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Risk Factors of Learning Disabilities in Chinese Children in Wuhan

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Objective To investigate prevalence rate of learning disabilities (LD) in Chinese children, and to explore related risk factors, and to provide theoretical basis for preventing such disabilities. **Methods** One thousand and one hundred fifty one children were randomly selected in primary schools. According to criteria set by ICD-10, 118 children diagnosed as LD were classified into the study group. Four hundred and ninety one children were classified into the normal control group. Five hundred and forty two children were classified into the excellent control group. The study instruments included PRS (The pupil rating scale revised screening for learning disabilities), Conners' children behavior check-list taken by parents and YG-WR character check-list. **Results** The prevalence rate of LD in Chinese children was 10.3%. Significant differences were observed between LD and normally learning children, and between the LD group and the excellent group, in terms of scores of Conners' behavior check-list ($P<0.05$). The study further showed that individual differences in character between the LD group and the control groups still existed even after controlling individual differences in age, IQ, and gender. Some possible causal explanations contributing to LD were improper teaching by parents, low educational level of the parents, and children's characteristics and social relationships. **Conclusion** These data underscore the fact that LD is a serious national public health problem in China. LD is resulted from a number of factors. Good studying and living environments should be created for LD children.

Key words: Learning disabilities (LD); Behavior problems; Character; Children; Risk factors

INTRODUCTION

Learning disabilities are disorders that affect people's abilities to either interpret what they see and hear or to link information from different parts of the brain. These limitations can show up in many ways, such as specific difficulties with spoken and written language, coordination, self-control, or attention. Such difficulties extend to school work and can impede learning to read, write, or do arithmetic[1]. Learning disabilities are life-long. They come from inefficient processing of information. This means information from the sensory organ such as the eye or ear follows a more disorganized path as it goes to the brain for processing and storage. Studies have shown that 5%-25% of all school children may have learning disability. The psychological, social, and economic consequences of LD are combined actions. That is why the NICHD (National Institute of Child Health and Human

Abbreviations: LD, learning disabilities; PRS, the pupil rating scale revised screening for learning disabilities

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Development) considers learning disabilities not only as an educational problem, but also as a significant public health problem[2]. These LD children have several mental and behavior problems, including aggressive behavior, and hyperactivity and lower social-adaptation etc. LD prevalence rate is roughly 8.76%-28.0% in Chinese primary school pupils[3]. We investigated 1 151 Chinese children in Wuhan City, so as to explore the risk factors of LD and to seek early identification and intervention with children at-risk for learning failure.

SUBJECT AND METHODS

Subjects

One thousand and one hundred fifty-one children were tested, whose parents were informed of their rights before participating in procedures. All children were physically healthy and free of neurological diseases, head injury, and psychiatric disorders. The subjects were between the ages of 7 and 12 ($\bar{x}\pm s$ = 9.4±2.3 yr.), and all of them were right-handed. Both study and control groups were in the average range for IQ. LD children had a full-scale IQ ($\bar{x}\pm s$) of 91±2.3 and normal and excellent control children had an IQ of 115±2.2. Other than requiring that all subjects had an IQ within the average range (80 or above), we did not match subjects on IQ so as not to bias our sample selection in favor of less impaired children because IQ was known to influence learning ability.

Methods

The pupil rating scale revised screening for learning disabilities (PRS), containing a total of 24 items, is divided into five major aspects such as listening comprehension and memory, language comprehension, time and spatial judgment, motion ability, social behavior. In China, "diagnosis statements of learning disabilities" depends on PRS testing. According to the score of PRS, the score of PRS≤60 is defined as LD group, 60 < the score≤85 as normal group, and the score > 85 as excellent group[4].

Conners' children behavior check-list A total of 48 items are divided into morality problems, learning problems, psycho-physiological problems, compulsion and hyperactivity, anxiety, and hyperactivity index. All these items were filled in by children's parents. Depending on Chinese children normal matrix, the child whose average score of the checklist in each factor was higher than 1.5 percent was diagnosed as having behavioral problems.

YG-WR character check-list The checking factors consist of D, C, I, N, O, Co, Ag, G, R, T, A, S. The testing results included five characteristic types such as A, B, C, D and E, Type D was the best and type E the worst.

General questionnaire The general circumstance questionnaire involved a total number of 24 items containing parental educational level, parental teaching methods, parental expectation, social relationships and interactions, etc.

Statistics and Data Analysis

The inquisition data were imported in computer, the SAS statistics software package was used to analyze them after sound verification.

RESULTS

Investigation Results of Three Groups of Children's Respectively

Prevalence rate of LD One hundred and eighteen LD children were diagnosed with the PRS in 1 151 school-aged children. The total prevalence rate was 10.3%. The prevalence rate of boys (13.06%) was significantly higher than that (7.14%) of girls, ($\chi^2=4.36$, $P<0.05$).

Average score of behavior problems There were significant differences among the three groups on the aspects of morality problems, learning problems and hyperactivity index (Table 1).

TABLE 1

Average Score of Behavior Problems in Three Groups of Children ($\bar{x}\pm s$)

Behavior Factors	LD Group (n=118)	Normal Group (n=491)	Excellent Group (n=542)	F	P
Morality Problems	0.80±0.48	0.70±0.37	0.66±0.37	7.11	<0.01
Learning Problems	1.32±0.66	1.10±0.53	0.94±0.50	28.48	<0.01
Psycho-Physiological Problems	0.54±0.44	0.52±0.43	0.54±0.42	0.30	>0.05
Compulsion and Hyperactivity	0.92±0.50	0.95±0.48	0.88±0.49	3.30	<0.05
Anxiety	0.59±0.43	0.59±0.40	0.54±0.40	1.81	>0.05
Hyperactivity Index	0.99±0.49	0.91±0.39	0.82±0.42	12.31	<0.01

Analysis of character traits 20.48% of LD children were of E type character, which was higher than that of the control groups (9.78%). However, proportion of D type character in LD children was 22.89%, which was lower than that of the control groups (32.23%) ($\chi^2=6.53$, $P<0.05$).

Single Factor Analysis

Parental teaching methods.

TABLE 2

Comparison of Prevalence Rate of Different Parental Teaching Modes in Three Groups of Children (n/%)

Parental Teaching Mode	LD Group	Normal Group	Excellent Group	χ^2	P
Paying Less Attention to Child's Thoughts	22/18.64	36/7.33	42/7.75	9.78	<0.01
Beating and Scolding Child Usually	25/21.19	58/11.81	47/8.67	9.25	<0.01
Never Acknowledging Child's Requests	13/11.02	26/5.30	15/2.77	10.14	<0.01
Talking Too Much About Child's Fault	39/33.05	99/20.16	126/23.25	6.96	<0.05
Thinking Child as a Burden	14/11.86	20/4.07	9/1.66	10.58	<0.01
Spoiling	28/23.73	82/16.70	70/12.92	9.36	<0.01
Giving Little Care for Child's Studies	11/9.32	21/4.28	15/2.77	7.29	<0.05
Discording With Child's Requests	16/13.56	64/13.03	42/7.75	7.16	<0.05

Familial surroundings.

Parental educational background.

TABLE 3

Comparison of Parental Educational Background in Three Groups of Children (*n*/%)

Educational Background	Educational Background of Father			Educational Background of Mother		
	Illiteracy	Secondary School	Associate Degree or Above	Illiteracy	Secondary School	Associate Degree or Above
LD Group	19/16.10	81/68.64	18/15.25	21/17.80	86/72.88	11/9.32
Normal Group	41/8.35	361/73.52	89/18.13	38/7.74	390/79.43	63/12.83
Excellent Group	34/6.27	406/74.91	107/18.82	23/4.24	447/82.47	72/13.28
χ^2		11.88			16.43	
P		<0.05			<0.01	

Family disputes 7.63% LD children had family disputes, which was higher than that of the control groups (3.42%), (χ^2=9.89, *P*<0.01).

Parents expectation The parents expectations of LD children were lower than those in the control groups (χ^2=9.24, *P*<0.01). There were 40.68% parents of LD children who expected their children only to make a living in future. On the contrary, most parents of the control groups expected their children to be able to enter university or go abroad for further study.

Children's Self Factors

Child social interaction The rate of LD children with undesirable *social interaction* was higher than that of the control groups, (χ^2=9.42/9.54/9.31, *P*<0.01). The undesirable *social interactions* with their teachers , classmates and neighbors in LD group were 7.63%, 9.32% and 7.83%, respectively, which were more than those in the normal（2.85%, 2.04% and 2.24%） and excellent control group (2.40%, 2.21% and 2.05%), *P*<0.01 (Table 4).

TABLE 4

Comparison of Children's Self Factors Among Three Groups (*n*/%)

	Feeling Nervous in Testing	Dislike Studying	Overload of Studies
LD Group	76/64.41	30/25.42	83/70.34
Normal Group	235/47.86	70/14.26	232/47.25
Excellent Group	213/39.30	45/8.30	235/43.36
χ^2	6.78	7.49	6.67
P	<0.01	<0.01	<0.01

Logistic Regression Analysis

We looked on score of PRS as dependent variable, and took 6 Conners' behavioral factors, 12 characteristic types and 42 circumstance factors as independent variables. Logistic regression analysis was used (α =0.05), and nine factors were chosen into square formula according to priority of contribution value, such as x_1 (child's academic achievements), x_2 (parents expectation), x_3 (familial memberships), x_4 (N characteristic, squeamish), x_5 (studying burden), x_6 (parents considering their child as a burden), x_7 (psycho-physiological disorder), x_8 (learning problems), x_9 (aggressive). The square formula

is as follows:

$$Y=116.24-7.64x_1-2.96x_2-15.15x_3+0.98x_4+3.64x_5-7.77x_6+3.90x_7-3.37x_8+0.78x_9$$

DISCUSSIONS

Prevalence Rate of LD

This study results showed that the LD prevalence rate in school-age children was 10.3%. The recent data derived from the 2002 national assessment of educational progress (NAEP) revealed an alarming trend: it appeared that for about half of children in USA[5], at least 20 to 30 percent of these youngsters, LD was one of the most difficult tasks that they would have to master throughout their life[6]. The boy's prevalence rate was significantly higher than girl's ($P<0.05$), which was consistent with previous study findings. The gender differences might relate to inherent characteristic differences between boys and girls[7].

Analysis of Risk Factors of LD

Parents circumstance Firstly, parents teaching methods may play a key role in the development of children study ability. Parents should regard active education as an universal principle, and should use encouraging words as far as possible, never use negative words, give more affirmative praise to the child on time when he or she makes a small progress.

Secondly, parents education attitude should keep consistent as far as possible, and never beat or scold them, and take good care of them.

Finally, family disputes also influence child's development by affecting the familial environment and atmosphere. Results further showed that children were feeling nervous during test, suffered from heavy learning burden, and lacked for interest in study, which may make children venerable to LD. Therefore, we should comprehend children's desire and interest, never force them to study, or stir up their multi-facet interest, and let them study in a free manner.

Social interaction also plays an important role in children's studies. If the relationships with their classmates, teachers or neighbors were not mutually agreeable, the children usually felt dissatisfied and suppressed, so it was impossible for them to efficiently spend their time in study[8]. We suggest that teachers should give more encouragements to LD children, let them feel collective warmth and help them to study in a positive mood.

LD children have various behavior problems as above-mentioned, which are attributed to LD related risk factors. Our studies on early prevention and intervention in the normal preschool children of China as well as other research programs[9], all pointed to the importance of early identification and intervention with children at-risk of learning failure. Procedures for correcting their behaviors now exist to identify such children with good accuracy. This information needs to be widely disseminated to schools, teachers, and parents.

Children's types of character certainly have a close correlation with LD. Findings of the study showed that type E character in LD children was more than in the control groups, but type D in the former was less than in the latter.

In one word, given this general background as above, our research has been able to identify and replicate findings which point to at least four factors that hinder LD among children irrespective of their environmental, socioeconomic, characteristic, and biological factors. We should create good studying and living environments for LD children. Parents and teachers should make joint efforts to establish an aim to rectify and cure LD children

according to their specific individual characteristics.

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