

### Artikel Asli/Original Articles

## The Association of Parent Education and Family Monthly Income on Intelligence Quotient (IQ) among Students with Special Needs in Kelantan, Malaysia (Hubungan antara Pendidikan Ibu Bapa dan Pendapatan Bulanan Keluarga terhadap Kecerdasan Intelektual (IQ) dalam Kalangan Pelajar Berkeperluan Khas di Kelantan, Malaysia)

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#### ABSTRACT

*This paper investigate the effect of parents' education background and family monthly income on the Intelligence Quotient (IQ) of students with special needs in Kelantan, Malaysia. This cross-sectional method study was employed multistage random sampling to obtain information drawn from 130 participants from 10 selected school in Kelantan, Malaysia. Questionnaire was used to obtain parents' education background, family monthly income and demographic variables. Students IQ were assessed using Comprehensive Test for Non-Verbal Intelligence (CTONI 2<sup>nd</sup> Edition). Data analysis involve independent sample t-test, one-way between group ANOVA, Pearson's correlation and multiple linear regression. From analysis of IQ score, 63.8% of the special needs students scored very poor IQ, 12.3% scored below average and only 1.5% score average IQ. Significant mean difference were revealed between age group ( $p = 0.002$ ), parents' education ( $p = 0.018$ ) and family monthly income ( $p < 0.05$ ) on special needs students IQ. Post-hoc tukey shows significance between parents who never went to school, went to secondary school ( $p = 0.037$ ) and university/college ( $p = 0.021$ ). In term of family monthly income, significance difference were found between family with low and high monthly income ( $p < 0.05$ ). Family monthly income ( $r = 0.393$ ,  $p < 0.01$ ) showed positive moderate correlation on special needs students IQ. After being forwarded by multiple linear regression, it was found that family monthly income ( $B = 3.605$ ,  $p < 0.05$ ) and age group of special needs students ( $B = 0.879$ ,  $p = 0.002$ ) were significant predictor for IQ score and explained 22.5% of the variance ( $R^2 = 0.225$ ,  $F(5,124) = 83.94$ ,  $p < 0.05$ ). Overall, majority of special needs students in current study have very poor IQ score. Further explanation are discussed on the paper.*

*Keywords: Parents' education; family monthly income; intelligence quotient; special needs students; Kelantan*

#### ABSTRAK

*Kajian ini dijalankan bagi mengkaji kesan latar belakang pendidikan ibu bapa dan pendapatan bulanan keluarga terhadap Kecerdasan Intelektual (IQ) dalam kalangan pelajar berkeperluan khas di Kelantan, Malaysia. Kajian keratan rentas ini menggunakan kaedah pensampelan rawak pelbagai peringkat untuk mendapatkan maklumat daripada 130 orang peserta dari 10 sekolah terpilih di seluruh Negeri Kelantan, Malaysia. Soal selidik digunakan bagi memperoleh maklumat tentang latar belakang pendidikan ibu bapa, pendapatan bulanan keluarga dan pembolehubah demografik. Paras IQ pelajar dinilai menggunakan Ujian Komprehensif Kecerdasan Bukan Lisan edisi Ke-2 (CTONI-2). Analisis data melibatkan ujian-t sampel tidak bersandar, ANOVA sehalu, kolerasi Pearson dan regresi linear pelbagai. Analisa IQ menunjukkan, 63.8% pelajar berkeperluan khas adalah sangat lemah IQ, 12.3% skor di bawah purata dan hanya 1.5% skor purata IQ. Perbezaan min yang signifikan telah diperolehi di antara kumpulan umur ( $p = 0.002$ ), pendidikan ibu bapa ( $p = 0.018$ ) dan pendapatan bulanan keluarga ( $p < 0.05$ ) terhadap IQ pelajar berkeperluan khas. Ujian Post-hoc Tukey menunjukkan perbezaan yang signifikan antara ibu bapa yang tidak pernah ke sekolah dengan ibu bapa yang menuntut sehingga peringkat menengah ( $p = 0.037$ ) dan universiti/kolej ( $p = 0.021$ ). Dari segi pendapatan bulanan keluarga, perbezaan yang signifikan ditemui antara keluarga berpendapatan rendah dan tinggi ( $p < 0.05$ ). Pendapatan bulanan keluarga menunjukkan hubungan kolerasi positif yang sederhana ( $r = 0.393$ ,  $p < 0.01$ ) terhadap IQ pelajar berkeperluan khas. Setelah diteruskan dengan ujian regresi linear pelbagai, didapati bahawa pendapatan bulanan keluarga ( $B = 3.605$ ,  $p < 0.05$ ) dan kumpulan umur pelajar keperluan pelajar khas ( $B = 0.879$ ,  $p = 0.002$ ) merupakan peramal yang signifikan bagi IQ pelajar berkeperluan khas dan menjelaskan varian sebanyak 22.5% ( $R^2 = 0.225$ ,  $F(5,124) = 83.94$ ,  $p < 0.05$ ). Secara keseluruhan, majoriti pelajar berkeperluan khas dalam kajian ini mempunyai IQ yang sangat rendah. Keterangan lanjut dibincangkan dalam kertas ini.*

*Kata kunci: Pendidikan ibu bapa; pendapatan bulanan keluarga; kecerdasan intelektual, pelajar berkeperluan khas; Kelantan*

## INTRODUCTION

Children's education is the responsibility that should be taken seriously and requires parents sacrifice. The future of the next generation are depend on how they are guided and shaped. Increasing levels of education may help the children's become more competitive and feared by many outsiders thereby increasing their intelligence (Norizan et al. 2013). In Malaysia, the education system has been implemented and develop to produce individuals that capable to dealing with today's challenges.

Parents' education play an important role in socioeconomic status and capable of affecting children academic development (Dubow et al. 2009) especially for those with learning disabilities (LD) or attention deficit hyperactive disorder (ADHD) (Patricia et al. 2012). Previous study on parental involvement in children learning process have been extensively carried. Coleman et al. (2008) found students with low academic performance were identified came from family with low monthly income. Low economic status can be stressful for the family and students' itself. It encourages students to skip from classes or quit from school for working to support their family (Flannery et al. 2006). Carniero & Heckmen (2003) claimed that parents' education may play a positive role in children education and increase their ability to support the learning process and participate in school related activities.

Parents with middle to high income hold higher expectation for their children academic achievement than those with low-income. Mayer et al. (2008) found the improvement of reading and mathematics score prior to an increase in income were slightly higher among primary school students. The study also found positive correlation between examination score and monthly income status. Several explanations have been provided by various studies on why income might affect childrens development. In mid 1980s, British studies found that social, economic, ethnic and environmental factors account up to 80 percent reduction in students academic performance (Kenneth 1995). These changes are very drastic in number and parents' should be aware and take this matter seriously. Furthermore students who come from poverty area are more likely to have poor verbal developmental and exhibit higher levels of distractibility and hostility in the classroom (Gordon & Lance 2012).

In Malaysia, there are a lot of studies have been conducted to determine the factors that affect learning and academic achievement of school students. For example, Yahaya et al. (2009) found learning techniques, family problems, peer problems and discipline problems and their impact on the academic performance of students. Studies using factors such as cooperative learning (Nur Hafizah 2016), stress (Nur Faridah 2007), emotional intelligence (EQ) and behavior (Chan & Rodziah 2012), health, teachers and peers (Salleh et al. 2013), poverty (Chandran & Geetha 2009) and discipline problem (Azizi et al. 2011) have been widely carried out in this country. However, previous

researchers did not take into account the parents' education factors in their study. However, there is minimum of studies that link the relationship between educational level of parents with family socio-economic status of non-verbal intelligence scores among students with special needs in Malaysia perspective. Therefore, current study are very important to determine the relationship between these two factors on non-verbal IQ among special needs students.

## METHODOLOGY

This cross-sectional study was carried out from January to July 2015 among 130 male (n = 92) and female (n = 38) special needs students along with their parents or caregivers. The ethics was approved by Research Ethics Committee, UKM Medical Centre (UKM PPI/111/8/JEP-2016-496). Calculation of sample size were employed multiple linear regression sample size formula (Hsieh et al. 1998).

The target population consisted of students with special needs who were enrolled in special education integration programme in Kelantan, Malaysia and the study population was special needs students who attended special education integration programme in the five district that have been selected around Kelantan, Malaysia. Multistage random sampling were employed in data collection which is made up of two stages. The first stage of sampling include a simple random sample to select 10 primary and secondary schools in the five districts choosen from 591 primary and secondary schools in Kelantan (Jabatan Pendidikan Negeri Kelantan 2015).

The second stage of sampling involved selection of all special needs students together with their parents who fulfilled all requirements needed for this study based on the name list provided by the school. The selection of schools were based on these criteria: (1) have a special education integration classes and (2) involved students who have been diagnosed as attention deficit hyperactive disorder (ADHD), Down syndrome, global developmental delay (GDD), intellectual deficit, slow learner and specific learning disabilities.

## INSTRUMENT USED

Questionnaire were used to assess parents and special needs students' information which consist of demographic and socioeconomic factors. Special needs students' IQ were measured using the Comprehensive Test for NonVerbal Intelligence (CTONI) Second Edition. This examination kit is an individually guided to measure nonverbal intelligence from the age of 6 until 89 years old. The test consists of six subtest (pictorial analogies, geometric analogies, pictorial categories, geometric categories, pictorial sequence and geometric sequence) that were used to measure analogical reasoning, sequential reasoning and categorical classification (Donald et al. 2006). The test structure consists of two different types of stimuli which

is the picture of familiar objects and geometric design. The results are reported as standard scores, percentile ranks and age equivalents.

#### MODE OF ADMINISTRATION CTONI 2<sup>ND</sup> EDITION

Pantomime directions are used to assessed CTONI-2 on special needs children. Pantomime directions are simple and easy to use. The pantomime consists of facial gestures, head movement and hand movements. Facial gestures include eye contact and smiling and a questioning expression. Head movements include nodding the head up and down in a “yes” motion and shaking the head side to side in a “no” motion. Hand movements include pointing, running a finger across a series of boxes and extending both hands in a questioning manner (Donald et al. 2006).

#### RELIABILITY AND VALIDITY OF CTONI-2

Internal consistency coefficients for all subtest of CTONI-2 have exceed 0.80s and for all composite score, pictorial scale and geometric scale had average exceed 0.90s, 0.91 and 0.95 (Harder 2009). There is a good evidence for the internal consistency of this test.

It can be conclude that the internal consistency for both score and age group are sufficient. For the validity, test content of the examination represent the behavior of the sample being measured and able to predict future performance on certain activities and traits of a test are reflective of the theoretical model in which it was design and constructed (Rossen et al. 2005).

#### STATISTICAL TEST

All the data obtain were analyzed using Software IBM SPSS version 22.0. Descriptive analysis was used to analyse respondent demographic factors. Independent t-test and one-way ANOVA were used to determine the significant difference between age, gender, race, parents’ education and family monthly income on IQ among special needs students.

Pearson correlation test was employed to determine the strength of association that exist between family monthly income on IQ score and multiple linear regression analysis were used to predict IQ from independent variables such as family monthly income, special needs students age, race (dummy coding) and parents education background (dummy coding).

#### RESULTS

Table 1 shows the demographic data of all respondents. Out of 70.8% of the respondents are male students. The majority of the respondents aged between 8-12 years old and Malay (96.9%) were the highest among the race.

Based on the type of learning disabilities, the majority of special needs students in this study have been diagnosed

as slow learner (25.4%) followed by Down syndromes (18.5%), intellectual deficit (16.2%), global developmental delay (GDD) (11.5%), specific learning disabilities (SLD) (10.8%), ADHD (9.2%) and autism (8.5%).

In term of parents’ education, 43.1% of parents attended primary school, 31.5% went to secondary school, 22.3% never went to school and only 3.1% went to University/College. The majority (46.2%) of parents’ income are below 1000 MYR per month while only 2.3% were above 2500 MYR per month. Household income was classified by categories based on the rural area families income released by The Department of Statistic, Malaysia for the year 2014 (Economic Planner Unit 2014). In term of IQ score, 63.8% of the special needs students scored very poor IQ, 12.3% scored below average and only 1.5% score average IQ.

TABLE 1. Distribution of sociodemographic characteristic of respondents

	Frequency (n)	Percentage (%)
Gender		
Male	92	70.8%
Female	38	29.2%
Age		
8-12	80	61.5%
13-18	50	38.5%
Race		
Malay	126	96.9%
Chinese	2	1.5%
Siamese	2	1.5%
Type of Learning Disabilities		
ADHD	12	9.2%
Autism	11	8.5%
Down syndrome	24	18.5%
GDD	15	11.5%
Intellectual deficit	21	16.2%
Slow learner	33	25.4%
Specific learning disabilities	14	10.8%
Parents Education		
Never went to school	29	22.3%
Primary school	56	43.1%
Secondary school	41	31.5%
University/College	4	3.1%
Parents Monthly Income <sup>a</sup>		
<499	14	10.8%
500-999	60	46.2%
1000-1499	25	19.2%
1500-1999	20	15.4%
2000-2499	8	6.2%
2500-2999	3	2.3%
Intelligence Quotient (IQ) score <sup>b</sup>		
<70 (Very Poor)	83	63.8%
70-79 (Poor)	29	22.3%
80-89 (Below Average)	16	12.3%
90-110 (Average)	2	1.5%

<sup>a</sup> Classification based on Malaysia Economic Planning Unit 2015;

<sup>b</sup> Standard score of CTONI-2

To measure the ability of students in terms of analogy reasoning, classification categories and sequential reasoning abilities, the composite pictorial and geometry scale were included in this study. Based on demographic comparisons between age, gender and race, the results obtained are shown in Table 2. Students aged 8-12 years, male and Malays had the highest score on the composite pictorial scale thus shows that most respondents in this study is someone with pictorial intelligence quotient (PNIQ) while the rest is non-verbal Geometric Intelligence Quotient (GNIQ).

TABLE 2. Distribution of geometric scale and pictorial scale of special needs students IQ by age group, gender and race

Variable	Mean ± SD	
	Pictorial Scale	Geometric Scale
Age		
8-12	81.14 ± 8.08	81.26 ± 7.86
13-18	79.15 ± 7.25	79.77 ± 7.74
Gender		
Male	80.23 ± 7.65	80.26 ± 8.14
Female	79.15 ± 7.56	80.15 ± 6.96
Race		
Malay	86.00 ± 14.14	87.30 ± 7.83
Chinese	79.83 ± 7.52	78.56 ± 4.95
Siamese	79.50 ± 12.02	76.00 ± 3.11

The comparison between age and gender by special needs students' IQ are shown in Table 3. Significant difference were revealed between students' aged 8-12 (70.96 ± 10.98) and 13-18 year old (64.18 ± 8.81),  $t(87.62) = 3.881, p = 0.002$ . Students aged 8-12 years

TABLE 3. Comparison of IQ score of special needs students by age group and gender

Categories	Mean ± SD IQ	<i>t</i> value	<i>p</i> value
Age			
8-12	70.96 ± 10.98	3.881	0.002*
13-18	64.18 ± 8.81		
Gender			
Male	66.87 ± 10.91	0.147	0.325
Female	66.58 ± 8.42		

\* $p < 0.05$

scored the highest IQ. However, no significance were found by gender comparison on IQ  $p = 0.325$ . One way ANOVA (Table 4) shows significant difference between parents' education [ $F(3, 126) = 3.464, p = 0.018$ ] and family monthly income [ $F(5, 124) = 9.786, p < 0.05$ ] on special needs students' IQ score. No significant difference was found between students' race [ $F(2, 127) = 0.507, p = 0.678$ ] on their IQ score. Post hoc Tukey's pairwise comparison revealed the significance between parents who never went to school and went to university/college ( $p = 0.021$ ) and between went to secondary school and went to university/college ( $p = 0.037$ ). In term of family monthly income, significance on IQ was found between parents' who has income <499 MYR with 1500-1999 MYR ( $p = 0.023$ ) and 2500-2999 MYR ( $p < 0.05$ ), 500-999 MYR with 1500-1999 MYR ( $p = 0.004$ ) and 2500-2999 MYR ( $p < 0.05$ ), 1000-1499 MYR with 2500-2999 MYR ( $p < 0.05$ ), 1500-1999 MYR with 2500-2999 MYR ( $p = 0.001$ ) and 2000-2499 with 2500-2999 MYR ( $p < 0.05$ ) per month.

Positive moderate correlation was found between family monthly income and special needs students IQ score ( $r = 0.393, p < 0.01$ ) (Table 5). After proceed by multiple

TABLE 4. Distribution of IQ based on race, parents' education and parents monthly income

Categories	Mean ± SD IQ	<i>F</i> value	<i>p</i> value
Race			
Malay	66.69 ± 10.14	0.399	0.678
Chinese	66.50 ± 16.26		
Siamese	73.00 ± 15.56		
Parents Education			
No education <sup>a</sup>	63.46 ± 10.14	3.464	0.018*
Primary education	66.09 ± 9.69		
Secondary education <sup>a</sup>	68.78 ± 10.32		
University/College	80.00 ± 13.22		
Parents Monthly Income			
<499	61.36 ± 8.07	9.786	$p < 0.05^*$
500-999	63.57 ± 8.65		
1000-1499	69.08 ± 9.37		
1500-1999	72.95 ± 8.95		
2000-2499	65.50 ± 10.54		
2500-2999	92.00 ± 6.08		

\* $p < 0.05$ ; <sup>a</sup>significant difference compared to University/college by never went to school and secondary school ( $p < 0.05$ )

TABLE 5. Pearson correlation between family monthly income on special needs students IQ score

Variable	Special Needs Students IQ	
	<i>r</i>	<i>p</i>
Family Monthly Income	0.393**	0.001

\*\*Significant at level 0.01 (2 tailed)

linear regression analysis, it was found that family monthly income ( $B = 3.605, p < 0.05$ ) and age group of special needs students ( $B = 0.879, p = 0.002$ ) were significant predictor for IQ score and explained 22.5% of the variance ( $R^2 = 0.225, F(5,124) = 83.94, p < 0.05$  (Table 6).

TABLE 6. Distribution of special needs students IQ score by multiple linear regression analysis

Variable	<i>B</i> [95% CI]	<i>R</i> <sup>2</sup>	<i>p</i>
Family Monthly Income	3.605 [0.001,0.010]		0.001*
Students Age	-0.879 [0.299, 0.303]		0.002*
Race			
Malay	-3.060 [-13.348, 7.228]		0.588
Chinese	-1.840 [-15.029, 11.348]		0.783
Siamese	2.092 [-4.455, 8.638]	0.175	0.633
Parents Education			
No Education	-0.906 [-5.180, 3.367]		0.675
Primary Education	-0.327 [-3.201, 2.521]		0.528
Secondary Education	-0.331 [-4.499, 3.789]		0.874
University/College	3.494 [-7.129, 14.117]		0.651

\*significant at level <0.05.

## DISCUSSION

Malay students aged 13-18 years old were the highest among all due Kelantan is one of the states in Malaysia with an average population are Malay and Muslim (Asran & Melastura 2014). Slow learner students were recorded as the highest number followed by Down syndrome and intellectual deficit. Students aged 8-12 years seem to have better IQ score than 13-18 years old. It can be pointed as extremely rare for normal growth of children as their IQ level will increased with the increasing of age. However after taking into account the number of students in each category, students aged 8-12 years are the majority in this study. This factor can be considered as on of the causes of the inverse finding. Study conducted by a group of researchers from the Wellcome Trust Centre of Neuroimaging, University College London found that human IQ is not constant as we thought. A total of 33 healthy adolescent were tested at the age of 12-16 years. Four years later, the same task was repeated when they were 15-20 years and the change in each individual IQ scores have been found. Some subjects showed increased IQ score and some subject showed a severe decline in IQ scores (Ramsden et al. 2011). These indicate the abnormalities finding in current situation are common especially among special needs students. There is a delay in growth, maturity, learning and specific intellectual functions among this group of students compared to normal childrens as early as 6 years old.

Most of responden shows the highest result on pictorial nonverbal intelligence quotient (PNIQ). The pictorial

nonverbal intelligence quotient is an index of problem solving and reasoning for which representational pictures of familiar objects are used in the test formats. Because the picture objects have names, researcher will likely verbalize to some extent while taking the substest that contributes to this quotient. Verbal ability will influence the PNIQ to some unknown degree. Although individuals could score high on this quotient without any verbal mediation at all (McCallum 2003). PNIQ was strongly correlated with receptive language skills and GNIQ was strongly related to nonverbal intelligence (Baron 2003). However the interpretation for both PNIQ and GNIQ is unclear and requires futher research.

Children aged 13 years old and above are categorized as matured and could not have plenty to be proud compared with normal children. It encourage children to feel unexcited for schooling and easily influenced by immoral activities which may lead to discipline problem. Students discipline problems in the class are defined as comprehensive instruction non-compliance with teacher and learning to undermine several components of learning discipline are matching with several learning skills required for academic achievement (Pasternak 2014). Children below 12 years old still do not understand about the sense of despair and comparing themselves with other childrens. According to Goleman (1995), children with low emotional intelligence are not capable of diagnosing and monitoring the internal environment by themselves. Therefore, they take the external aspects of normal persons and compared with other people around them. It is acknowledged that each student has a lower IQ scores would have a formal

education in accordance with their age (Chan & Rodziah 2012).

In term of parents education background, the majority of parents have low educational background. Parents education are found to be significantly difference between special needs students' IQ score. It is clearly shows that parents education are important in ensuring good education and behavioral among childrens. Current study found parents who graduated up to university/ college and secondary school had a childrens' with better IQ score compared to parents who never went to school and graduating up to primary school. Educated parents usually are concerned about their childrens' education and knowledge, give a good parental and love their children's as they should. Parents who have finished high school and gone on to receive additional schooling understand the pressures and stresses of school. Children's brain is like a sponge that absorbs everything surrounding them. Therefore, what they learn from their parents in the begining of their lives will impact them for the rest of their lives (Gratz 2006). Baker and Stevenson (1986) found educated parents have many strategies in ensuring their childrens' performance and more proefficient in managing career by keep following the academic progress of their childrens.' Less educated parents are too busy with daily work to care for their childrens' education. Lack of parental support contribute a major problems to students emotional thus affecting their education (Noor Saliza & Zulkafli 2005). Students who reported higher levels of parental education tended to have higher average scores in subject studied compared to students with lower parental education (Jabor et al. 2011). Johnson (2000) found parents monthly income and occupational status were related positively to their children's adulthood status.

Based on family monthly income, signicifance correlation and relationship was found by special needs students IQ score. As stated by The Ministry of Urban Wellbeing, Housing and Local Government, household with total income less than or equal to 940.00 MYR per month belongs to the poor category. The very poor category is depicted as a household with a total income less than or equal to 580.00 MYR per month. The majority of parents in current studies belong to poor and very poor families. Significance IQ score were revealed between parents who earning less than 499.00 MYR per month with parents earning 2500.00 to 2999.00 MYR per month. Educated parents often have higher monthly income compared to parents who are not well educated. Students who come from higher income families have a better IQ than those who come from low income families. Low income parents tend to be less educated thus can not be a good example for their children to follow and have poor parenting technique (Tukheimer et al. 2003). In addition, children who grow in families with poor incomes tend to have difficulty in their resourcefulness and development (Burchinal et al. 1996). Age group of special needs students also revealed positive relationship whereas by increasing of age will decrease

0.879 in IQ score. It is something that is very rare occur and inversely with the law of nature. A detailed description are as discussed in the previous section.

For overall, the majority of special needs student in current study had a very low and weak IQ scores. This may be due to the attitude, knowledge and behavior of parents and students itself that are less concerned with the importance of education and learning in todays challenges. Furthermore, most of the respondent come from rural area with low monthly income which may considered as the factors that helping in contributing towards deficiency in IQ. However, there are some limitations in this study. These include not taking into account the aspects of special needs students parents quality of life (QOL). Clarity can be obtained from the data about their satisfaction in life and their children schooling function. In addition, the factors affecting the level of education and their monthly income is not assessed in this study. Further studies should be done by considering these factors to produce more accurate and consistent result.

## CONCLUSION

This paper have investigated the relationship between parental characteristic of education and family monthly income on special needs students' IQ using data that were obtain from survey and IQ test. This is motivated by a large literature which suggest a strong parental income and parents education gradient in special needs students' intelligence will increase by age. As a conclusion, this study revealed the relationship between parents education background and family monthly income on special needs students intelligence quotient (IQ).

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