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The Association Between IQ and Verbal Cognitive Performance of Stanford-Binet Intelligence Scales in a Sample of School Children

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Abstract: Verbal cognitive performance is a strong predictor of academic achievement, particularly in contexts where language skills are emphasized. This study aims to identify the predictors of verbal cognitive performance in a sample of 6-and 7-year-old Iraqi schoolchildren. This is a cross-sectional study that included 100 school children and was conducted in Baghdad/ Iraq, during the period from 1/3/2024 to 1/7/2024. Each child underwent individual testing using the Stanford Binet-5, administered by the researcher. Scores from the verbal cognitive performance subtests and overall IQ scores were recorded. In the hierarchical regression model, mother's education was associated with each of the verbal, visual-spatial, quantitative reasoning, and knowledge domains. Lower child rank was significantly associated with improved verbal fluid reasoning. The private school type was associated with improved verbal and quantitative reasoning and knowledge domains. Adding the overall IQ to the model significantly improved the predictive power across all domains. Based on the findings of the present study, demographic factors (child rank, school type, and maternal education) were found to be significant predictors of verbal cognitive domains. Full-scale IQ was the most significant predictor of verbal cognitive domains.

Keywords: Verbal Cognitive, Stanford-Binet Intelligence, School Children

Introduction: Intelligence Quotient (IQ) testing has long been a cornerstone in the assessment of cognitive abilities, particularly in educational settings [1]. Among the various tools available for measuring intelligence, the Stanford-Binet Intelligence Scales stand out due to their comprehensive evaluation of both verbal and nonverbal cognitive skills. The verbal cognitive domains reflect a child's ability to understand and manipulate language—a critical skill for academic success and effective communication in social contexts [2].

Research has consistently shown that verbal cognitive performance is a strong predictor of academic achievement, particularly in contexts where language skills are emphasized. For example, a comprehensive literature review indicates that verbal abilities correlate more strongly with academic success than nonverbal abilities, underscoring the importance of language skills in educational settings [3]. Children with higher verbal IQ scores tend to excel in reading and writing tasks, which are foundational for learning across various subjects. This relationship is supported by studies demonstrating that cognitive processes related to verbal fluency significantly impact

academic performance, particularly in younger students [4] [5].Therefore, this study aims to identify the predictors of verbal cognitive performance in a sample of 6-and 7-year-old Iraqi schoolchildren

Materials and Methods: Study design and setting

This is a cross-sectional study that included 100 participants and was conducted in Baghdad/Iraq, during the period from 1/3/2024 to 1/7/2024.

Inclusion criteria:

1.Age: 6-7 years old.

2.Enrollment: Enrolled in a regular school setting.

3.Parental Consent: Obtained written informed consent from parents or legal guardians.

4.Cognitive Ability: No history of significant cognitive impairment or developmental delay.

Exclusion criteria:

1.Sensory Impairments: Visual or auditory impairments that would significantly affect test performance.

2.Neurological Disorders: History of neurological conditions (e.g., epilepsy, brain injury)

3.Psychiatric Disorders: Diagnosis of significant psychiatric disorders (e.g., autism spectrum disorder, ADHD).

4.Medical Conditions: Severe medical conditions that could impact cognitive functioning (e.g., chronic illness, severe malnutrition).

5.Language Barriers: Difficulty understanding or speaking the language of the test administration.

Data Collection: Prior to testing, participants and their parents were informed about the nature of the study. The parents were asked to complete a demographic questionnaire that included their education, residence, and occupation.Testing Administration: Each child underwent individual testing using the Stanford Binet-5, administered by the researcher. The test was conducted in a quiet room to minimize distractions. Scores from the verbal cognitive performance subtests and overall IQ scores were recorded.

Results: The study sample

A total number of 100 participants were included in the study sample.

3.2 Basic characteristics of the studied sample

Age Distribution: The participants were predominantly 6 years old (56%) compared to 7 years old (44%).

Sex: The sample was balanced in terms of sex, with 56 males (56%) and 44 females (44%).

Child Rank: The majority of participants were first-born children (40%), followed by second-born (34%), third-born (14%), and fourth-born (12%).

School Type: A slight majority attended private schools (54%) over public schools (46%).

Table 1: Basic characteristics of the studied sample

Basic characteristics	Frequency	Percentage
Age		
6 years	56	56.0
7 years	44	44.0
Sex		
Male	56	56.0
Female	44	44.0
Child rank		
1	40	40.0
2	34	34.0
3	14	14.0
4	12	12.0
School type		
Public	46	46.0
Private	54	54.0
Mother education		
Secondary school	30	30.0
Higher education	70	70.0

Verbal Cognitive Domains:

Visual spatial: Significant positive correlation with school type (r = 0.235, p = 0.019) and child rank (r = -0.222, p= 0.027), indicating that children from private schools and those with lower child rank tended to have higher verbal visual spatial score.

Working Memory: Correlated positively with school type (r = 0.210, p = 0.036) and full IQ (r=0.852, p<0.001).

Quantitative Reasoning: Significant correlation with school type (r = 0.309, p = 0.002) and full IQ, suggesting that private improves influences quantitative reasoning abilities.

Knowledge: School type showed a significant positive correlation (r = 0.308, p = 0.002).Fluid reasoning: Correlation significantly with full IQ (r=0.665, p <0.001) but not with other variables.

Table (2) Correlation of verbal cognitive domains with each of sex, school type, child rank, mother education, and full IQ

Verbal cognitive domains		Sex	School type	Child rank	Mother education	Full IQ
Visual spatial	r	-.072	**.235**	**-.222**	.054	**.895**
	p value	.479	**.019**	**.027**	.592	**.000**
Working memory	r	-.159	**.210**	-.144	.167	**.852**
	p value	.114	**.036**	.152	.096	**.000**
Quantitative reasoning	r	-.053	**.309**	-.162	.071	**.797**
	p value	.604	**.002**	.110	.485	**.000**
Knowledge	r	.019	**.308**	-.086	-.032	**.687**
	p value	.848	**.002**	.393	.753	**.000**
Fluid reasoning	r	-.095	.184	-.009	.029	**.665**
	p value	.345	.067	.927	.778	**.000**

Hierarchical Regression Analysis

The hierarchical regression model analyzed the relationship between verbal cognitive domains and demographic variables, along with IQ. Results were as the following:

- Visual spatial:
- Step 1 showed low explanatory power (R2=0.048), but adding IQ in Step 2 significantly increased it to R2=0.809. This indicates that demographic variables alone have limited predictive power for full IQ.
- Significant predictors included mother education (β=0.207, p < 0.001).
- Working Memory:
- The model improved from R2=0.030 to R2=0.730. Child rank was notably significant (β=−0.595), suggesting that lower child rank negatively impacts working memory.
- Quantitative Reasoning:
- Increased from R2=0.069 to R2=0.649 with significant contributions from school type (β=0.794).
- Knowledge:
- Showed an increase from R2=0.096 to R2=0.542, with school type being a significant predictor (β=1.048)

Table (3): Hierarchical regression models of the relationship between verbal cognitive domains and each of the demographic variables and IQ

Verbal domain		Step 1				Step 2
		Sex	School type	Child rank	Mother education	Full IQ
Visual special	R^2	0.048				0.809
	β	-.020	.246	.051	**0.175**	.207
	P value	.938	.400	.707	**0.006**	.000
Working memory	R^2	0.030				0.730
	β	-.595	-.176	.421	.146	.272
	P value	.157	.711	.057	.772	.000
Quantitative reasoning	R^2	0.069				0.649
	β	.054	**.794**	.179	**0.654**	.143
	P value	.846	**.013**	.222	**.033**	.000
Knowledge	R^2	0.096				0.542
	β	.283	**1.048**	.263	**1.004**	.108
	P value	.297	**.001**	.067	**.003**	.000
Fluid reasoning	R^2	0.006				0.464
	β	-.230	.467	**.514**	.612	.149
	P value	.563	.304	**.015**	.204	.000

Discussion: In the present study, sex was not found to be a predictor of cognitive domains. The research conducted by Buczylowska et al. included a sample of 965 children from the Netherlands and 762 youngsters from Germany. The research indicated that minor but substantial mean sex differences favoring females were identified up to the age of four. Boys at ages six and seven had comparable cognitive development levels to girls across all measured skills and surpassed females in visuospatial cognition [6].

The results indicated that children attending private schools exhibited higher scores in verbal quantitative reasoning and knowledge. Specifically, the correlation between school type and each of

quantitative reasoning and knowledge suggests that the educational environment plays a crucial role in developing cognitive abilities. The study by Akubuilo et al. in Nigeria included 1,122 pupils aged 6 to 12 years and reported that being from a higher socioeconomic status, in a private school, and family size less than 4 were the significant determinants of high IQ and good academic performance [7].

Mother's education was a significant predictor of the child's verbal cognitive domains. This finding is in concordance with the study by Meador et al., who reported that maternal IQ and education, but not paternal, are independently related to child cognitive outcome [8]. Lean et al. reported that maternal intellectual ability was associated with child intellectual and language abilities [9].

The present study also found that lower child rank was associated with improved verbal fluid reasoning. This finding is in discordance with Black et al., who reported that birth order significantly affects cognitive function, indicating that firstborns have higher improved function than later-born children [10]. Another study by Roher et al. found that firstborns score higher on intelligence tests, with a decline of approximately 1.5 IQ points for each subsequent sibling. This effect was more pronounced when comparing siblings within the same family, reinforcing the idea that birth order influences cognitive abilities [11].

Moreover, the hierarchical regression analysis demonstrated that demographic variables alone had limited predictive power for all cognitive domains (R2 range: 0.006 –0.096), but when IQ was included in the model, it significantly increased explanatory power (R^2 range: 0.809 0.464). This reinforces the notion that while demographic factors such as maternal education influence cognitive performance, the impact of overall IQ is paramount. This is in concordance with the study by Mohn et al., who reported thatadding IQ to the independent variables, gender, age, and education into hierarchical regression analyses (Step 2) generally increased the level of explained variance [12].

Conlusion: Based on the findings of the present study, demographic factors (child rank, school type, and maternal education) were found to be significant predictors of verbal cognitive domains. Full-scale IQ was the most significant predictor of verbal cognitive domains. Educational policies and practices should therefore concentrate on improving mothers' education and offering children from lower child ranks specific help. Schools can also take use of the benefits of private learning environments in order to encourage children's verbal cognitive development.

References:

1. Bouzaher MH, Wu S, Ramanathan D, Chi DH, Klaas P, Anne S. Intelligence quotient testing in children with hearing loss: A systematic review. American journal of otolaryngology 2024;45 (3):104219.
2. Coolican J, Bryson SE, Zwaigenbaum L. Brief report: data on the Stanford-Binet Intelligence Scales (5th ed.) in children with autism spectrum disorder. Journal of autism and developmental disorders 2008;38 (1):190–7.
3. Kaya F, Juntune J, Stough L. Intelligence and Its Relationship to Achievement. İlköğretim Online 2015;14.
4. Aksamovic A, Djordjevic M, Malec D, Memisevic H. RELATIONSHIP BETWEEN THE VERBAL FLUENCY AND ACADEMIC ACHIEVEMENT IN SECOND AND

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THIRD GRADE STUDENTS: THE EFFECTS OF GENDER AND PARENTS' EDUCATIONAL LEVEL. Acta Neuropsychologica 2019;17.

5. Puerta Morales L. Relationship between cognitive processes and academic performance in high school students. Psychologia: avances de la disciplina 2015;9:85–100.
6. Buczyłowska D, Ronniger P, Melzer J, Petermann F. Sex Similarities and Differences in Intelligence in Children Aged Two to Eight: Analysis of SON-R 2-8 Scores. Journal of Intelligence 2019;7 (2).
7. Akubuilo UC, Iloh KK, Onu JU, Ayuk AC, Ubesie AC, Ikefuna AN. Academic performance and intelligence quotient of primary school children in Enugu. The Pan African medical journal 2020;36:129.
8. Meador KJ, Baker GA, Browning N, Clayton-Smith J, Cohen MJ, Kalayjian LA, et al. Relationship of child IQ to parental IQ and education in children with fetal antiepileptic drug exposure. Epilepsy & behavior : E&B 2011;21 (2):147–52.
9. Lean RE, Paul RA, Smyser CD, Rogers CE. Maternal intelligence quotient (IQ) predicts IQ and language in very preterm children at age 5years. Journal of child psychology and psychiatry, and allied disciplines 2018;59 (2):150–9.
10. Black SE, Devereux PJ, Salvanes KG. Older and wiser? Birth order and IQ of young men. CESifo Economic Studies 2011;57 (1):103–20.
11. Rohrer JM, Egloff B, Schmukle SC. Examining the effects of birth order on personality. Proceedings of the National Academy of Sciences of the United States of America 2015;112 (46):14224–9.
12. Mohn C, Sundet K, Rund BR. The relationship between IQ and performance on the MATRICS consensus cognitive battery. Schizophrenia research Cognition 2014;1 (2):96–100