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# Cognitive, Psychosocial Development and School Adjustment of Singapore Adolescents: Gender Differences

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## Abstract

Gender difference is a big issue in both psychology and education areas. Most studies on gender differences in school achievement ignore the fact that individuals hold multiple statuses. The present study examines gender differences of Singapore adolescents (ages 13-16) in their growing up years from a number of perspectives. It tries to present briefly some information regarding the intellectual and psychological growth of Singapore adolescents and to show a global picture of their gender differences. This paper will also discuss the results and implications for educators, schools and researchers who need to adopt a broader cultural perspective in their work if they are going to change the opportunities and outcomes for the next generation of students. The discussion in this paper hopes to inform and contribute towards such an effort.

## Introduction

Many differences have been documented between the cognitive abilities, psychological attitudes and social behaviours of adolescents and though controversy has appeared about causes and implications of their sex differences. There is high agreement that the psychological development and adjustment of adolescent boys and girls are not the same in many ways. The issue of gender difference has been noted more than a few decades and the evaluations made of adolescent male and female performance are sometimes more disparate than the observed behaviours and achievements of the two sexes. (Pheterson, Kiesler & Goldberg, 1971)

Substantial differences have already appeared in the behaviours of boys and girls by the time they enter school and after that they continue to exhibit many differences in attitudes, interests and academic achievements. It is also commonly seen that on the average, boys do not read as well as girls, although boys tend to outperform girls in other subjects, such as mathematics. This scholastic gender gap however, has been quite elastic lately and such a diversity as in all other forms of diversity across the sexes, is affected by many factors.

## Research findings on Gender Differences

According to recent trends in research on gender and education, gender differences continue to exist in several areas of adolescent development and achievement (Meece & Eccles, 1993). In the Scholastic Aptitude Test the verbal scores which have previously favoured females have begun to show a small advantage for males in the last few years (Burton, Lewis & Robertson, 1988). On the other hand, Mullis and Jenkins (1988) found that gender differences in science achievement from 1970 to 1986 have more than doubled at the lower secondary school and have narrowed only slightly among older students. National US surveys also indicate that older boys have scored higher than girls on tests of reading and writing abilities since 1971.

In a study by Bitner (1988) the developmental patterns in logical reasoning of 84 students in grades 6-10 (secondary school) over a span of 20 months was investigated based on the Group Assessment of Logical Thinking (GALT). Correlational reasoning was found to be the most difficult for the total sample and the results for gender difference were not significant. This seems to indicate that the majority of this sample, no matter boys or girls, was not functioning at the formal operational reasoning level.

A wide range of tests was used by Andrich and Styles (1994) to study the intellectual growth spurts of a group of early adolescents. Quantitative evidence combining psychometric modeling, computerized testing with the Raven progressive matrices, and longitudinal socioeconomic and educational

backgrounds were examined and it was found that gender difference was not significant. In a science performance study by Klein (1997) 2000 students in a secondary school were assessed using two different types of test and the results suggest that the type of test has little effect on the differences in mean scores among gender groups on science ability.

Science and mathematical abilities in adolescents are the most common cognitive indicators used in gender difference studies though lately there have been meta-analyses on gender differences in psychological adjustment and self esteem. (Kling, Hyde, Showers, & Buswell, 1999). The findings are not confirmatory in all cases and at all different ages, but their implications do signify a number of concerns to look into. Major findings seem to stress that schools need to be responsive to adolescents developmental needs, such as the need for diversity, competence and achievement and for positive interaction with peers and adults. It is important to deal with the whole child by addressing social-emotional development as well as intellectual development.

In a longitudinal study on the development of cognitive competence, educational performance and academic attainment (Grundmann, 1997) results indicate that social class had a large impact on educational performance and academic attainment. A great deal of psychosocial development also occur outside of class and if more and more students come to school with no real, stable connections outside the school setting, it is increasingly important for educators to reach out to them. A number of gender studies have indicated that the school learning and working environments should be redesigned to promote gender equality. (Linn & Hyde, 1989). The importance of active classroom involvement as a way of enhancing gender equity is also emphasised. (Burkam, 1997). Clearly there is a need for more research concerning the ways in which boys and girls cope with school- particularly when that coping leads to academic success.

Most studies of gender differences in educational achievement have compared males and females, as if they come from homogenous groups paying little attention to the confounding influences of socioeconomic, ethnic and cultural factors. It is important that we discuss gender issues against a larger frame of reference. School is one very powerful influence in shaping the student's achievement, attitudes and educational choice. Differences are also shaped by mass media, parents' economic opportunities, community values and resources.

### The Singapore Study

The data of the present study were collected from a four-year longitudinal study conducted at four secondary schools in Singapore. From secondary one to four, about 600 students were repeatedly tested by several scales that measure their different cognitive abilities, self-esteem, perception of their family and of their schools. Based on the data, a rather large frame of gender difference can be generalised and gender differences compared and studied from a developmental perspective.

## Method

### The sample

The participants (about 600) of this study are from four Singapore secondary schools. These schools are all government schools, two of which are in the east area and the other two are in the west.

### Instruments

A standard Cognitive Abilities Test developed by Thorndike, Hagen and France in 1986 in United Kingdom was used. It includes three batteries: Verbal battery, Quantitative battery and Non-verbal battery and can be used to assess secondary school students' development of verbal ability, quantitative ability and spatial ability. The Verbal battery is made up of four sub-tests and measures four aspects: Vocabulary, Sentence completion, Verbal classification and Verbal Analogies. The Quantitative battery is composed of three sub-tests: Quantitative relationship, Number series and Equation building. The Non-verbal battery consists of three sub-tests: Figure classification, Figure analogies and Figure Synthesis.

Other scales used measure the participants' self-esteem, their perception of family relationship and their school.

### Data collection

Started from 1995, when the participants were in Secondary One, all these scales were given to them annually in their schools.

Although the same Cognitive Abilities tests were used repeatedly, the students were asked to answer different items in different years. For example, when students were in Secondary Two, five most simple items were removed and, at the same time, another five harder items were added into each sub-test used in Secondary One. When students were in Secondary Three, the same procedure of changing test items was employed again to every sub-test. Thus, in these annual assessments, the students had exactly same number of items in each sub-test, however, when they got older they had more difficult items.

When participants in Secondary Four, because of the administration difficulty only some students completed all Cognitive Abilities tests. In present paper, the data of Cognitive Abilities tests in Secondary Four were not included.

## Results and Discussion

### Cognitive Ability Tests

Table 1 and Table 2 show the results of Verbal tests. The mean scores indicated the performance of male and females from Secondary One to Secondary Three and the differences were obtained by subtracting females' mean scores from males'.

Table 1

*Total mean scores of males and females in Verbal test for three years*

Year	Mean of Males	Mean of Females	Difference (M-F)
Sec 1 (100 items)	68.10	67.95	+0.15
Sec 2 (100 items)	65.19	67.29	-2.10
Sec 3 (100 items)	57.21	60.24	-3.04*

\*  $p < 0.05$

Table 2 *Mean scores of males and females in Verbal sub-tests for three years*

	Mean of Males	Mean of females	Difference (M-F)
<u>Sec 1</u>			
Vocabulary test (25 items)	15.31	15.05	+0.26*
Sentence completion (25 items)	19.23	19.40	-0.17
Verbal classification (25 items)	17.15	17.32	-0.17
Verbal analogies (25 items)	16.19	15.93	+0.26*
<u>Sec 2</u>			
Vocabulary test (25 items)	15.10	15.43	-0.33
Sentence completion (25 items)	19.13	19.53	-0.40
Verbal classification (25 items)	16.08	16.82	-0.74
Verbal analogies (25 items)	13.54	14.36	-0.82
<u>Sec 3</u>			
Vocabulary test (25 items)	14.21	14.93	-0.72
Sentence completion (25 items)	17.32	17.88	-0.56
Verbal classification (25 items)	13.63	14.41	-0.78
Verbal analogies (25 items)	11.85	12.94	-1.09

\* $p < 0.05$

As shown in Table 1, only one statistical significance between male and females was found in Secondary Three: Females performed better than males. Although no significant difference was found in Secondary One and Two, but the changes of differences between males and females are interesting: at first the males were better, then the females were better than males, finally females were significantly better than males. The results support the previous research findings that girls demonstrate slightly higher verbal ability than boys (e.g. Halpern, 1992). This trend seems to be in conflict with the National Survey results (Muller et al., 1991). However,

when we check the results of the sub-tests in Verbal battery from Table 2, a different story came out.

Only two significant differences were found when the students were in Secondary One and both of them showed that the boys were better than girls. The significance in Secondary Three did not show up in any sub-test, although some mean differences are rather large. From statistics, the only explanation is that the variability of test scores among boys and girls is quite high then the mean difference are not tested significant. The implication is that from the results shown in these two tables we cannot conclude girls have better verbal ability than boys or vice versa, since there is a great deal of overlap between these two groups.

Table 3 and Table 4 show the results of Non-verbal test. Usually Non-verbal test is considered as the measurement of visual-spatial ability.

*Table 3 Total mean scores of males and females in Non-Verbal test for three years*

Year	Mean of Males	Mean of Females	Difference (M-F)
Sec 1 (80 items)	67.60	67.20	+ 0.40
Sec 2 (80 items)	63.83	66.08	- 2.25 *
Sec 3 (80 items)	56.89	61.07	- 4.18***

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\* $p < 0.001$

*Table 4. Mean scores of males and females in Non-Verbal sub-tests for three years*

	Mean of Males	Mean of females	Difference (M- F)
<u>Sec 1</u>			
Figure Classification (25 items)	20.90	21.25	- 0.35
Figure Analogies (25 items)	20.54	20.15	+ 0.39
Figure Synthesis (30 items)	26.11	25.71	+ 0.30
<u>Sec 2</u>			
Figure Classification (25 items)	19.83	21.13	- 1.30***
Figure Analogies (25 items)	20.04	20.90	- 0.86*
Figure Synthesis (30 items)	23.15	23.73	- 0.58
<u>Sec 3</u>			
Figure Classification (25 items)	17.32	19.65	- 2.33***
Figure Analogies (25 items)	17.15	18.82	- 1.67**
Figure Synthesis (30 items)	22.05	22.52	- 0.47

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\* $p < 0.001$

The results shown in the tables indicated a similar developmental trend of gender difference: In Secondary One boys are better, but later on girls catch up and finally become better than boys. In Secondary Three, girls performed much better than the boys especially in Figure Classification test and Figure Analytic test. All previous studies suggested that boys have better visual-spatial ability (e.g., Halpern, 1992; Law, Pellegrion, & Hunt, 1993) but the results of present study support a different conclusion.

Table 5 and Table 6 show the results of Quantitative test. Quantitative test is usually related to the measurement of mathematical and logic ability.

*Table 5. Total mean scores of males and females in Quantitative test for three years*

Year	Mean of Males	Mean of Females	Difference (M-F)
Sec 1 (60 items)	50.74	50.37	+ 0.37
Sec 2 (60 items)	47.85	48.36	- 0.51
Sec 3 (60 items)	38.16	40.77	- 2.59*

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\* $p < 0.001$

Table 6. Mean scores of males and females in Quantitative sub-tests for three years

	Mean of Males	Mean of females	Difference (M- F)
<u>Sec 1</u>			
Quantitative Relations (25 items)	21.34	21.21	+ 0.13
Number Series (20 items)	17.57	17.46	+ 0.11
Equation Building (15 items)	11.66	11.65	+ 0.01
<u>Sec 2</u>			
Quantitative Relations (25 items)	20.54	20.83	- 0.29
Number Series (20 items)	15.81	16.29	- 0.48
Equation Building (15 items)	9.97	10.30	- 0.33
<u>Sec 3</u>			
Quantitative Relations (25 items)	18.28	19.19	- 0.91*
Number Series (20 items)	12.63	13.82	- 1.19**
Equation Building (15 items)	7.27	7.56	- 0.29

\* p < 0.05, \*\* p < 0.01, \*\*\*p < 0.001

The results in these tables indicate a similar development tendency: As grow older, the girls became better than boys. All these ability test results seem to suggest that in Singapore secondary schools the girls develop their ability faster than boys.

Table 7. Male and female total mean scores of self-esteem for four years

Year	Mean of Males	Mean of Females	Difference (M-F)
Sec 1	15.61	14.73	+ 0.88**
Sec 2	15.29	14.41	+ 0.88*
Sec 3	15.18	14.18	+ 1.00**
Sec 4	15.31	14.64	+ 0.67*

\*p < 0.05, \*\* p < 0.01

Note: Midpoint of the total scores of self-esteem is 12.5.

Table 8. Male and Female mean scores of self-esteem sub-scales for four years

	Mean of Males	Mean of females	Difference (M- F)
<u>Sec 1</u>			
General Self-esteem	5.06	4.41	+ 1.65***
Peer Self-esteem	2.75	2.71	+ 0.04
Home Self-esteem	4.23	4.04	+ 0.19
Academic Self-esteem	3.57	3.56	+ 0.01
<u>Sec 2</u>			
General Self-esteem	4.99	4.29	+ 0.70***
Peer Self-esteem	3.01	2.74	+ 0.25*
Home Self-esteem	3.88	3.79	+ 0.09
Academic Self-esteem	3.41	3.60	- 0.19
<u>Sec 3</u>			
General Self-esteem	5.34	4.45	+ 0.89***
Peer Self-esteem	3.22	2.98	+ 0.24*
Home Self-esteem	3.64	3.52	+ 0.12
Academic Self-esteem	2.98	3.17	- 0.19
<u>Sec 4</u>			
General Self-esteem	5.24	4.69	+ 0.55**
Peer Self-esteem	3.30	3.23	+ 0.07
Home Self-esteem	3.69	3.54	+ 0.15
Academic Self-esteem	3.07	3.22	- 0.15

\* p < 0.05, \*\* p < 0.01, \*\*\*p < 0.001

Note: Midpoint value for general self-esteem is 5, for the rest three sub-scales are 2.5.

Table 7 and Table 8 show the mean scores of self-esteem. Compared to the values of midpoint of each scale, the mean scores indicate a generally positive self-esteem for either male or female students. However, the boys showed significantly higher self-esteem than girls. From Table 8 we can find these significance values mainly came from the measurement of General Self-esteem. The finding is consistent with the most recent meta-analysis study results (Kling et al., 1999). This meta-analysis study showed that from age 11 to 18, males show higher self-esteem than females.

The present study results also show an interesting tendency: Females showed higher mean scores in the sub-scale of Academic Self-esteem in Secondary Two and Three, although these differences were not statistically significant. Related to their higher cognitive ability scores in Secondary Two and Secondary Three, the results seem to suggest that they are more confident about themselves in academic performance.

Table 9. *Male and Female mean scores of perceiving family relationship for four years*

	Mean of Males	Mean of females	Difference (M- F)
<u>Sec 1</u>			
With father	38.45	36.19	+ 2.26***
With mother	40.19	37.45	+ 2.74***
With family	20.43	19.73	+ 0.70*
<u>Sec 2</u>			
With father	36.02	35.00	+ 1.02
With mother	37.56	37.44	+ 0.12
With family	19.21	18.62	+ 0.59
<u>Sec 3</u>			
With father	36.20	33.29	+ 2.91***
With mother	37.91	36.01	+ 1.90**
With family	19.16	18.33	+ 0.83**
<u>Sec 4</u>			
With father	34.69	32.85	+ 1.84**
With mother	36.93	35.62	+ 1.31*
With family	18.83	18.34	+ 0.49

\* p < 0.05, \*\* p < 0.01, \*\*\*p < 0.001

Note: Median for sub-scale of with father and the sub-scale of with mother is 32.5, for with family is 15.

Table 9 shows the results of male and female students perceiving their family relationship: with their father, mother, or with whole family. The mean scores in this table indicate that generally, both boys and girls perceived their family positively since all scores are higher than midpoint of the sub-scales. However, girls showed lower scores in all sub-scales of perceiving their family and these differences appeared across all four years. Comparing to boys, the girls perceived their parents significantly negative in Secondary One, Three and Four. In Secondary Two, the boys did not indicate a significant better perception about their parents, that was not because the girls perceived their family better but the boys perceived their family more negatively. These consistent results do not definitely mean that the parents treat girls worse than boys, it is possible that at this age level parents pay more attention and take care of their daughters more, but the girls do not like to be treated this way.

Table 10 shows the mean scores of male and female students' perception about their schools. The only significant differences found between boys and girls were the perception about their teachers. Boys perceived their teachers more positively.

Table 10. *Male and Female mean scores of perceiving schools for four years*

	Mean of Males	Mean of females	Difference (M- F)
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<u>Sec 1</u>			
With classmates	46.98	47.54	- 0.56
With teachers	45.87	44.42	+ 1.43*
With school work	41.08	41.47	- 0.39
With school	43.67	43.94	- 0.27
<u>Sec 2</u>			
With classmates	45.86	45.61	+ 0.25
With teachers	41.88	43.07	- 1.19
With school work	39.23	39.34	- 0.11
With school	41.10	41.00	+ 0.10
<u>Sec 3</u>			
With classmates	45.93	45.70	+ 0.23
With teachers	43.67	42.10	+ 1.57*
With school work	37.33	37.91	- 0.58
With school	40.16	40.82	- 0.62
<u>Sec 4</u>			
With classmates	46.31	46.41	- 0.10
With teachers	42.17	41.23	+ 0.94
With school work	37.61	37.99	- 0.38
With school	39.62	40.04	- 0.42

\* p < 0.05, \*\* p < 0.01, \*\*\*p < 0.001

Note: the median for the sub-scale of with classmates is 40, for with teachers is 37.5, for both with school work and with school the median is 35.

### Summary

Today, some gender differences appear smaller and smaller, for instance sometimes we have hard time to differentiate males and females only by their hair or clothing. However, focusing on the Singapore adolescents the present study shows that there are still differences existing between boys and girls. Girls showed a better development in their cognitive abilities, especially in quantitative ability and visual ability. In other aspects, such as self-esteem, perception about families, about teachers, the girls showed a relatively negative attitude than boys. All these findings will help our teachers and parents know and understand more their students or their children.

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