Research on PEP-3 psychological education evaluation system for disabled children and autistic children in minority areas

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Abstract. – **OBJECTIVE:** Rehabilitation of disabled children with autism has become a challenge for current rehabilitation centres. This study conducted psychological investigations on disabled children and analysed the symptoms and characteristics of autism in these children to develop more reasonable rehabilitation treatment plans that would help the children receive psychological counselling and effective rehabilitation.

SUBJECTS AND METHODS: This study investigated 107 disabled children from the Disabled Rehabilitation Research Centre of the South China Minority Autonomous Region. Using the PEP-3 scale as a research tool, a questionnaire was developed to investigate and collect data on the mental health of disabled children. The survey was conducted from 2017 to 2021, and 107 children's mental health data were collected in the form of questionnaires based on PEP-3 evaluation indicators. After cleaning the data, the questionnaire data were screened and processed. Descriptive statistical and correlation analysis tools were used for model analysis to understand the overall data distribution and the potential relationships among various data variables.

RESULTS: The results of correlation analysis showed that cognition, language expression, language understanding, emotion, and social interaction in the subtest of developmental behaviour were the main indicators of the degree of autism in children. These indicators had a strong and significant correlation with the comprehensive score. Moreover, these indicators had a significant correlation with the individual self-care and adaptive behaviours reported by the children's caregivers. Small muscles, big muscles, and imitation (vision and movement) indicators had a significant correlation with problematic behaviours and physical fitness, and language and cognitive indicators also had a strong correlation with emotion and social interaction.

CONCLUSIONS: Emphasis should be placed on the improvement of the language and cognitive abilities of disabled children with autism, and corresponding rehabilitation plans, and trainings can be formulated according to children with different degrees of illness to get a better rehabilitation outcome. Further, identification of key indicators of autism will be of help in aiding the development of rehabilitation treatment for disabled children with autism and formulation of long-term rehabilitation plans.

Key Words:
   Minority areas, Disabled children, Psychological education assessment for children with autism (PEP-3), Research centres for the rehabilitation of disabled children.

Introduction

Children's health and hygiene status, important indicators for evaluating the improvement of living standards in ethnic minority areas in China, are directly related to the overall social and economic development in ethnic minority areas. Thus, methods to improve the children's health index in such areas have become a problem of great concern to the state and society in recent years[1].

The poor mental health of disabled children is a particularly prominent health problem in children of ethnic minority areas. According to the existing survey, the incidence of disabled children in ethnic minority areas in China is much higher than the national average, and the incidence of autism among disabled children is particularly prominent. Moreover, due to a lack of psychological counselling and treatment for disabled children, a large number of them have mental health problems, which is an important factor in the development of autism among disabled children. Therefore, it is of great value to investigate the incidence and characteristics

of autism among such children to help rehabilitate their mental health and to systematically analyse and evaluate their psychological quality from the perspective of mental health[2]. The widely used international Psychoeducational Profile, Third Edition (PEP-3) assessment scale to investigate children's psychological quality and autism characteristics assesses children's psychological health through cognitive and linguistic expression and social interaction, among other factors. It systematically evaluates the psychological education status of children with autism to help rehabilitation centres formulate more reasonable psychological counselling and treatment programmes[3-5]. For example, a regression model based on the data collected by the PEP-3 scale is proposed to analyse the correlation and characteristics of various assessment factors for children with autism, and a targeted treatment scheme is proposed, which improves the psychological counselling effect[6]. Another study[7] systematically analysed the characteristics of autistic children based on the data collected by the PEP-3 scale and relevant statistical methods. Then, a personalised multi-dimensional rehabilitation programme was put forward, which had a remarkable effect on the rehabilitation and quality of psychological education in children with autism[7].

We conducted a psychological education evaluation based on PEP-3 scale on disabled children from rehabilitation centres in the minority areas of South China. Basic information such as children's age, gender, and evaluation data were collected and statistically analysed to investigate the overall distribution of characteristics and different development behaviours of children with autism. Further, suggestions and guidance were also provided for later treatment and rehabilitation programmes to improve their effectiveness in children with autism[8-10].

Subjects and Methods

Using the PEP-3 scale as a research tool, a questionnaire was developed to investigate and collect data on the mental health of disabled children. The survey was conducted from 2017 to 2021, and 107 children's mental health data were collected in the form of questionnaires based on PEP-3 evaluation indicators, of which 107 were valid data. After cleaning, the questionnaire data were imported into Excel for preliminary screening and processing.

Research Method

Literature research
To understand the overall incidence rate of disabled children with autism and the existing research and information on rehabilitation programmes by collecting children's health data and existing relevant research literature[11].

Statistical data analysis
To understand the overall disease distribution and status quo of the current research objects from the perspective of data by simply analysing the collected statistical data using scientific statistical methods[12,13].

Subjects
1. PEP-3 Questionnaire on Autism Education Level of Disabled Children was used to investigate the situation of individual samples, according to the measurement variables and methods provided in the PEP-3 system evaluation standard[14].
2. PEP-3 Statistical Table of Autism Education Level of Disabled Children was used to perform a preliminary analysis and screening of all survey participants[15,16].

Participants
From the rehabilitation centres in the minority areas of South China, 107 disabled children (3-7 years old) were investigated, of which 42 were 3 years old and 26 were 4 years old.

Statistical Analysis
Various analysis models provided by the existing data analysis software and tools were applied, and the obtained analysis statistics and charts were used to discover the potential relationships and correlations among various data variables through the data input and the use of SPSS 22.0 (IBM, Armonk, NY, USA) software[17].

The variables of the composite score of behaviour, physical ability, and communication of the samples were statistically analysed, and their confidence was analysed based on the bootstrap model[18]. The overall distribution of the composite scores of the samples was obtained.

To further explore the potential correlation between each measurement data, the correlation

analysis was performed on the data obtained from the measurement, and the two-variable multilateral correlation analysis model provided by SPSS 22.0 (IBM, Armonk, NY, USA) software was adopted to analyse the data. Moreover, the correlation analysis model was used to analyse the correlation between the development behaviour subtest, the composite result, and the comprehensive evaluation.

Results

Analysis of Descriptive Statistical Results of Sample Data

There were 88 boys and 18 girls, with boys as the dominant group. In terms of ethnic distribution, among the ethnic minorities, 48 participants were Zhuang; 50, Han; 1, Dong; 4, Mulao; and 4, Yao; the ethnic minorities accounted for 52.2% of the sample, indicating that the overall research object was dominated by ethnic minorities, which met the research requirements of this study. Distribution of the composite scores of behaviour, physical ability, and communication.

According to the basic information of the participants and the statistical description results after synthesising the scores, the confidence level of the variables was within the confidence interval range, which met the requirements of subsequent statistical analysis.

To better evaluate the participants, a comprehensive evaluation indicator was constructed in this study to calculate the average value based on the sum of the standard scores of behaviour, physical ability, and communication in the composite score, to obtain the data value of the comprehensive average score as the parameter of the comprehensive score indicator. The comprehensive score indicator was analysed to observe the overall distribution of autism in the participants.

Assuming that the comprehensive evaluation score is W, the comprehensive score is calculated based on the mean calculation model, including behavior score, physical fitness score and communication score, as shown below:

The distribution of the overall comprehensive score was calculated by the mean histogram model in SPSS 20.0 software (IBM, Armonk, NY, USA) as shown in Figure 1.

The comprehensive scores were analysed with respect to age, and the distribution results were obtained by box plot analysis as shown in Figure 2.
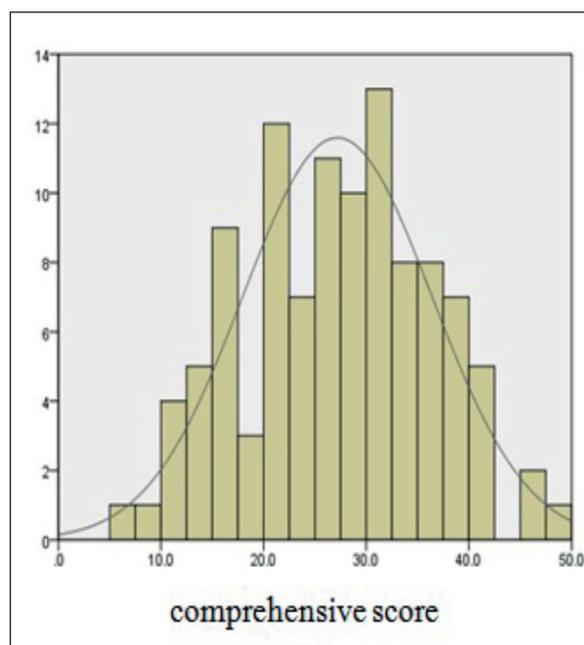

Figure 1. Comprehensive score distribution.

The distribution of the composite scores with respect to gender obtained by box plot analysis is shown in Figure 3.
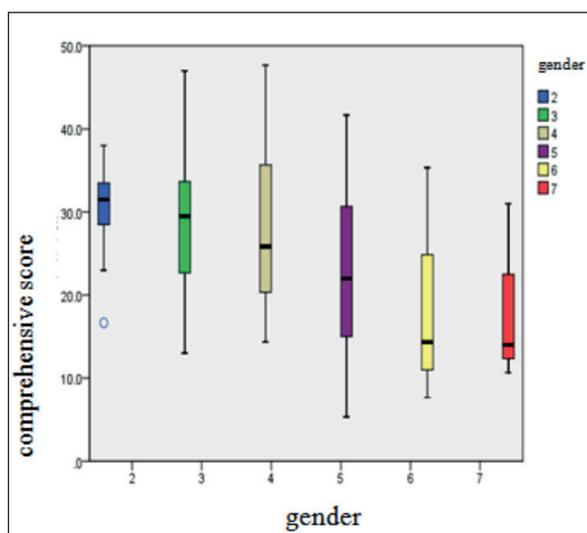
The distribution of comprehensive scores was in the range of 20 to 35 points and had a normal distribution (Figure 1). In addition, the number of participants with scores below 10 and above 50 was very small; hence, the overall comprehensive assessment scores of disabled children with autism were in the lower range. From the perspective of age, the comprehensive score and age also followed a certain distribution rule. The comprehensive score of children aged 3 to 5 years was mainly concentrated in the range of 20 to 35 points. However, in terms of gender distribution, there was little difference between boys and girls.

Correlation Analysis Between Data

The correlation analysis results of the measurement data of each indicator are shown in Table I.

From the analysis of the correlation of the comprehensive score with gender and age, it was found that the comprehensive score of autism education level was significantly correlated with age but not with gender (Table I).

A correlation test was performed considering the correlation between the subtest reported by the child caregiver and the composite and comprehensive scores, and the results are shown in Table II.

Figure 2. Box plot distribution results of comprehensive score and age.

Based on the above analysis, the results of correlation analysis between each indicator, composite and comprehensive score show that cognition, language expression, language understanding, and emotional expression were strongly correlated with comprehensive evaluation scores.

Discussion

The research results of the rehabilitation centres in the minority areas of South China studied in this paper are representative, reflecting the health status and characteristics of disabled children with autism in the current minority areas in China[23].

Based on the results of the descriptive statistical and correlation analysis of the samples mentioned above, the overall law and potential correlation of each indicator can be discussed and further analysed. Our data analysis demonstrates the following:

1) First, we found a significant correlation between the condition (comprehensive score) of disabled children with autism and their age. The highest incidence was found in children aged between 3 to 5 years old, which is a key age range for the development of autism. Therefore, screening and timely identification of disabled children with autism before the age of 3 years is beneficial for their follow-up rehabilitation treatment. Most severe patients were aged between 5 and 7 years, which suggests that the ideal treatment period for patients with autism is between 3 and 5 years of age, during which the aggravation of the condition is easy if they do not receive good rehabilitation treatment. Second, there was no correlation between gender and the condition of disabled children with autism. Therefore, gender is unlikely to be important when treating autistic children and formulating relevant rehabilitation programmes[19,20]. As ethnic minorities pay more attention to the rehabilitation treatment of boys, this leads to the gender imbalance of the sample participants.

2) From the results of correlation analysis, cognition, language expression, language understanding, emotion, and social interaction in the subtest of developmental behaviour were the main indicators for the severity of autism. A highly significant correlation of these indicators with the comprehensive score was found. Moreover, these indicators had a significant correlation with individual self-care and adaptive behaviours reported by the child caregivers, which directly affects the individual self-care and adaptive behaviours of children. Small muscles, big muscles, and imitation (vision and movement) indicators had a significant correlation with problematic behaviours. Physical fitness, language, and cognitive indicators also have a strong correlation with emotion and social interaction. Therefore, in treatment and rehabilitation, emphasis can be placed on the improvement and restoration of the language and cognitive abilities of disabled children with autism, and corresponding rehabilitation plans, and trainings can be formulated according to the dif-
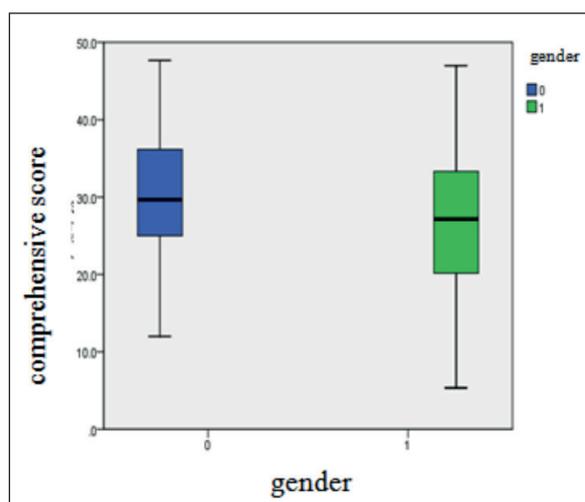
Figure 3. Box plot distribution results of comprehensive score and gender.

Table I. Correlation analysis results of age, gender and comprehensive score.

Variables	Parameters			Age	Gender	Comprehensive score
Age	Pearson Pearson correlation			1	.074	-.290**
	Significance (both sides)				.447	.002
	N			107	107	107
	Bootstrap[c]	Deviation		0	.000	.002
		SE		0	.097	.098
		95% confidence	Lower limit	1	-.137	-.467
			Upper limit	1	.253	-.092
Gender	Pearson correlation			.074	1	-.131
	Significance (both sides)			.447		.178
	N			107	107	107
	Bootstrap[c]	Deviation		.000	0	-.002
		SE		.097	0	.100
		95% confidence	Lower limit	-.137	1	-.320
			Upper limit	.253	1	.072
Comprehensive score	Pearson correlation			-.290**	-.131	1
	Significance (both sides)			.002	.178	
	N			107	107	107
	Bootstrap[c]	Deviation		.002	-.002	0
		SE		.098	.100	0
		95% confidence	Lower limit	-.467	-.320	1
			Upper limit	-.092	.072	1

** indicates significant correlation at .01 level (both sides).
c. Bootstrap results will be based on 1000 bootstrap samples unless otherwise specified
($p<0.05$)

ferent degrees of illness to improve the effect of rehabilitation[21].

Based on our results of descriptive statistics and correlation analysis, it is possible to focus on relatively strong indicators of autism for the development of rehabilitation treatment plans for children with disabilities, and to carry out treatment in batches for children of different ages to achieve better rehabilitation efficacy[22].

Conclusions

The characteristics and correlation of key indicators in the PEP-3 evaluation system for disabled children with autism were comprehensively evaluated. The condition of disabled children with autism and various comprehensive evaluation indicators were significantly correlated with age, with the highest incidence of disabled children with autism being between 3 and 5 years old. As ethnic minorities pay more attention to the rehabilitation treatment of boys, this leads to the gender imbalance of the sample participants. Cognition, language expression, language understanding, and emotional expression are the main factors that

affect the condition of disabled children with autism[23,24]. Our data can be used to visually observe the developmental status of autistic children in cognition, language, social interaction, physical fitness, and adaptability. This will aid the further development of rehabilitation treatment and long-term rehabilitation plans[25,26].

Conflict of Interest

The authors declare that they have no conflict of interests.

Table II. Correlation analysis of child caregivers' report subtest, composite score and comprehensive score indicator.

Indicators			Composite and comprehensive evaluation			
			Communication	Physical ability	Behavior	Comprehensive
Child caregivers report subtest	Problematic behaviors	Pearson correlation	.405**	.364**	.390**	-.506**
		Significance (both sides)	.000	.000	.000	.000
		N	107	107	107	107
	Self-care ability	Pearson correlation	.409**	.370**	.289**	-.506**
		Significance (both sides)	.000	.000	.003	.000
		N	107	107	107	107
	Adaptive behaviors	Pearson correlation	.587**	.455**	.501**	-.628**
		Significance (both sides)	.000	.000	.000	.000
		N	107	107	107	107

(p<0.05) **indicates significant correlation at .01 level (both sides).

Informed Consent

Informed consent was obtained from the respondents.

Data Availability

The data presented in this study are available on request from the corresponding author.

Authors' Contribution

Data Curation: Weiwei Tan, Yingying Lin, Liangliang Huang, Ming Chen and Jinsheng Jiang; Formal analysis: Guozhi Chen, Wen-lung Chang and Yu Shi; Investigation: Weiwei Tan, Yingying Lin, Liangliang Huang, Ming Chen and Jinsheng Jiang; Methodology: Wen-lung Chang; Project administration: Guozhi Chen, Wen-lung Chang and Yu Shi; Resources: Wen-lung Chang; Statistical analysis: Liangliang Huang, M. Chen and Jinsheng Jiang; Supervision: Guozhi Chen, Wen-lung Chang and Yu Shi; Validation: Weiwei Tan and Yingying Lin; Writing-original draft: Wen-lung Chang; Writing-review & editing: Tzu-yuan Chang.

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