The effect of kindergarten training on child's Intelligence Quotient (IQ)

Pantea Bazeghi [1] (Bs), Vahid Farnia [2] (MD)*, Jalal Shakeri [3] (MD), Mohammad Mahboubi [4](PhD)

[1.] Clinical Psychologist, Department of Psychology, Kermanshah Science and Research Branch, Islamic Azad University, Kermanshah, Iran, Email: p.bazeghi@yahoo.com
[*2.] Assistant professor, Behavioral sciences Research Center, Psychiatry department, Kermanshah University of Medical Sciences, Kermanshah, Iran, Email: vfarnia@kums.ac.ir
[3.] Associate professor, Behavioral sciences Research Center, Psychiatry department, Kermanshah University of Medical Sciences, Kermanshah, Iran, Email: jshakeri_md@yahoo.com
[4.] Ph.D. in Health Services Administration, Kermanshah University of Medical Sciences, Kermanshah, Iran. Email: mmahboubi@kums.ac.ir
*Corresponding author: Vahid Farnia MD, Assistant professor, Behavioral sciences Research Center, Psychiatry department, Kermanshah University of Medical Sciences, Kermanshah, Iran,
Email: vfarnia@kums.ac.ir , Telefax: 00988318261046

Abstract: Introduction: The first years of life are a critical period for growth and vulnerability to harm. Preschool training has an important role in child's cognitive development. The aim of present study was to evaluate the role of kindergarten training on child's Intelligence Quotient (IQ). **Methods:** After matching for socio-economic factors and parental education sixty children were assigned in two groups. Group 1 consisted of 30 children with previous history of kindergarten training and group 2 consisted of 30 children without previous history of kindergarten training. Cognitive function was assessed by a psychologist using the Wechsler Intelligence Scale for Children (WISC–III). **Results:** Mean IQ score was 101±8.07 and 98±3.81 in group 1 and 2 respectively. There was a significant difference between two groups regarding mean IQ score. (P-value< 0.05)**. Discussion:** Our results showed that children with kindergarten training had significantly higher IQ compare to those without kindergarten training. This suggests that preschool training programs may improve IQ in children.
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Introduction

Child development is an important determinant of health over the life span. (1) The first years of life are a period of considerable opportunity for growth and vulnerability to harm. Children's developmental trajectories are shaped by sources of resilience as well as vulnerability. The cumulative experience of buffers or burdens is a more powerful determinant of children's developmental well-being than single risk or protective factors. (2) Early developmental opportunities establish a critical foundation for children's academic success, health, and general well-being. (3)

Intelligence quotient, commonly known as IQ, is the ratio of a person's mental age to his/her chronological age (multiplied by 100) that can be measured by an intelligence test. IQ testing was first coined by Alfred Binet and his colleague Theodore Simon. The two researchers together created the Stanford-Binet IQ testing in 1905 aiming to identify students who could benefit from extra help in school. Their assumption was that a lower score on IQ scale indicated the need for more teaching, not an inability to learn. This test became widely accepted at the beginning of the 20th century. (4)

Today the commonly used IQ test is the Wechsler Intelligence Scale for Children -III (WISC-III), originally developed by David Wechsler in 1974. (5) WISC-III test is an individually administered intelligence test for children inclusive that can be completed without reading or writing. The WISC takes 65–80 minutes to administer and generates an IQ score which represents a child's general cognitive ability. The WISC-III test comprises ten types of problems, categorized by difficulty and by skill type (verbal and performance scales). While calculating the IQ, took age into account. In other words, in the computation of the IQ, an age-correction takes place. Because of this feature, the IQ stays relatively constant over the life span. (6)

Previous studies which investigated the effects of preschool programs reported influences on children's intellectual performance and their socio-emotional functioning. The attention of researchers and the public focused particularly on the ability of the programs to boost IQ test scores by about five

points. However, these IQ gains faded two or three years after the children entered public school. (7-9)

While preschool training has an important role in child's cognitive development, the aim of present study was to evaluate the role of kindergarten training on child's Intelligence function.

METHODS

This was a cross sectional study involving the assessment of Intelligence Quotient (IQ) in preschool children. Matching was performed for socio-economic factors and parental education to control the confounding factors. Subjects were excluded if they had mental disorders or other potential cognitive impairing factors and finally sixty subjects were selected from a sample consisted of one hundred thirty children. The children were assigned in two groups. Group 1 consisted of 30 children with previous history of kindergarten training and group 2 consisted of 30 children without previous history of kindergarten training. Ethical approval for the study was granted by the local joint ethics committee.

Cognitive function was assessed by a psychologist using the Wechsler Intelligence Scale for Children (WISC–III). The WISC-III consists of 13 sub-tests, each measuring a different facet of intelligence. The child's attainments on these various measures are summarized into three composite scores, the verbal, performance, and full scale IQs, which provide estimates of the individual's intellectual ability. In addition the WISC-III provides four optional factor based index scores (perceptual organization, freedom from distractibility, processing speed and verbal comprehension) allowing a more detailed examination of the strengths and weaknesses of an individual's performance. Assessment is performed on an individual basis and takes approximately 60 minutes to complete.

Data analysis was done using SPSS-19 version. Independent sample t-tests were administered to compare the mean differences. P-value of < 0.05 was considered statistically significant.

RESULTS

Sixty preschool children were evaluated using WISC-III. The descriptive results of subjects' IQ score were summarized in table-1.

Table 1: Descriptive statistics of subjects

Variables / Groups	Measures of central tendency			Measures of variability		
	Mode	Median	Mean	Quartile Deviation	Variance	Standard Deviation
Children with kindergarten training	101	101	101.30	28	65.18	8.07
Children without kindergarten training	97	98	98.03	16	14.51	3.81

Mean IQ score was 101±8.07 and 98±3.81 in group 1 and 2 respectively. There was a significant difference between two groups regarding mean IQ score. (P-value< 0.05).

Discussion

Extant program evaluations in the field of early childhood education consist primarily of retrospective analyses of non-experimental data. Some previous studies have investigated the long-term and short-term effects of preschool programs on children, but the results have been controversial.

The present study investigated the effects of kindergarten training on intelligence quotient of preschool children. Our results showed that children with kindergarten training had significantly higher IQ compare to those without kindergarten training. This suggests that preschool training programs may improve IQ in children. These results were consistent with few previous studies suggested that kindergarten training has positive influences on children's intellectual performance. (7-9)

The most robust data bearing on long-term effects of preschool training come from a report by researchers who pooled follow-up data gathered on about 11 preschool programs. These programs, which randomly assigned children with preschool training or to a control group, had a number of short-term influences on children's intellectual performance and their socio-emotional functioning. (7-9)

Although genetic inheritance was once thought to be the determinant of intelligence in a child, but that notion too has been refined with current knowledge. Studies describe the genes as being in a dynamic relationship with environmental influences that can turn a gene on or off, affecting the brain's development. A good environment can turn on good genes; a bad environment can turn on bad genes or prevent good genes from being activated. (10) Therefore kindergarten training as an environmental factor may interact with genes to determine the intellectual function of children.

Also another study suggested that doing better in the early grades is important for long-term success because the early grades in school constitute a "critical period" for children's adjustment as students. (11)

Limitations

This study has some limitations. Quality of training in different kindergartens is an important

confounding factor which may alter the results. The use of the Wechsler Intelligence Scale as the only outcome measures might also be considered a limitation. Further limitations are the lack of a long term follow-up and the rather small sample size. Consequently, the results should be interpreted with appropriate caution.

Conclusion

The current data support the role of kindergarten training in improvement of Intelligence Quotient (IQ) of preschool children. However the effects of kindergarten training on children's cognitive function and how it may work should also continue to be investigated.

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