqrt{n}$. Finally, the initial cluster centers are determined. The cluster centers are determined by using the above-mentioned related models.The clustering results of college students' psychological data as shown in Figure 1 are obtained.
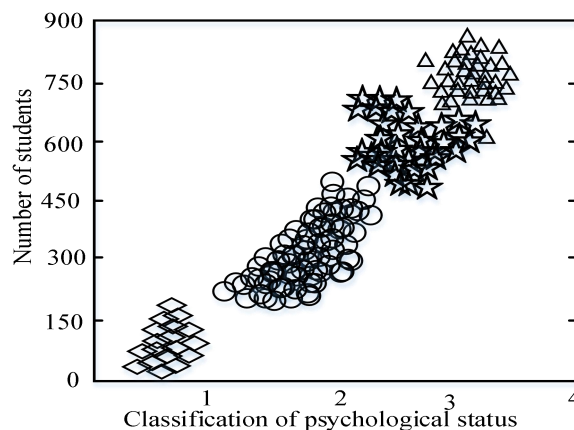

Fig. 1. Psychological clustering results of College Students' social data

According to Figure 1, college students' mental health based on social data can be divided into four categories, namely, students with severe psychological problems, students with moderate psychological problems, students with mild psychological problems and students with some psychological distress. Among them, students with severe psychological problems are represented by lozenges; students with moderate psychological problems are represented by circles; students with mild psychological problems are represented by stars; and some students with mental distress are represented by triangles. And it can be seen from the figure that the number of students with moderate psychological problems is the largest,the number of students with severe psychological problems is the least.From the results of clustering, we can see that most of the students have mental health problems, so it is necessary to carry out mental health intervention on students.

2.2 2.2 Mental Health Intervention for College Students

Relevant data shows that music can relieve pressure and relieve mood, which plays an important role in the prevention and treatment of mental health[10].   The human body is composed of many regular vibration systems, human brain wave movement, heart pulsation, lung contraction, gastrointestinal peristalsis and autonomic nerve activity have a certain rhythm.When the music rhythm of a certain frequency is consistent with the rhythm of each organ in the human body, it can make the body resonate and produce psychological pleasure.At present, music therapy has become an important means of mental health prevention and treatment, has a high authority, but also easy to be accepted by college students.

Music prevention and treatment method is a systematic psychological intervention method.In the process of prevention and treatment, the therapist uses relevant music experience to carry out treatment for those who need psychological prevention and treatment[11]. Based on the classification of college students' social data, the music prevention method is used to prevent and treat the above four types of students. The profile of mood state *POMS* was issued to these four types of students and tested. The selected subjects were all students without music therapy, and the corresponding age was 18-23 years old. Finally, 56 subjects were selected.Using music to relax muscles and nerves, combined with some psychological counseling, can improve the psychological control ability and environmental adaptability of the subjects, so as to help them improve their stress resistance.The number of subjects in the music control experiment is shown in Table 1.

Table 1 Literature References Statistics of music control subjects

Types of students	Number of genders		Total number of people
	Female	Male	
Severe psychological problems	7	7	14
Moderate psychological problems	7	7	14
Mild psychological problems	7	7	14
Some psychological problems	7	7	14

The instruments used in the research mainly include an intelligent group wireless music relaxation system and a body feedback training instrument.The two instruments are developed by Shanghai Huicheng Consulting Co., Ltd., which can measure the physical fitness of subjects and play music. The experimental intervention stage was from September 2019 to November 2019, and the frequency of intervention treatment was once a week, a total of 8 times prevention and treatment, and each prevention and treatment time was one hour. Before the beginning of the experiment, the subjects should fill in the profile of mood state $POMS$ to compare with the effect of music prevention. At the same time, 56 experimental members were asked to fill in the corresponding music preference paper, and then they were divided into groups according to the results of the questionnaire. The subjects need to adjust their posture, and connect to the corresponding physiological index testing instrument. First, record the basic physiological value before the intervention, and then carry out the music intervention on the subjects, and then test the physiological indicators after the intervention.In the whole process of music prevention and treatment, the therapist led the subjects to follow the music into a relaxed state, and guided the subjects to imagine.After many times of training, the relaxation concert became the stimulating response of the subjects to relax. As soon as they heard the relaxation music, they would consciously enter the relaxation state. The whole music psychological intervention is expected to be 50 minutes, and after the intervention, the subjects were asked to fill in the profile of mood state $POMS$ .The information of all subjects should be kept secret in order to eliminate their psychological concerns and minimize   external interference. The overall setting of the music prevention and control environment is relatively comfortable, which creates a sense of relaxation. According to the music preference questionnaire, the songs used in psychological prevention and treatment are mainly "The Autumn Moon in Han Palace", "The Butterfly Lovers", "Piano Concerto No.5" and "Moonlight Sonata", which are all classical folk music at home and abroad.

3. Analysis on the Results of Mental Health Intervention

As a condiment of life, music has an incomparable role in people's lives. According to relevant data, 37% of college students love music, 60% of them listen to music to improve their mood, and only 3% of them think that listening to music can not affect their mood. It can be seen that music has a high degree of recognition among students.Therefore, the use of music to intervene in students' mental health is not only highly acceptable, but also in line with the psychological prevention and control criteria[11] .According to the above methods, the data of subjects before and after music prevention and treatment were statistically analyzed, and SPSS software was used to conduct the corresponding analysis of variance and t-test on the test samples. The experimental results before and after the prevention and treatment are shown in Table 2.

Table 2 Comparison of mood state of POMS before and after intervention （**p<0.01）

Dimension	Before prevention and treatment	After prevention and treatment	F	Sig
Fatigue	9.322±4.122	8.788±3.914	3.094	0.038
Melancholy	7.655±2.342	5.898±1.111	6.216	0.008**
Body and mind	8.562±2.127	11.681±3.768	8.167	0.005**
Nervous	8.432±4.436	7.691±3.188	2.461	0.045
Self esteem	8.465±3.126	10.808±4.189	4.524	0.014
Panic	7.597±3.127	7.457±2.791	0.947	0.048
Anger	7.455±3.989	5.459±3.216	0.983	0.053
POMS total score	108.686±53.875	101.575±48.275	6.423	0.033

It can be seen from Table 2 that from the perspective of psychological state and POMS total score under different dimensions,when the significance level is fixed at 0.05, the probability valuesobtained by the experiment is less than 0.05, indicating that there are significant differences in the "POMS total score", fatigue, tension and inferiority complex in the prevention and treatment experiment. The probability valuesof "depression" and "body and mind" are less than 0.01, which can be considered as significant differences; however, the probability valueof "anger" dimension is greater than 0.05, indicating that there is no significant difference in prevention and treatment. In addition, from the profile of mood state POMS before and after the intervention, we can see that there are significant differences in the two dimensions of "depression" and "body and mind", which indicates that the music intervention has a good effect on the prevention and treatment of college students' mental health.Generally speaking, there were significant differences in the dimensions of the subjects before and after the intervention. The total score of POMS before intervention was higher than that before intervention, which obviously decreased after the intervention, which can prove that music prevention and control can enhance the mental health level of the subjects. The main applicable population of the feedback training of body and the mind regulation is the people who have been in a high pressure environment for a long time and their muscles are in a tense state for a long time. Through the feedback training of body and mind regulation, the body and mind of these people can be relaxed. The results of body and mind control training obtained by using the above methods are shown in Table 3.

Table 3 Comparison results before and after physical and mental regulation

Project	Before prevention and treatment	After prevention and treatment	t	p
PNN50(%)	24.66±13.66	21.66±10.46	2.813	0.0038
Pulse	87.37±12.45	83.76±9.22	2.659	0.0342
Blood pressure (diastolic blood pressure mmmHg)	85.14±19.25	78.14±15.28	3.420	0.0265
Blood pressure (systolic blood pressure mmmHg)	108±18.55	108.55±13.35	3.847	0.0466
Breathing	15.03±5.46	13.56±4.53	2.659	0.0342

It can be seen from Table 3 that after the feedback training of physical and mental regulation, the probability valueof PNN50 project has reached 0.0038, which is significantly less than 0.01, indicating that the change is more significant. In addition, according to the relevant standards, when the diastolic blood pressure is less than 80 mmHg and the systolic pressure is less than 120 mmHg, the blood pressure is in an ideal state. From table 3, we can see that although the changes in systolic blood pressure before and after prevention and treatment are not significant, the diastolic blood pressure after intervention is significantly reduced to less than 80 mmHg, indicating that the control

effect is good. In order to further explore the effect of music prevention and control, according to the prevention and control principle, group wireless music training was carried out, and the test data before and after the experiment were recorded, and the training comparison results as shown in Fig. 2 were obtained.
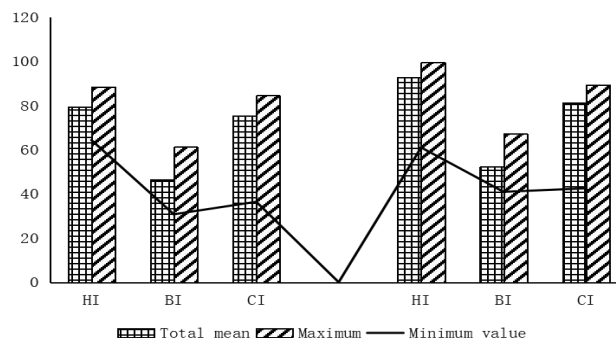

Fig.1 Comparative analysis of group wireless music prevention experiment

It can be seen from Figure 2 that after the group wireless music training, H relaxation index (HI), B relaxation index (BI) and comprehensive relaxation degree (CI) have increased significantly, among which the H relaxation index has the largest increase, with a rate of an increase about 120%; the composite index has a rate of increase about 106%; and the B index has a rate of increase about 112%. Therefore, after the group wireless music training, the psychological pressure of the students has been reduced, and wireless music therapy has a good effect on the prevention and treatment of psychological diseases.

4. Conclusion

Wechat , QQ , Microblog and other social software record the data of students in detail. Making full use of the data to realize the real-time monitoring of college students' psychological state is of great significance for the prevention and treatment of college students' psychological diseases. Based on the social data of college students, this study carried out the cluster analysis on the data to achieve the purpose of accurate prediction of students' psychological problems and timely intervention. From the clustering results, 56 students were selected as experimental objects to carry out music physical and mental control training and wireless music relaxation training. The intervention results showed that the factors of each item changed significantly after the feedback training of body and the mind regulation.The probability value p of PNN50 project reached 0.0038, which was significantly less than 0.01, which indicated a significant change.The results of group wireless music relaxation training show that the three relaxation indexes are significantly increased, among which the H relaxation index increased by about 120%, the composite index rose by about 106%, and the B index rose by 112%. In conclusion, after the music intervention, the students' nervous system and the muscle tissue have been relaxed to varying degrees, and the psychological pressure has been significantly reduced, which shows that the music intervention based on the cluster analysis has a good effect on the prevention of psychological diseases of college students. Although this study has certain reference significance for college students' mental health education under the background of big data, there are still some problems with the research, such as less sampling and low experimental precision.

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