An Examination and Comparison of the Wechsler Intelligence Scale for Children (WISC-IV AR) in the State of Qatar

Tamader Al-Thani, PhD
Department of Psychological Sciences, Qatar University
An Examination and Comparison of the Wechsler Intelligence Scale for Children (WISC-IV AR) in the State of Qatar

ABSTRACT

This study used the scores from the Arabian Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV-AR) in estimating relationships with academic achievement. Participants were one hundred primary school children from sevenschools in Qatar. All children were first grade and second grade students and were aged from 6 to 7 years old. According to the literature, the results revealed a significant correlation between the FSIQ and academic achievement. In addition, the relationship between academic achievement and the FSIQ was similar for boys and girls.

INTRODUCTION

The Wechsler Intelligence Scale for Children and adolescents – Fourth Edition (WISC-IV) is one of the most often used psychological tests across the world and has been adapted in several nations. The Arabian WISC-IV (WISC-IV-AR) was adapted from the U.S. version (Touma, 2014). In the present study, the WISC-IV-AR was administered to Children from Qatar.

Manuscripts are important resources for this type of research, "The purpose of this manuscript is to provide a comprehensive meta-analysis regarding ethnic group differences on measures of cognitive ability in applied psychology."(Roth, 2001, p298).
The study of Ruth is based on studying ethnic group differences and ability in work places regarding cognitive ability, and cognitive ability was based on education results. He based the differences between ethnic groups on the bases of their education results in math, verbal, SAT exams and GRE tests. "Methodologically, this structure suggests a substantial commonality between intelligence tests and achievement tests. (Roth,2001,p.304)So he based his research on the education results and ethnic difference achievement, which we are applying in this research.

The State of Qatar is an independent country in the Arabian Gulf. The country is bordered by Saudi Arabia. Qatar shares maritime borders with Bahrain, Iran and the United Arab Emirates. The country has an area of 11,586 square kilometers (4,473 square miles) with a population of 2.7 million (end of 2017), but Qatari citizens are only a minority. The capital is Doha with a population of 800,000, and Arabic is the official language (MDPS, 2017). The Ministry of Education runs the educational system in Qatar, which consists of a six-year primary stage followed by a three-year preparatory stage and a three-year secondary stage. After successful secondary stage, students can go for university studies or for the labor market. Primary education in Qatar is compulsory for all and free in public schools (SEC, 2003).

Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV)

Currently, the interpretation of the WISC-IV-AR WISC-IV, as presented in the test manuals, is based on the interpretation of four factors, considered among the main basic factors underlying intelligence: i) the Verbal Comprehension Index (VCI), which measures verbal abilities such as comprehension and verbal reasoning; ii) the Perceptual Reasoning Index (PRI), which measures abilities such as abstract problem solving and the non-verbal manipulation of materials; iii) The Working Memory Index (WMI), which measures the capacity of retaining and manipulating verbal material for a short period of time; and iv) the Processing Speed Index (PSI), which measures the ability to respond promptly and focus attention on a task. These four factors have been amply studied and are partly supported both by statistically and clinically evidence (Wechsler, 2004).According to some studies, the WISC-IV successfully measures "consistent constructs" across all age groups of the instrument (Keith et al., 2006). It is also suggested that "females and males score identically on IQ tests" (Halpern, 2012)

The first goal of this study is to find out if there isa statistically significant correlation between the IQ and the academic achievement in the sample of primary school students.

The second goal is to find out if there are statistically significant differences between males and females in the correlation coefficient of IQ and academic achievement in the study sample of primary school students.

Methods

Participants

The sample in this study consisted of1oo primary school students from four schools in Qatar. All subjects were between first grade and second grade. The sample consisted of 50 males and 50 females. The sample of children aged 6:0 to 6:11. The sample was stratified on key demographic variables (i.e, age, sex, geographic region) and was collected in different parts in Qatar.

Instruments

WISC-IV. The Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) was used as an instrument using the Arabi adapted version WISC-IV-AR . The WISC-IV-AR, adapted version of the US WISCIV was published in 2014 after 3 years research program and was based on standardization samples representative of the Lebanese population and the Omani population of students aged 6:0 to 16:11. (TOUMA, 2014)

The WISC-IV AR typically takes between 65 to 80 minutes to administer. The WISCIV manual provides validity evidence for test content, response processes, internal structure, relationships with other variables, and consequences of testing. The internal consistency of the WISC-IV is very good, with the composites having a higher internal consistency than the individual subtests (O'Donnell, 2009). The internal consistency coefficients range from .97 for Full Scale to .88 for Processing. SPSS software was used as a statistical instrument

The test which consisted of ten subtitles was conducted in one session for each child.

Results and Discussion

The first hypothesis: There is a statistically significant correlation between the IQ and the academic achievement in the sample of primary school students.

To verify the validity of this hypothesis Pearson correlation coefficient was used as, shown in table 1:

Table (1) Pearson correlation coefficient between IQ and academic achievement in the total sample

		FSIQ	Achievement
FSIQ	Pearson Correlation	1	.288**
	Sig. (2-tailed)		.004
	N	100	100
Achievement	Pearson Correlation	.288**	1
	Sig. (2-tailed)	.004	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the previous table indicate a statistically significant positive correlation at 0.01 between IQ and academic achievement in the total study sample, which means the acceptance of the hypothesis.

This result of the current study is consistent with the literature presented in the previous studies that examined the relationship between academic achievement and the IQ of students. This means that by increasing IQ, academic achievement is increasing and vice versa.

The second hypothesis: There are no statistically significant differences between males and females in the correlation coefficient of IQ and academic achievement in the study sample of primary school students.

To verify the validity of this hypothesis, the Spearman Nonparametric Correlation coefficient was used to determine the correlation between IQ and academic achievement in the male and female study groups, and the Z-factor coefficient to examine the differences in this correlation to determine the correlation between males and females in the study sample.

Significance of the difference between two correlation coefficients for female sample is shown in table 2.

Table (2) Results of the correlation coefficient between the IQ ratio and the academic achievement in the female sample

Correlations (Female)

			FSIQ	Achievement
Spearman's rho	FSIQ	Correlation Coefficient	1	.964
		Sig. (2-tailed)	.	. 007
		N	50	50
	Achievement	Correlation Coefficient	.964**	1
		Sig. (2-tailed)	.007	.
		N	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

Significance of the difference between two correlation coefficients for female sample is shown i table 3.

Table (3) Results of the correlation coefficient between the IQ ratio and the academi achievement in the male sample

Correlations (Male)

			FSIQ	Achievement
Spearman's rho	FSIQ	Correlation Coefficient	1	.540**
		Sig. (2-tailed)		.000
		N	50	50
	Achievement	Correlation Coefficient	.540**	1
		Sig. (2-tailed)	.000	
		N	50	50

**. Correlation is significant at the 0.01 level (2-tailed)

The correlation coefficient "z" was used to calculate the differences in the correlation between the IQ ratio and the academic achievement of male and female samples as shown in table 4.

Table (4) Results of the correlation coefficient "z" to calculate the differences in the correlation between the IQ ratio and the academic achievement of males and females

Sig	z	r	Gender
0.9681	0.04	0.655	Males (n=50)
		0.645	Female (n=50)

The results indicate that there is a statistically significant correlation between the IQ ratio and the academic achievement

of males and females at the level of 0.01, either male or female. The results did not reveal any differences in this relationship, which means acceptance of the hypothesis.

These results indicate that both males and females need high intelligence to enable them to attain high academic achievement and vice versa.

The third hypothesis: There is a statistically significant correlation between the academic achievement and the four indicators of intelligence (index scores) in the study sample of primary school students. Table 5 shows the correlation between the academic achievement and the four indicators of intelligence:

Verbal Comprehension Index (VCI
Perceptual Reasoning Index (PRI)
Working Memory Index (WMI)
Processing Speed Index (PSI)

Table (5) The correlations between the academic achievement and the four indicators of intelligence

		Achievement	VCI	PRI	WMI	PSI
Achievement	Pearson Correlation	1	.335**	.232*	.123	.313**
	Sig. (2-tailed)		.001	.020	.221	.002
	N	100	100	100	100	100
VCI	Pearson Correlation	.335**	1	.540**	.446**	.481**
	Sig. (2-tailed)	.001		.000	.000	.000
	N	100	100	100	100	100
PRI	Pearson Correlation	.232*	.540**	1	.472**	.362**
	Sig. (2-tailed)	.020	.000		.000	.000
	N	100	100	100	100	100
WMI	Pearson Correlation	.313**	.481**	.362**	.497**	1
	Sig. (2-tailed)	.002	.000	.000	.000	
	N	100	100	100	100	100
PSI	Pearson Correlation	.123	.446**	.472**	1	.497**
	Sig. (2-tailed)	.221	.000	.000		.000
	N	100	100	100	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Pearson correlation coefficient between the four indicators of intelligence and academic achievement in the total sample is shown in table 6.

Table (6) Pearson correlation coefficient between the four indicators of intelligence and academic achievement in the total sample

Sig	r	Index scores
.031	.394*	Verbal Comprehension
.000	.702**	Perceptual Reasoning
.006	.493**	Working Memory
.000	.708**	Processing Speed

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the previous table indicate that there is a statistically significant correlation between the four indicators of intelligence and academic achievement in the study sample at level 0.01 in the indicators (perceptual reasoning, working emory, processing speed) and at 0.05 in the verbal comprehension index.

Because academic achievement is linked to intelligence, it is expected that any component of intelligence will be associated with academic achievement.

Fourth hypothesis: There is a statistically significant correlation between academic achievement in the four basic school subjects (Arabic, English, Math, Science) and the four indicators of intelligence in the sample of primary school students.

To verify the validity of this hypothesis Pearson correlation coefficient was used to determine the Correlation as shown in table7.

Table (7) Correlation between academic achievement in the four basic school subjects (Arabic, English, Math, Science) and the four indicators of intelligence

		VCI	PRI	WMI	PSI	Arabic Language	English Language	Math	Science
VCI	Pearson Correlation	1	.540**	.362**	.472**	.297**	.168	.195	.171
	Sig. (2-tailed)		.000	.000	.000	.003	.095	.052	.089
	N	100	100	100	100	100	100	100	100
PRI	Pearson Correlation	.540**	1	.481**	.446**	.362**	.319**	.319**	.321**
	Sig. (2-tailed)	.000		.000	.000	.000	.001	.001	.001
	N	100	100	100	100	100	100	100	100
WMI	Pearson Correlation	.362**	.481**	1	.497**	.332**	.218*	.245*	.345**
	Sig. (2-tailed)	.000	.000		.000	.001	.029	.014	.000
	N	100	100	100	100	100	100	100	100
PSI	Pearson Correlation	.472**	.446**	.497**	1	.159	.021	.170	.090
	Sig. (2-tailed)	.000	.000	.000		.115	.838	.090	.375
	N	100	100	100	100	100	100	100	100
Arabic Language	Pearson Correlation	.297**	.362**	.332**	.159	1	.779**	.785**	.797**
	Sig. (2-tailed)	.003	.000	.001	.115		.000	.000	.000
	N	100	100	100	100	100	100	100	100
English Language	Pearson Correlation	.168	.215*	.218*	.021	.779**	1	.766**	.744**
	Sig. (2-tailed)	.095	.032	.029	.838	.000		.000	.000
	N	100	100	100	100	100	100	100	100

Math	Pearson Correlation	.195	.319**	.245*	.170	.785**	.766**	1	.818**
	Sig. (2-tailed)	.052	.001	.014	.090	.000	.000		.000
	N	100	100	100	100	100	100	100	100
Science	Pearson Correlation	.171	.321**	.345**	.090	.797**	.744**	.818**	1
	Sig. (2-tailed)	.089	.001	.000	.375	.000	.000	.000	
	N	100	100	100	100	100	100	100	100

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlation between the four intelligence indicators and the academic achievement in the four basic school subjects in the total sample is shown in table 8.

Table (8) Pearson Correlation between the four intelligence indicators and the academic achievement in the four basic school subjects in the total sample

**. Correlation is significant at the 0.01 level (2-tailed).

Science	Math	English Language	Arabic Language	Subjects	Index scores
.445*	.419*	.305	.439*		Verbal Comprehension
.759**	.742**	.656**	.756**		Perceptual Reasoning
.584**	.531**	.467**	.531**		Working Memory
.484**	.482**	.520**	.416*		Processing Speed

*. Correlation is significant at the 0.05 level (2-tailed).

The results of the previous table indicate a statistically significant positive correlation between 0.01 and 0.05 between the four intelligence and scholastic achievement scores in the four basic subjects in the total sample except for the verbal understanding index and the English language. The relationship between them was not statistically significant,
Because intelligence is linked to intelligence, it is expected that any component of intelligence will be associated with any of the learning materials.

Summary and Conclusion

This study is the first of its kind to measure the cognitive abilities (IQ) using the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) on the Qatari environment, as well as targeting the age group of the first grades of the primary stage.

In summary, the findings of the present paper showed a significant correlation between IQ and academic achievement in the sample of primary school students. This result is consistent with the literature presented in the previous studies that examined the relationship between academic achievement and the IQ of students. No significant differences between males and females regarding the relationship between academic achievement and the IQ of students were found. The findings also indicated that there is a statistically significant correlation between the four indicators of intelligence and academic achievement in the study sample. Moreover, this study revealed that the use of the using the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) for this age group contributes significantly to the prediction of learning difficulties as well as the discovery of talented students.

The research also showed that the scores of the four scale indicators can be explained: verbal understanding index, cognitive reasoning index, working memory index, where it shows strong indicators of learning difficulties or the emergence of talent. There is a need to measure intelligence especially for students in the first and second grades to verify the strengths and weaknesses in cognitive abilities that relate to academic achievement.

The findings of the study pointed out that using the Wechsler Intelligence Scale can be very helpful for teachers and educators in the early years especially in the first two grades. In spite of this, no rigid classification should be based on intelligence tests at least in the primary grades.

References:

Al-Kobaisi A. J., The Development of Education in Qatar, 1950-1977, With an Analysis of Some Educational Problems (University of Durham, School of Education, July 1979).

Gottfredson, L. (1997a). Mainstream science on intelligence: an editorial with 52 signatories, history, and bibliography. Intelligence, 24(1), 13–23. http://dx.doi.org/10.1016/ S0160-2896(97)90011-8.

Halpern, D. (2012). Gender Differences in Cognitive Abilities. Mahwah, NJ: Lawrence Erlbaum.

Keith, T.Z., Fine, J.G., Taub., G.E, Reynolds, M.R., & Kranzler, J.H. (2006). Higher order,

Ministry of Development Planning and Statistics (2017) . Qatar's Sixth Human Development Report (2017), Doha, Qatar

Ministry of Education and Higher Education (2017), Statistical Bulletin of Education in Qatar November, 2017

Multisample, Confirmatory Factor Analysis of the Wechsler Intelligence Scale forChildren—Fourth Edition: What Does it Measure? School Psychology Review, 35(1), 108-127

O'Donnell, L. (2009). The Wechsler Intelligence Scale for Children-Fourth Edition. In J. A. Naglieri, & S. Goldstein (Eds.), Practitioner's guide to assessin intelligence and achievement (pp. 153-190). Hoboken, N.J: Wiley.

Prifitera, A., Saklofske, D. H., & Weiss, L. G. (2008). WISC-IV Clinical Assessment and Intervention (2nd ed.). Amsterdam: Elsevier.

Supreme Education Council (SEC). 2003. Education for a New Era: A Brief Outline on Reform. Doha, Qatar: SEC.

Supreme Education Council. (2008). The development of education. Retrieved September 1, 2017, from http://www.ibe.unesco.org/National_Reports/ICE_2008/qatar_NR08_ea.pdf

TOUMA V. M.(2014). WISCIV-AR – Technical Report, LTE, C.R. 2003973 Baabda, Lebanon.

Wechsler, D. (2003). WISC-IV Technical and Interpretive Manual. San Antonio, TX: The Psychological Association.

Wechsler, D. (2004). The Wechsler Intelligence Scale for Children (fourth ed.). London, UK: Pearson Assessment.

Zellman, G. L., Ryan, G., Karam, R., Constant, L., Salem, H., Gonzalez, G., … Al-Obaidli, K. (2009). Implementation of the K-12 education reform in Qatar's schools. Santa Monica, CA: RAND-Qatar Policy Institute.

ROTH, P., BEVIER, C., BOBKO, P., SWITZER, F., & TYLER, P. (2001). ETHNIC GROUP DIFFERENCES IN COGNITIVE ABILITY IN EMPLOYMENT AND EDUCATIONAL SETTINGS: A META-ANALYSIS. Personnel Psychology, 54(2), 297–330. https://doi.org/10.1111/j.1744-6570.2001.tb00094.x