

Assessment of the Psychometric Properties of the New Version of Tehran-Stanford- Binet Intelligence Scale in Children with Dyslexia

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Article information	Abstract
<p>Article history: Received: 13 Aug 2012 Accepted: 24 Oct 2012 Available online: 20 Jan 2013 ZJRMS 2014 Sep; 16(9): 26-29</p> <p>Keywords: Dyslexia Sensitivity Reliability</p> <p>*Corresponding author at: Department of Psychology and Exceptional Children, Social Welfare and Rehabilitation Sciences University, Tehran, Iran. E-mail: abasmahvash@yahoo.com</p>	<p>Background: Cognitive abilities assessment, is considered to be one of the most complicated and controversial issues in psychological tests. In spite of great usage of new version of Tehran- Stanford- Binet intelligence scale in screening and diagnosis, they have not made so many endeavors to use this valid test in our country and little researches have been conducted to survey psychometric characteristics of mentioned scale. Given the above considerations, the aim of this study is to investigate Tehran-Stanford-Binet intelligence scale psychometric characteristics in dyslexic children.</p> <p>Materials and Methods: In this psychometric study with classical approach, the statistical society was all the students with dyslexia in the elementary schools of Tehran provinces in 1390. The sample size was equal with 120 students with dyslexia who were selected based on purposive sampling. The new version of Tehran-Stanford-Binet intelligence Scale which includes 10 subtests in verbal and nonverbal domains (fluid reasoning, knowledge, quantitative reasoning, visual spatial processing and working memory and eight IQ) was used for them. Findings highlight characteristics of this tool is its ability to calculate the combined scores connected to the reading skills. ROC curve methods, kronbach alpha and pearson correlation was used to analyze the data.</p> <p>Results: Result show that SB5 Test has a good reliability and diagnostic validity. It has 98% sensitivity and a desirable potential to identify student with dyslexia (72%).</p> <p>Conclusion: SB5 could be used as an identification tool test for dyslexia.</p> <p>Copyright © 2014 Zahedan University of Medical Sciences. All rights reserved.</p>

Introduction

Dyslexia is a disorder in children, which despite being educated according to their intelligence level, face difficulties in the field of verbal skills like reading, writing and spelling [1]. The best way to help them is a quick recognition and initiation of timely treatment and education. Cognitive abilities assessment, is considered to be one of the most complicated and controversial issues in psychological tests. Intelligence tests help to achieve complementary knowledge to identify learning disabilities such as dyslexia [2]. In these tests, sub-scales dispersion is a detrimental symptom. Therefore using sub-cognitive test profiles is one of the most superior approaches of contemporary psychometric, and enables you to test the strengths and weaknesses of the subject [3]. Nowadays the study of differences of high and low scores on intelligence profiles is used as a tool to diagnose learning disabilities. For more than a few decades, the samples of subjects' scores have been used to form diagnostic and clinical theories by the specialists. Silverstein and Briggs tried to use the combined scores of Wechsler intelligence scale sub-tests, to create combination indicators. Kaufman and colleagues also made useful attempts in the same field in 1994 [4]. Considering this viewpoint, Roid studies, showed that total scores level of active memory and knowledge in the

Stanford-Binet Intelligence scale, fifth edition (SB5), has the ability to anticipate reading achievements as well as math academic progresses by combining the scores of active memory and quantitative reasoning [5]. Furthermore the studies conducted by Askarian et al. [6] showed that there is a reasonable difference between subtests of active memory and knowledge in the students with learning disabilities and the ordinary students. So it can be said that these two factors are the indicators of detecting and diagnosing learning disabilities. Roid et al. [7] showed that SB5 is able to identify the active memory disorders and learning disabilities before entering school. Regarding the reading centered validity, it is known that the validity coefficient is beyond 0.80 and has the optimal validity characteristic of internal homogeneity and stability coefficient type. According to the assessment of the criterion validity of this scale through correlation with Woodcock-Johnson test and the other relevant tests, SB5 is an acceptable criterion [8]. Also, based on the surveys on psychometric characteristics, in which sensitivity and deterministic are required to be beyond 0.70 to obtain diagnostic reliability, SB5 is known to have the quality of diagnosis reliability [9]. Given the lack of a valid and stable scale to detect children with learning disabilities, it is required to use modern technology for the development

of knowledge in our country and to achieve Tehran-Stanford- Binet intelligence scale psychometric indicators in dyslexic children.

Materials and Methods

The present research is considered to be about psychometric plans, and these plans are considered as sub-tests of psychological plans. In this psychometric study with classical approach, the statistical society was all the students with dyslexia in the elementary schools of Tehran provinces in 2011. The sample size was equal with 120 students with dyslexia who were selected based on purposive sampling. The new version of Tehran-Stanford-Binet intelligence scale which includes 10 subtests in verbal and nonverbal domains (fluid reasoning, knowledge, quantitative reasoning, visual spatial processing and working memory and eight IQ) was used for them. Findings highlight characteristics of this tool is its ability to calculate the combined scores connected to the reading skills. Tehran- Stanford- Binet intelligence scale is the investigation tool in this research which has been used as an optimal version in psychology with emphasis on the structure of intelligence at the age range of 2-85 years. It can also be used in the fields of identification, diagnosis and individual assignment, and educational programs with special needs [10]. The above scale was standardized by Roid and has been raised in verbal and non-verbal aspects and 5 other factors including fluid reasoning, knowledge, quantitative reasoning, spatial visual processing and active memory which include both aspects. There are 8 intelligence quotients obtained from this scale such as fluid reasoning IQ, knowledge IQ, quantitative reasoning IQ, spatial visual processing IQ, active memory IQ, verbal and non-verbal IQ and total IQ. The calculating method of reading combination axis in SB5 is as follows [11]. The above mentioned test is designed based on Horne et al. theory and has content reliability. Validity coefficients for verbal and non-verbal aspects of the five intelligence maker factors are between 0.80 and 0.90 and whereas all validity coefficients are higher than 0.90 in the aspects of in fluid reasoning, knowledge, quantitative reasoning and active memory, so the validity of the five intelligence makers is suitable and have got the optimal psychometric characteristic [12].

Results

In the SPSS-20 software, by using ROC curve statistical orders, and in cite with right and wrong diagnosis, the contingency table associated to the diagnostic reliability was used in an accurate way and the deterministic and sensitivity rates were also investigated by the help of ROC curve psychometric analysis. On the other hand they used the retest and internal homogeneity test methods in order to conduct an accurate investigation on the validity of the tools. After testing the scale on 120 students, the

level scores profile of the students mean scores was drawn (Fig.1).

Table 1. Results of the validity of Tehran- Stanford- Binet intelligence scale

Eight intelligence makers	Stability coefficients	Internal heterogeneity
Verbal IQ	95.0	87.0
Non-verbal IQ	94.0	81.0
Total IQ	95.0	86.0
Fluid reasoning IQ	91.0	77.0
Knowledge IQ	95.0	69.0
Quantitative reasoning IQ	92.0	89.0
Spatial visual processing IQ	94.0	88.0
Active memory IQ	92.0	75.0

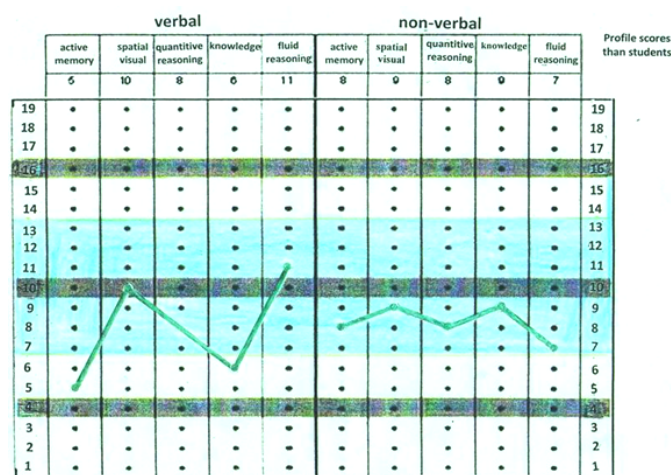


Figure 1. Profile scores than students

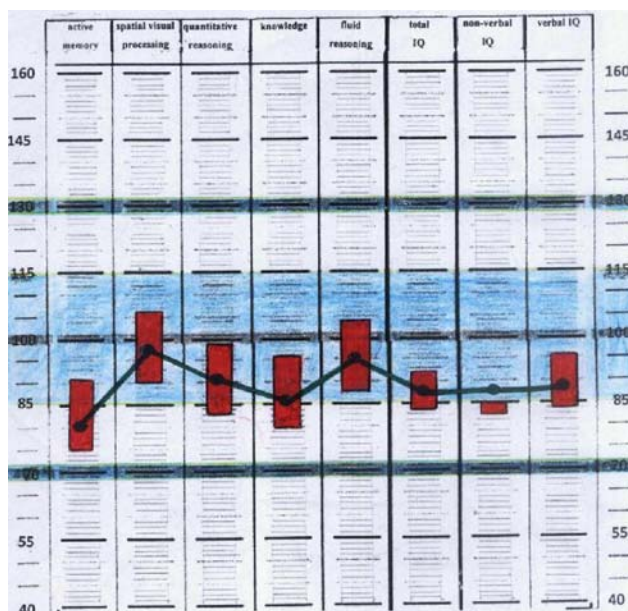


Figure 2. Profiles of IQ scores in children with dyslexia

According to the results of dyslexic students mean scores investigation their scores in active memory and knowledge in the aspects of verbal and fluid reasoning was lower than other sub-tests.

Figure 2 shows that there is no difference between verbal IQ and non-verbal IQ in the students with dyslexia. On the other hand the lowest IQ is 80 which has belonged to active memory and the spatial visual processing IQ which is close to the average (100), has got the highest score among these 8 intelligence quotients. In line with the stability coefficient review on reading disability assessment in Tehran-Stanford-Binet intelligence scale, 15 students undergone a retest, 2 weeks after the first test. By using Pearson correlation coefficient on 10 factors and 8 IQ, the stability coefficient was gained which is considered to have the higher stability coefficient with 0.97 attributing to verbal spatial visual processing and the lowest stability coefficient with 0.89 attributing to verbal quantitative and non-verbal fluid reasoning. Furthermore, in line with the review on internal homogeneity of reading disability assessment in Tehran-Stanford-Binet intelligence scale, alfa Cronbach method was used in which the alfa of each factor is being investigated. According to the results non-verbal fluid reasoning with 0.88 has the higher internal homogeneity and the non-verbal quantitative reasoning, with 0.68 has got the lowest internal homogeneity among others. With the emphasis on psychometric analysis diagnostic reliability sphere, the sensitivity and accuracy were calculated. During the calculation of SB5 sensitivity rate, it diagnosed 94 students as being with dyslexia who are really dyslectic; this represents the high sensitivity of SB5 in dyslexia diagnosis. Seven students were not dyslectic while they had been diagnosed as dyslectic by SB5, and 18 students were diagnosed as not being dyslectic and in reality they are not dyslectic. According to the Rock curve the deterministic rate of dyslexia detection is 0.72 in this scale. As a result and in respect to diagnostic reliability of reading disability assessment in Tehran-Stanford-Binet intelligence scale version considering the optimum sensitivity and deterministic rate, it can be stated that SB5 scale, has the dyslexia diagnostic reliability.

Discussion

In spite of great usage of intelligence test of Tehran-Stanford- Binet in screening and diagnosis, they have not made so many endeavors to use this valid test in our country and little researches have been conducted to survey psychometric characteristics of mentioned scale. Given the above considerations, the aim of this study is to investigate Tehran- Stanford- Binet intelligence scale psychometric characteristics in dyslexic children. In order to review the psychometric characteristics of SB5, the reliability and validity of the scale were examined. In reading internal homogeneity method for validity investigation, the knowledge and active memory in verbal and non-verbal spheres were 0.69 and 0.71 and 0.78 and 0.75, respectively, which represent the optimal validity. These findings are compatible with Askarian et al. studies, Kamkari, Ahadi and Roid in which the interval homogeneity of reading has been beyond 0.70 [3, 6-8]. In addition, the stability coefficient method was used to examine the validity which shows that the knowledge and

active memory in verbal and non-verbal spheres have the stability coefficient of 0.96, 0.91, 0.93 and 0.92, which in terms of stability or durability is compatible with Askarian et al. study. Diagnostic stability is considered to be one of the most useful aspects of reliability have been ever used in diagnostic tests. The reading disorders diagnostic reliability is obtained from deterministic and sensitivity coefficients. According to the Tehran-Stanford-Binet intelligence scale in current research, the reading disability assessment deterministic rate was 0.72, that is in case of individuals not being dyslectic, dyslexia diagnosis is denied by SB5 in 72% of cases. The deterministic coefficient was 0.82 in Kamkari research [8]. In Askarian study, the deterministic coefficient of the SB5 is 0.79 [6]. As it is shown the accuracy rate of the scale in this research is lower than the previous ones, which might be the result of disagreements between specialists in their diagnosis of individuals as being dyslectic. The sensitivity rate of the mentioned scale is 0.98 in this research, which means that in 98% of the cases SB5 is able to diagnose dyslexia. This result is also compatible with the results of Roid and Kamakari research [8, 9]. Finally, with an emphasis on reading disability assessment based diagnostic validity of intelligence tests new version Tehran-Stanford-Binet showed that the scale of diagnostic validity in dyslexic children. This result is also compatible with the results of Askarian et al. DiStefano and Dombrowski [13] Roid [7], et al. Canivez [19] and Kamakari research [8]. Given that in some subjects of this study, it was not possible to control the intervening variables such as environmental condition, emotional status and personal problems of individuals or using drugs and undergoing tests simultaneously, it is recommended to control the variables, which have not been checked in the present study and to expand the spheres of the studies to other communities, such as state and community centers and also attend to calculation and dictation disabilities and pay more attentions to standardize reading sub-tests in primary schools with the aim of detect and diagnose the reading disorders. Tehran-Stanford-Binet intelligence scale can also be used to diagnose dyslectic children and in cite with the scores of the subjects in basic tests, can develop an intervention plan based on training-medical needs of dyslexic students.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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