Modeling Parental Role in Academic Achievement: Comparing High-Ability to Low- and Average-Ability Students

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Abstract

The Vygotskyan (1978) perspective on child development suggests that parents play a significant role in mediating the relationship between students' intellectual ability and their achievement. This study, hence, path-modeled and compared high-ability students to low-ability and average-ability students, the relationships that exist between parental factors and students' intellectual ability in predicting students' academic achievement in English, Chinese and mathematics in one Hong Kong Chinese primary school. Measures of parent factors included parental estimates of their school and home involvement, parental beliefs of their children's ability and parental expected scores in academic subjects. Measures of student intellectual ability was obtained through Ravens Progressive Matrices test, and expressed as deviation IQ. Students' achievement measures were final year school reported grades using a 7-point scale (1 = *lowest achievement* to 7 = *highest achievement*). The total sample of 780 students consisted of 161 high-ability students (IQ >115), 467 average-ability students (90 ≤ IQ ≤ 115), and 152 low-ability students (IQ < 90). It was found that, having controlled for grade level and gender, parental affective factors (as indicated by mainly parental expectations and moderated by parental income), fully mediated student ability in predicting mathematics, English and Chinese achievement for high-ability students. Similar results were found for average-ability students with variations in moderating variables. Parental affective factors of low-ability students directly impacted upon their children's achievement. These findings show that parents play an important mediatory role in predicting student achievement for more able students whilst parents play even a bigger role for low-ability students. These results confirm the impact of parents' role in supporting and developing their children's academic achievement, regardless of their children's ability.

Modeling Parental Role in Academic Achievement: Comparing High-Ability to Low- and Average-Ability Students

A large number of research studies have shown that intellectual ability is a significant predictor of achievement (e.g., Kytala & Lehto, 2008; Taub, Keith, Floyd, & Mcgrew, 2008). Equally, other studies have found that there is a strong relationship between parents' role with their children's academic achievement (Dandy & Nettelbeck, 2002a, 2002b; S. Phillipson, 2009a; S. Phillipson & Phillipson, 2007). The Vygotskyan (1978) perspective on child development suggests that parents play a significant role in mediating the relationship between students' intellectual ability and their achievement. This mediatory role implies an intervention of the direct relationship between students' intellectual ability and academic achievement by parental factors, although this contentious proposal is not widely researched.

Recent studies, nevertheless, found that parental affective factors influenced students' intellectual ability in predicting students' academic achievement in language and mathematics in four primary schools in Hong Kong (S. Phillipson, 2009c), and that the parental role were different, depending on the context of the schools (S. Phillipson, 2009a). Taking Phillipson's approach as an empirical basis, this study path-modeled the relationship between parental factors and students' intellectual ability in predicting students' academic achievement in English, Chinese and mathematics in one Hong Kong primary school. The main aim of this study, however, was to compare the modeled relationship of parents' role in achievement between students of high ability with students of low ability and average ability within a context of schooling. This aim was consistent with the findings in multiple studies in talent development, which suggested that families and parents in particular, have a role to play in advancing students' potential in achievement (e.g., Chan, 2005; Olszewski, Kulieke, & Buescher, 1987; Piirto, 1999).

Parents and Talent Development

Research on parents in relation to talent development of their children is scarce in both international and local research. Research available, however, usually takes a qualitative angle on how to parent a gifted and talented (or high-ability) child (Morawska & Sanders, 2009; Sankar-DeLeeuw, 2007; Wu, 2005) with very little empirical work completed on the complex relationships between achievement linked to talent and parents' sociocultural practices and beliefs. Assessments by Chinese gifted students of the role played by their parents in enhancing their potential talent showed that they considered their parents' expectations and family cohesion in encouraging independent effort as important (Chan, 2005). In an American

context, gifted students' perception of their parental involvement and their income and education were highly associated with their academic achievement (Clemons, 2005).

Although the term "talent development" is not usually associated with academic achievement, Chinese parents in general have emphasized excellence in academic achievement as crucial advancement in their children's development (Salili, Chiu, & Hong, 2001; Salili, Chiu, & Lai, 2001). Chan (2005) found that despite his attempt to classify high-ability as beyond that of academic achievement, the Chinese parents' and students' tendency to view excellence seemed to fall within the caveat of school performance. In other words, Chinese parents' expectations and encouragement are linked with the perceived academic skills, and creativity and leadership associated with those skills.

An early cross national study showed that Chinese students of high-ability generally did well in mathematics (Stevenson, Lee, Chen, Stigler, et al., 1990). This study found that students' intellectual ability was one of the many factors that contributed to students' achievement in mathematics compared to their Western counterparts. Gender (Tsui, 2007) and grade level (S. N. Phillipson, 2008) were also found to be factors determining mathematics achievement. However, other environmental factors such as parental expectations were also found to play a role in boosting student performance (S. Phillipson, 2009c).

Indeed, aspects of parental expectations that stem from their beliefs and practices have been a dominant predictor of achievement (Neuenschwander, Vida, Garret, & Eccles, 2007; S. Phillipson & Phillipson, 2007). Though high-ability students could be high-achieving academically, they need the same emotional and social support and encouragement as do students of lower-ability (Morawska & Sanders, 2008). Parental expectations and expressions of confidence in their children's ability and talent are paramount in promoting the potential that the children have in academic achievement (Chan, 2009; Furnham, Rakow, & Mak, 2002). Furthermore, the nature and extent of parental involvement at home and at school play a crucial role in the development of their children's academic potential (Clemons, 2005; Morrison, 2009). Hence, the relationship that exists between parental affective values such as parents' expectations and involvement and their belief of their children's ability to achieve, especially in high-ability students, warrants further investigation.

Vygotskyan Perspective on Child Development

To understand the processes underlying parents' role in the development of their children, the Vygotskyan framework in child development is taken as the theoretical paradigm of this research (S. Phillipson, 2009c). Within this paradigm, cultural and psychological beliefs are

passed on to students through a filtering framework that mature mediators including parents, see fit for their children's development (Vygotsky, 2004b, 2004c). Parental affective factors related to their children, for example, stem from cultural values that they believe and practice within their home and community. Parental aspirations and expectations are communicated, either implicitly or explicitly, to their children in their everyday interactions, which then directly or indirectly determine the way the children then perceive education and perform at school (Dandy & Nettelbeck, 2002b; S. Phillipson, 2009a, 2009b).

Potvin, Deslandes and Leclerc (1999) defined parental affective support as parental praise, encouragement, discussions about school and presence at school as audience that manifest themselves in parental involvement, which is critical for their children's overall development. Parental involvement at home and at school determines the mediation structure that occurs for their expectations to be transferred to their children (Epstein, 1995; Georgiou, 1999). Parental perceptions of their children's ability and personality, through interactions and involvement, underpin the causes they perceive of their children's achievement (Hong & Ho, 2005) and the opportunities they provide for their children to succeed (Hung, 2007; Marjoribanks, 2005).

Parents' prior beliefs of their children's ability and the causes parents infer for their children's achievement have been found to influence other aspects of their values and practices (Miller & Turnbull, 1986; S. Phillipson & Phillipson, 2007; Stevenson, Lee, Chen, Stigler, et al., 1990). It has been suggested that such prior beliefs derives from their children's past performance at home and at school (Graham, 1991; Pomerantz & Dong, 2006), and hence, in turn affect parents' other affective responses. For example, it was suggested that parental academic expectations could be influenced by parents' perceptions of their children's ability (Furnham & Petrides, 2004; Furnham et al., 2002). Along the same line of research, parental academic expectations was found to predict their children's academic achievement (S. Phillipson, 2009a; S. Phillipson & Phillipson, 2007). And usually, parents tend to have a higher belief of their children's ability and consequently, higher expectations of academic performance if their children show high ability.

Parental expectations are usually conveyed through their involvement with their children's everyday lives. Parents who have lower academic expectations of their children are most likely to be less involved in their children's schooling. Asian American parents, for example, who had higher expectations were found to be more actively involved with students' home and schooling processes and vice versa (Hong & Ho, 2005). Accordingly, Chinese parents who have higher expectations of their children's academic performance consider

effort as an important achievement attribute and most always emphasize this attribute to their children in the course of their daily interaction. Having controlled for prior achievement, parental expectations for boys were significantly lower than that for girls (Wood, Kaplan, & McLoyd, 2007), whereas such difference were not apparent in an earlier context of study (Davis-Kean, 2005). The Davis-Kean study, however, found that the more highly educated parents showed higher educational expectations for their children and spent more time in constructive interactions with their children. These studies, in general, demonstrated that parental expectations and involvement were highly influential in determining how students worked towards their goals in academic achievement.

It was also found that the better academic achievement of students from a higher socioeconomic background could be attributed to more parental school involvement (Ma, 2000). Recent findings demonstrated that parental involvement at home to be more valuable for students as an encouraging and supportive environment towards their academic achievement (DePlanty, Coulter-Kern, & Duchane, 2007; Hung, 2007; Ingram, Wolfe, & Lieberman, 2007). These studies, generally, have only seen parental variables in relation to other parental variables or their children's academic achievement, and not in relation to students' cognitive ability in predicting their achievement. Therefore, the aim of this study was to investigate the role of parental affective factors in mediating students' ability that predicts their achievement, and compare these roles between students of high-ability with students of low-ability and average-ability within a context of schooling.

Parental Achievement Model

Although the literature findings echo Vygotsky's perspective of a culturally appropriate mediation structure where parents are supportive and encourage students to feel that they are in control of their own learning situation (S. Phillipson, 2009b, 2009c; Vygotsky, 2004a), most studies did not clearly establish a role between parental affective and social values to students' ability, which determines their achievement. This was especially the case where high-ability students are concerned (e.g., Brody & Blackburn, 1996; Chan, 2005; Morawska & Sanders, 2009). No one study, comparing cohorts of high-ability with other ability students, has investigated the relationships between parental factors and student ability in predicting their achievement. Assuming parental role in influencing children's ability towards achievement depends upon the emergence of the sociocultural values surrounding parents and students, the need to conceptualize and investigate this interaction is thus important to the research field.

In the current paper, hence, parental affective factors are indicated by their beliefs and expectations that are conveyed through their involvement in their children's schooling. This factor is viewed as affecting children's ability to achieve. Parental income and educational level that provide access to educational opportunities for their children are also seen as influencing parental practices and values, and their children's academic success. Three subjects are chosen as indicators of academic achievement because in Hong Kong, three academic subjects are emphasized in the curriculum (Hong Kong Education Commission, 2004). Mathematics is given priority by many parents because it is seen as the traditional marker of success in academia which embodies the Chinese cultural heritage of hard work and memorization (Leung, 2001, 2002). On the other hand languages such as Cantonese, Mandarin and English are seen as pragmatic subjects for future employment and generation mobility (Cheung, 2008; Lai & Byram, 2003).

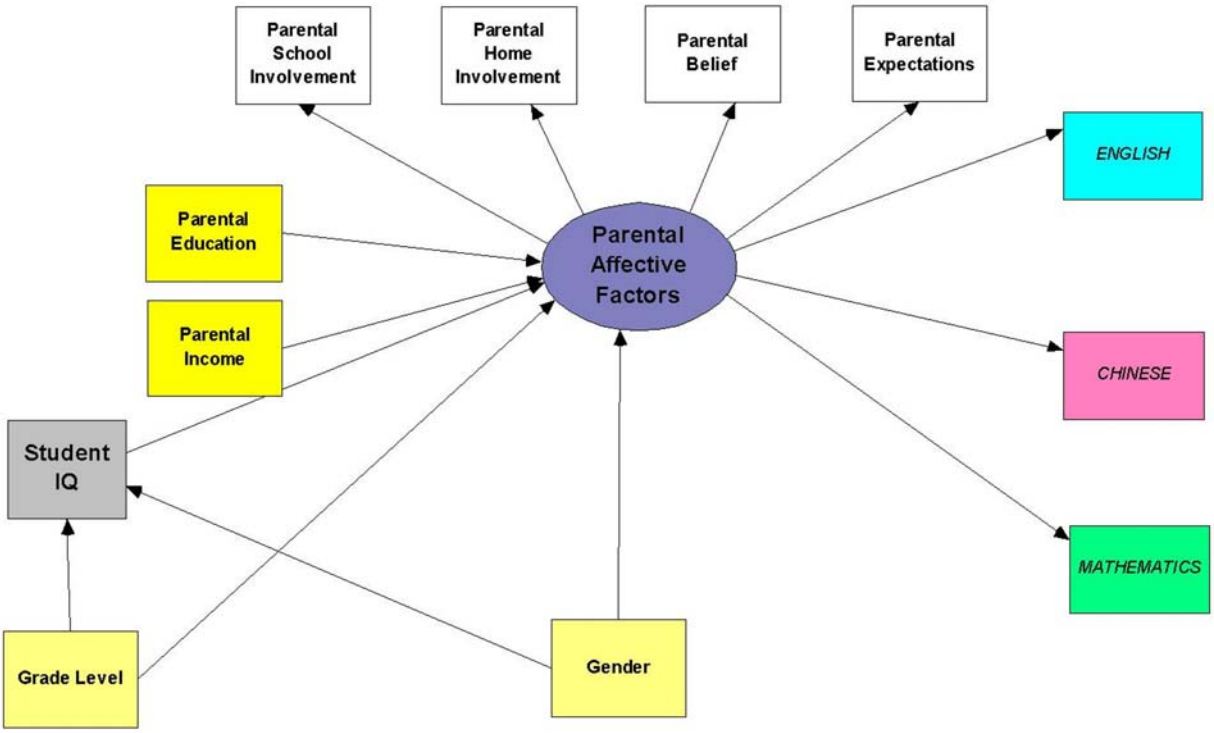

Figure 1. A conceptual model of parental affective factors mediating student IQ, as moderated by parental education and parental income and controlled for grade level and gender, which affects students' achievement in English, Chinese and Mathematics.

An achievement model that reflects these processes are generated to allow for the testing of the following hypothesis (see Figure 1).

1. When controlled for gender and grade levels (as an indicator of schooling and chronological age), student IQ will indirectly affect their achievement as parental factors play a bigger role in their achievement (e.g., S. Phillipson, 2009a, 2009c; Vygotsky, 1978).
2. Parental affective factors is seen as the latent factor that mediate student IQ in affecting academic achievement, and this modeled relationship will be similar across the ability levels because high-ability students need the same support and encouragement as other ability students do (e.g., Morawska & Sanders, 2008).
3. Parental education and parental income are seen as moderating parental affective factors in predicting achievement as they are crucial in providing educational opportunities to children to succeed (e.g., Hung & Marjoribanks, 2005).

Method

Participants

A total of 1279 students (640 girls and 639 boys) from one Chinese primary school in Hong Kong, and their parents were invited to participate in this study. The school was financially subsidized by the government and had high level of parental involvement in the school through their parents' association.

A resulting complete data set of 780 students' and parents' responses were obtained after parents' data were matched with their children's data (60.99% of total sample). There were 111 students from Primary 1, 134 from Primary 2, 125 from Primary 3, 134 from Primary 4, 119 from Primary 5 and 157 from Primary 6.

There were 584 mothers, 193 fathers, and two grandfathers and one grandmother. Out of the 780 parents, 49.9% of them had tertiary education whereas 40.1% had completed secondary education with remaining parents completing at least vocational education. Most of these parents (96.8%) were moderate to high income earners.

Measures

The measure of student intellectual ability was obtained through group administered Ravens Progressive Matrices (RPM) test, with the responses transformed into Rasch scores and then expressed as deviation IQ. Students were classified as high-ability if they obtained a deviation IQ score of more than 115. They were classified of low-ability if they got less than 90 in the deviation IQ score. Students were classified of average-ability if they fell between the two margin of 90 and 115 deviation IQ score. Students' achievement measures were final

year school reported grades for mathematics, English and Chinese, using a 7-point scale (1 = *lowest achievement* to 7 = *highest achievement*), based upon a series of tests conducted throughout the year.

Parental factors were surveyed using the Parents' Attributions and Perception Questionnaire (PAPQ) (S. Phillipson, 2006), which included subscales measuring parental estimates of their school and home involvement, parental beliefs of their children's ability and parental expected scores in the three subjects. Parents were sent the questionnaires through the schools and were provided stamped addressed envelopes to mail back the completed questionnaires.

Analysis

The data was analysed in four broad ways. First, was a preliminary analysis comprising of Rasch analysis and descriptive analysis. This was followed by a series of ANOVAs with Bonferonni corrections for multiple comparisons of mean distributions of variables between the ability groups. Differences were held significant at $p < .01$. Third, a series of intercorrelations of variables for each ability group was generated to complement the final analysis of this study, structural equation modeling (SEM). Structural models were built with parental affective factors as the intervening variable between student IQ and their achievement for each ability group. Parental affective factors as a latent variable were operationalized with parental school-involvement and parental home-involvement, parental belief of their children's ability, and parental expectations in relation to their children's achievement. Parental education and income were added as moderating variables to parental affective factors. Grade levels and gender were inserted as controlling variables as the sample of ability groups consisted of different grade levels (and age) and gender.

SEM (Bollen, 1989; Joreskog, 1993) was used to test the conceptual achievement model as this analysis allowed for complete confirmation and simultaneous tests of the complex relationships present in the achievement model hypothesized in this study (Hoyle, 1995). AMOS 17.0.1 (Arbuckle, 2008) was used to perform SEM on the achievement model using a maximum likelihood estimation method. Established criteria for specifying suitable empirical models that tested mediation and moderation effect set out by MacKinnon, Lockwood, Hoffman, West, and Sheets (2002), and Shrout and Bolger (2002), were followed. A 95% bias-corrected confidence interval that includes a non-zero interval will be taken as showing a reliable mediation effect (Shrout & Bolger, 2002).

The SEM was conducted using transformed scores resulting from Rasch analysis (Rasch,

1960, 1980, 1993). The data obtained in this study were ordinal, hence, violating one fundamental assumption of SEM that the data should be interval or ratio. Rasch measurement offers a unique mathematical means of transforming ordinal responses to linear interval data for meaningful interpretations (Bond & Fox, 2007; Fischer & Molenaar, 1995). Rasch analysis also provided the means of interpreting and reporting validity and reliability of instruments used in this study. Using WINSTEPS Version 3.61.2 (Linacre, 2006), Rasch analysis was performed separately on each instrument's data and the transformed scores were used for SEM.

A number of goodness of fits, including traditional and non-traditional fit values, was reported in this study as evidence of SEM model fits. A non-significant χ^2 ($p > .001$) is preferred as it shows a small discrepancy between the hypothesized model and the population. Ratio values of less than 2.00 in a χ^2/df indicate a good-fitting model (Bollen, 1989; Ullman, 2001). Other goodness of fits that are reported in this study include the Goodness of Fit Index (GFI) (Joreskog & Sorbom, 1986), Comparative Fit Index (CFI) (Bentler, 1990; cited in Byrne, 2001, p. 83) and the Root Mean Square Error of Approximation (RMSEA) (Bollen, 1989). These indexes were chosen as they provide stringent measures of fit in consideration of sample variances and have been frequently quoted as the sufficient indicators of fit along with the traditional chi-squares (Bollen & Long, 1993; Hu & Bentler, 1999; Joreskog, 1993).

Results

Preliminary Analysis

The fit statistics for Rasch analysis of the parents' and Raven were obtained. The fit statistics in Rasch are comparable to construct validity in classical theory terms (Linacre, 2004b). The data consisting of 780 cases were Rasch analyzed and checked for outliers. The infit and outfit mean squares found for each instrument's items' and persons' measure showed good fits overall. The values were close to +1 for both items and persons measures. Similarly, the infit and outfit *t* values showed spreads of close to zero and within the stipulated range of +2 and -2, indicating good construct validity for both instruments within the population of this study.

Another indicator of good-fitting data to the Rasch model is the reliability index. A reliability index of close to 1 is needed to diagnose a conforming and viable model. The reliability index reported for items of each instrument and their subscales ranged from the lowest .95 to .99, accepted as high values indicative of good-fitting data to the estimated Rasch model (Bond & Fox, 2007). Person reliability indexes were lower, ranging from .71

to .82, but are still considered acceptable for most social educational research (Linacre, 2004a). A normality test conducted on the Rasch person estimates obtained showed very small skewness and kurtosis. This result suggested a very small departure from normality, which is expected in educational research (Tabachnick & Fidell, 2001). The person estimates for each variable were then used in the SEM.

Table 1 shows the distribution of students' gender, year levels and age range according to their ability levels. Interestingly, there were slightly more boys in the high-ability group. The same was found for the low-ability group whilst there were more girls than boys in the average-ability group. More of the high-ability students came from the upper primary levels whereas more of the low-ability students came from lower primary levels. Age range of the high-ability students was smallest compared to the other two ability groups.

Table 1

Distribution of students' gender and year levels according to ability groups (N = 780)

	High-ability (n = 161)	Low-ability (n = 152)	Average-ability (n = 467)
Number of Boys	84	78	222
Number of Girls	77	74	245
Number of Primary 1 Students	17	46	48
Number of Primary 2 Students	17	35	82
Number of Primary 3 Students	13	25	87
Number of Primary 4 Students	31	11	92
Number of Primary 5 Students	24	23	72
Number of Primary 6 Students	59	12	86
Age range in years	6.5 - 13.2	6.3 - 13.9	6.3 - 13.5

Comparisons across Ability Groups

For means and standard deviations for each variable in each ability group, please refer to Tables 3, 4 and 5. The ANOVA results (see Table 2) showed that high-ability students' parents had significantly higher beliefs of their children's ability (M = 2.14, SD = 1.24) than the low-ability students' parents (M = 1.52, SD = 1.23). The same results were not found between parents of high-ability and average-ability students (M = 1.87, SD = 1.27). The average-ability students' parents, similar to the high-ability students' parents, had higher beliefs of their children's ability than those parents' of low-ability students. There were also significant

differences between the three groups' parents in their expectations of their children's achievement. The high-ability students' parents had the highest expectations (M = .30, SD = .17), followed by average-ability students' parents (M = .24, SD = .14) and low-ability students' parents (M = .19, SD = .14). No other differences were found in parents' factors in this study.

There were significant differences between the ability groups for all three subjects' achievement, except for between low-ability students and average-ability students in English achievement. High-ability students had the highest mean for all three subjects followed by average-ability group and then low-ability group. Difference was found between grade levels as the control variable for the ability groups. High-ability students mainly came from higher primary levels (M = 4.27, SD = 1.74) whereas average-ability students came from middle primary levels (M = 3.74, SD = 1.59) and low-ability students mainly came from the lower primary levels (M = 2.78, SD = 1.67). There were no significant differences in gender between the ability groups.

Table 2
Multiple comparisons of variables across the ability groups

Variable	Ability	Ability	Mean Difference	*F*	*p*
Parental School Involvement	H-A	L-A	-.24	.92	.54
		A-A	-.10		1.00
	L-A	A-A	.14		.99
Parental Home Involvement	H-A	L-A	-.37	2.61	.07
		A-A	-.14		.79
	L-A	A-A	.22		.30
Parental Beliefs	H-A	L-A	.64*	9.77	.01
		A-A	.27		.06
	L-A	A-A	-.36*		.00
Parental Expectations	H-A	L-A	.10*	20.17	.00
		A-A	.06*		.00
	L-A	A-A	-.05*		.00
Parental Education	H-A	L-A	.14	1.03	.65
		A-A	.01		1.00
	L-A	A-A	-.13		.54
Parental Income	H-A	L-A	.17	.81	.64

		A-A	.10		1.00
	L-A	A-A	-.06		1.00
Student IQ	H-A	L-A	44.75*	1108.90	.00
		A-A	19.13*		.00
	L-A	A-A	-25.62*		.00
English Achievement	H-A	L-A	.63*	17.41	.00
		A-A	.43*		.00
	L-A	A-A	-.20		.09
Chinese Achievement	H-A	L-A	.87*	28.54	.00
		A-A	.32*		.00
	L-A	A-A	-.55*		.00
Mathematics Achievement	H-A	L-A	1.04*	47.92	.00
		A-A	.65*		.00
	L-A	A-A	-.40*		.00
Grade Level	H-A	L-A	1.50*	32.71	.00
		A-A	.60*		.00
	L-A	A-A	-.90*		.00
Gender	H-A	L-A	-.01	.59	1.00
		A-A	-.04		1.00
	L-A	A-A	-.04		1.00

Note. H-A = High-ability; L-A = Low-ability; A-A = Average-ability.
*$p < .01$ level

Intercorrelations across Ability Groups

Table 3 shows the intercorrelations results between variables for high-ability students in this study. It was found that student IQ was positively and significantly correlated with mathematics achievement ($r = .34$, $p < .01$) only, and not the languages achievement. Student IQ, however, was also significantly correlated with one parental variable – parental-school involvement ($r = .17$, $p < .05$). Parental home-involvement was significantly correlated with parental belief ($r = .19$, $p < .05$). Parental expectations were significantly correlated with parental income ($r = .20$, $p < .05$) and all three subject achievement scores with the lowest effect being in Chinese achievement. Parental income and parental education were also significantly correlated with English achievement ($r = .26$, $p < .01$). Parental education was correlated with parental income ($r = .38$, $p < .01$) and Chinese achievement ($r = .19$, $p < .05$).

All three subjects were strongly correlated with each other with the weakest link being between Chinese and mathematics. Grade level was significantly and positively correlated with parental belief but negatively and significantly correlated with student IQ, English, Chinese and mathematics achievement whereas gender was only significantly and negatively correlated with student IQ.

Table 3

Intercorrelations between variables for high-ability student group

	Parental Variables						Student Variables					
	1	2	3	4	5	6	7	8	9	10	11	12
1. Parental School-Involvement	1	.42**	.15	.04	-.13	.14	.17*	.04	.13	.09	-.09	.07
2. Parental Home-Involvement		1	.19*	.02	.08	.12	.05	.06	.04	-.03	-.01	-.03
3. Parental Belief			1	.19*	-.03	-.01	-.02	.06	.06	.06	.16*	-.12
4. Parental Expectations				1	.04	.20*	.11	.43**	.25**	.43**	-.14	-.03
5. Parental Education					1	.38**	.10	.26**	.19*	.05	-.11	-.05
6. Parental Income						1	.03	.26**	.14	.09	.01	-.01
7. Student IQ							1	.12	.01	.34**	-.17*	-.16*
8. English Achievement								1	.45**	.52**	-.21**	.01
9. Chinese Achievement									1	.33**	-.19*	.10
10. Mathematics Achievement										1	-.28**	-.04
11. Grade Level											1	-.12
12. Gender												1
Mean	.57[a]	2.07[a]	2.14[a]	.30[a]	5.12[b]	4.69[b]	121.91[c]	5.19[d]	5.44[d]	5.98[d]	4.27[d]	1.48[e]
SD	1.66	1.36	1.24	.17	.97	1.15	6.78	.86	1.03	.89	1.74	.50

[a]Rasch logit scores

[b]Raw scores from a scale of 1 to 6

[c]Deviation IQ score

[d]Raw scores from a scale of 1 to 7

[e]Raw scores from a scale of 1 to 2

** $p < .01$ level (2-tailed) ; * $p < .05$ level (2-tailed)

Table 4

Intercorrelations between variables for low-ability student group

	Parental Variables						Student Variables					
	1	2	3	4	5	6	7	8	9	10	11	12
1. Parental School-Involvement	1	.40**	.08	.13	.03	.05	-.04	.09	.01	.07	-.19*	-.22**
2. Parental Home-Involvement		1	.18*	.29**	.16	-.01	-.12	.24**	.12	.16	-.14	-.12
3. Parental Belief			1	.25**	.01	-.18*	.10	.20*	.13	.06	.09	-.09
4. Parental Expectations				1	.14	.16**	-.02	.57**	.47**	.55**	-.24**	.01
5. Parental Education					1	.40**	-.07	.17*	.07	.12	.06	-.01
6. Parental Income						1	-.04	.09	.02	.04	-.04	-.13
7. Student IQ							1	-.02	-.10	-.08	.28**	-.01
8. English Achievement								1	.52**	.53**	-.32**	.05
9. Chinese Achievement									1	.47**	-.20**	.24**
10. Mathematics Achievement										1	-.56**	.02
11. Grade Level											1	.04
12. Gender												1
Mean	.81[a]	2.45[a]	1.52[a]	.19[a]	4.98[b]	4.52[b]	77.16[c]	4.57[d]	4.57[d]	4.94[d]	2.78[d]	1.48[e]
SD	1.53	1.44	1.23	.14	.97	1.19	12.97	1.00	1.04	.94	1.67	.50

[a]Rasch logit scores

[b]Raw scores from a scale of 1 to 6

[c]Deviation IQ score

[d]Raw scores from a scale of 1 to 7

[e]Raw scores from a scale of 1 to 2

** p < .01 level (2-tailed) ; * p < .05 level (2-tailed)

Table 4 shows the intercorrelations results between variables for low-ability students in this study. Student IQ was found to have no links at all with any of the subject achievements or the parental variables. Parental school-involvement was significantly and negatively

correlated with both grade level (r = -.19, p < .01) and gender (r = -.22, p < .01). Parental home-involvement, however, was significantly and positively correlated with parental belief (r = .18, p < .01) and parental expectations (r = .29, p < .01). All of the parent variables except for parental school-involvement and parental income were significantly correlated with English achievement. Parental expectation were significantly correlated with parental income (r = .16, p < .01), English achievement (r = .57, p < .01), Chinese achievement (r = .47, p < .01), mathematics achievement (r = .55, p < .01), and grade levels (r = -.24, p < .01). Parental education was correlated with parental income (r = .36, p < .01) and English achievement (r = .17, p < .05). Like for the high-ability group, all three subjects were strongly correlated with each other with the weakest link being between Chinese and mathematics. Grade level was significantly and negatively correlated with parental school-involvement, parental expectations, English, Chinese and mathematics achievement. Grade level, however, was positively and significantly correlated with student IQ. Gender was significantly correlated with Chinese achievement (r = .24, p < .01).

Table 5 shows the intercorrelations results between variables for average-ability students in this study. Unlike the other two groups, student IQ was significantly correlated with all three subjects' achievement. Student IQ also had a significant relationship with parental belief (r = .17, p < .05), parental expectations (r = .20, p < .05), and parental income (r = .11, p < .05). All parental variables, except for parental school-involvement, had a significant correlation with English achievement. On the other hand, only parental home-involvement, parental belief, parental expectations and parental education were significantly correlated with Chinese and mathematics achievement. Parental school-involvement were strongly and significantly correlated with parental home-involvement (r = .39, p < .01) and parental belief (r = .16, p < .01), whereas parental home-involvement was significantly correlated with parental belief (r = .19, p < .01) and parental expectations (r = .17, p < .01). Parental expectations had a strong and significant relationship with parental belief (r = .36, p < .01) and parental income (r = .15, p < .01) whilst parental education had a similar relationship with parental income (r = .44, p < .01). Like the other groups, all three subjects were strongly correlated with each other with the weakest link being between Chinese and mathematics. Grade level was significantly and negatively correlated with parental school-involvement, parental home-involvement, English, Chinese and mathematics achievements. Grade level, however, was positively and significantly correlated with parental belief and student IQ. Gender was significantly correlated with parental belief, parental expectations, and English and Chinese achievement.

Table 5

Intercorrelations between variables for average-ability student group

	Parental Variables						Student Variables					
	1	2	3	4	5	6	7	8	9	10	11	12
1. Parental School-Involvement	1	.39**	.16**	.05	.03	.05	-.02	.12	.01	.04	-.12*	.06
2. Parental Home-Involvement		1	.19**	.17**	.08	.03	.04	.22**	.11*	.13*	-.16*	.05
3. Parental Belief			1	.36**	-.01	.04	.17*	.17*	.22*	.13*	.18**	.12**
4. Parental Expectations				1	.08	.15**	.20*	.54**	.52**	.43**	-.09	.19**
5. Parental Education					1	.44**	.05	.25**	.10*	.11*	-.03	-.01
6. Parental Income						1	.11*	.29**	.01	.13**	.06	-.02
7. Student IQ							1	.24**	.23**	.24**	.13**	-.06
8. English Achievement								1	.53**	.59**	-.20**	.17**
9. Chinese Achievement									1	.49**	-.10*	.20**
10. Mathematics Achievement										1	-.32**	.04
11. Grade Level											1	-.03
12. Gender												1
Mean	.67[a]	2.23[a]	1.87[a]	.24[a]	5.11[b]	4.58[b]	102.77[c]	4.77[d]	5.12[d]	5.34[d]	3.68[d]	1.52[e]
SD	1.55	1.48	1.27	.14	.97	1.17	6.97	1.02	1.02	.99	1.61	.50

[a]Rasch logit scores

[b]Raw scores from a scale of 1 to 6

[c]Deviation IQ score

[d]Raw scores from a scale of 1 to 7

[e]Raw scores from a scale of 1 to 2

** p < .01 level (2-tailed) ; * p < .05 level (2-tailed)

Structural Models across Ability Groups

Three parsimonious achievement models were generated in accordance with the conceptual model of this study, where only non-significant pathways were taken out when necessary and significant pathways were left in or added in the model. The first model was for the high-ability students, the second was for the low-ability students and the third was for the average-ability students.

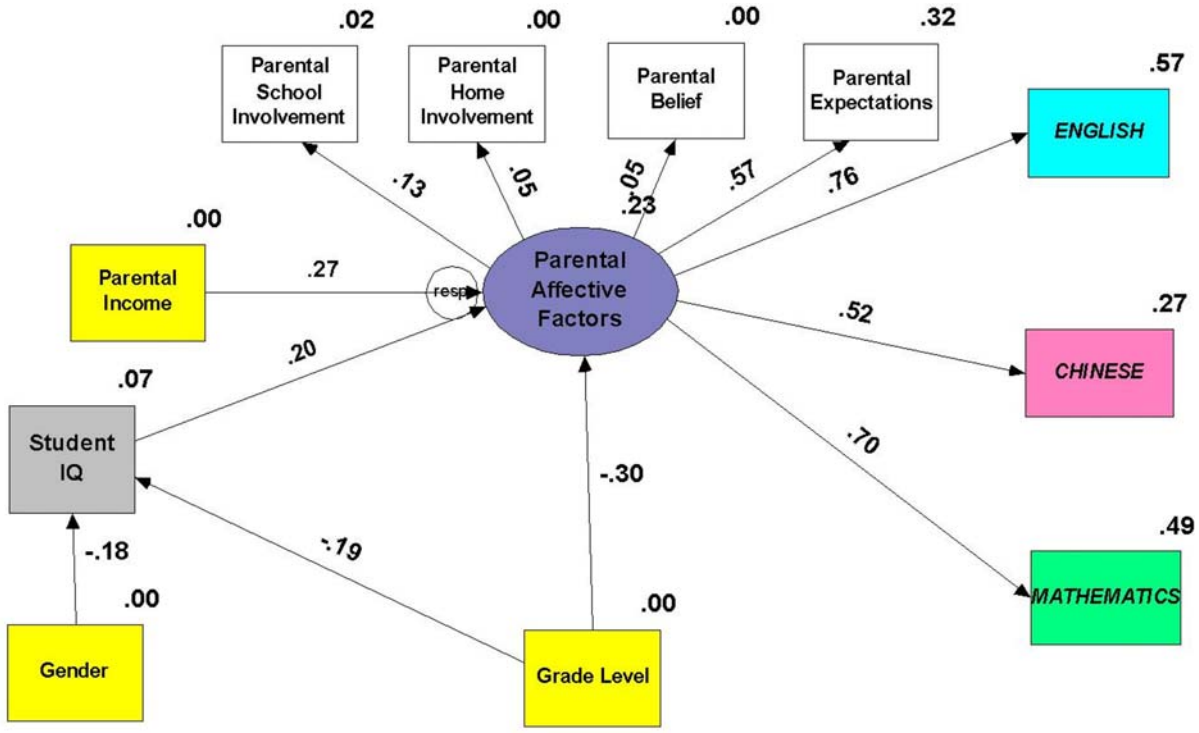

Figure 2. Overall model of parental role for high-ability students (n = 161)
Controlled for grade level and gender, student IQ was fully mediated by parental affective factors, as significantly moderated by parental income, to predict mathematics, English and Chinese achievement.

High-ability students model. The high-ability students' model (see Figure 2) was an over identified recursive model where, χ^2 (39, N = 161) = 52.07, p = .08. The χ^2/df = 1.34, was within the acceptable value of less than 2.00. Both the GFI and the CFI were good values at .95 and .94 respectively. The RMSEA value was also a good value of .05. All these values indicated a good-fitting model. The model accounted for 57% of variance in English achievement, 27% of variance in Chinese achievement and 49% of variance in mathematics achievement, signaling moderate to large effect sizes for the relationships in the model.

The model showed that, controlled for grade level and gender, there was a full parental mediation role in the pathway between student IQ and their achievement. Student IQ was significantly and positively linked to parental affective factors. Parental affective factors were mainly indicated by parental expectations (R^2 = .32). Parental income significantly moderated parental affective factors, with a path estimate of .27, $p < .05$ (c.r < 1.96), in predicting English, Chinese and mathematics achievement. A significant relationship between student IQ and parental affective factors along with large pathways between parental affective factors and all the subjects were indicative of a parental mediation model.

A bias corrected bootstrap 95% confidence interval (MacKinnon, Lockwood, & Williams, 2004; Shrout & Bolger, 2002) estimate on 10,000 empirical sample of the indirect effect between student IQ to each subject achievement was generated to confirm the mediation finding in the high-ability group model. The mathematics achievement pathway produced a significant non-zero interval of .02 to .29, p = .02. Similar results were found for English achievement (a non-zero interval of .03 to .20, p = .01) and Chinese achievement (a non-zero interval of .03 to .19, p = .01). This meant that the mediation effect was, in fact, reliable and significant, and hence, student IQ of high-ability group was fully mediated by parental affective factors in predicting all three subjects' achievement.

Low-ability students model. The low-ability students' model (see Figure 3) was an over identified recursive model where, χ^2 (38, N = 324) = 41.57, p = .32. The χ^2/df = 1.09, was within the acceptable value of less than 2.00. Both the GFI and the CFI were good values at .96 and .99 respectively. The RMSEA value was also a good value of .03. All these values indicated a good-fitting model. The model accounted for 58% of variance in English achievement, 46% of variance in Chinese achievement and 62% of variance in mathematics achievement, signaling large effect sizes for the relationships in the model.

Different to the high-ability model, controlled for grade level and gender, the low-ability model showed that there was a direct parental affective factors impact to their children's achievement. Student IQ did not have a significant relationship with parental affective factors whilst parental affective factors significantly predicted all three achievement subjects. Parental affective factors were significantly indicated by parental home-involvement, parental belief and parental expectations with the strongest effect being in parental expectations (R^2 = .57). Large pathways between parental affective factors and all the subjects were indicative of a direct parental model in the low-ability student group's case. Parental education alone moderated parental affective factors significantly. Grade level also showed significant relationships with both student IQ and parental affective factors. However, there was a

negative relationship between grade level and parental affective factors (r = -.39). Gender had no significant relationships with student IQ or parental affective factors. Gender predicted Chinese achievement whereas grade level negatively predicted mathematics achievement.

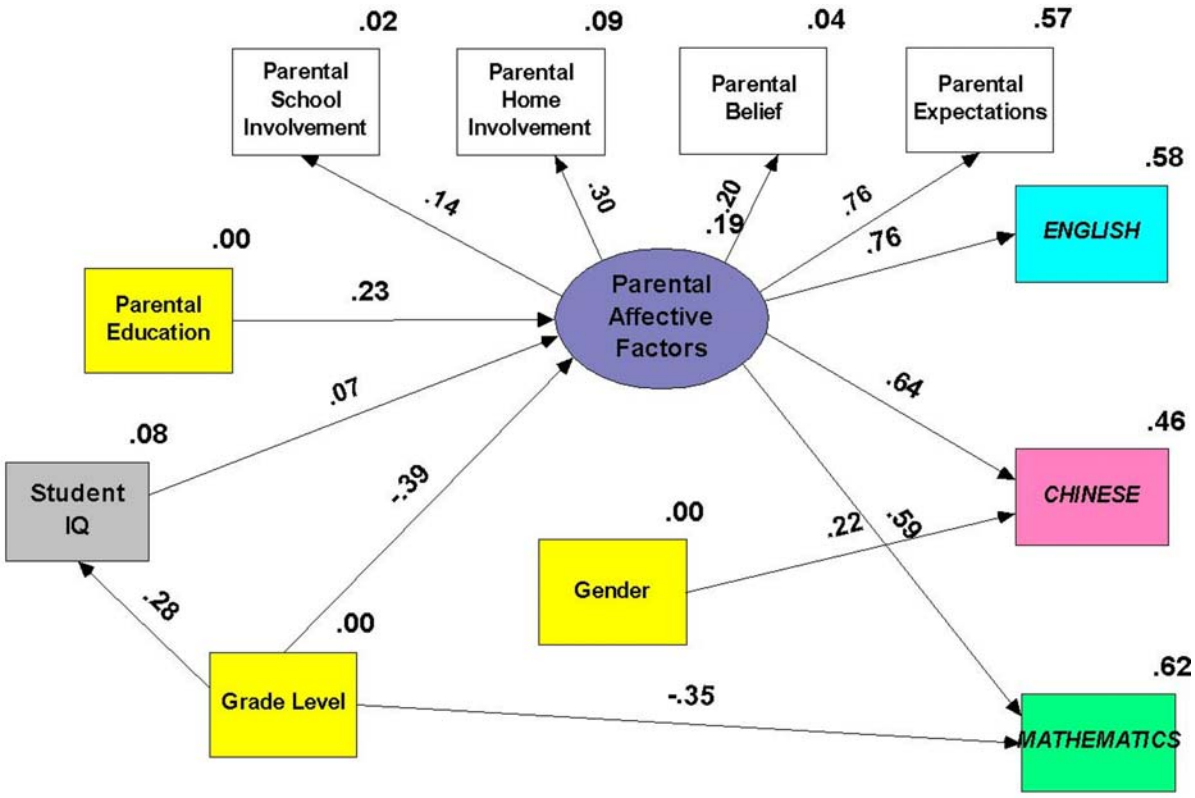

Figure 3. Overall model of parental role for low-ability students (n = 152)

Controlled for grade levels and gender, student IQ did not a significant relationship with parental affective factors and did not predict achievement at all. Instead parental affective factors, as significantly moderated by parental education and controlled for grade level, directly predicted mathematics, English and Chinese achievement. Gender significantly predicted Chinese achievement whereas grade level negatively and significantly predicted mathematics achievement.

Average-ability students model. The average-ability students' model (see Figure 4) was an over identified recursive model where, χ^2 (37, N = 467) = 70.67, p = .09. The χ^2/df = 1.91, was within the acceptable value of less than 2.00. Both the GFI and the CFI were good values at .96 and .95 respectively. The RMSEA value was also a good value of .05. All these values indicated a good-fitting model. The model accounted for 65% of variance in English achievement, 52% of variance in Chinese achievement and 54% of variance in mathematics

achievement, signaling large effect sizes for the relationships in the model.

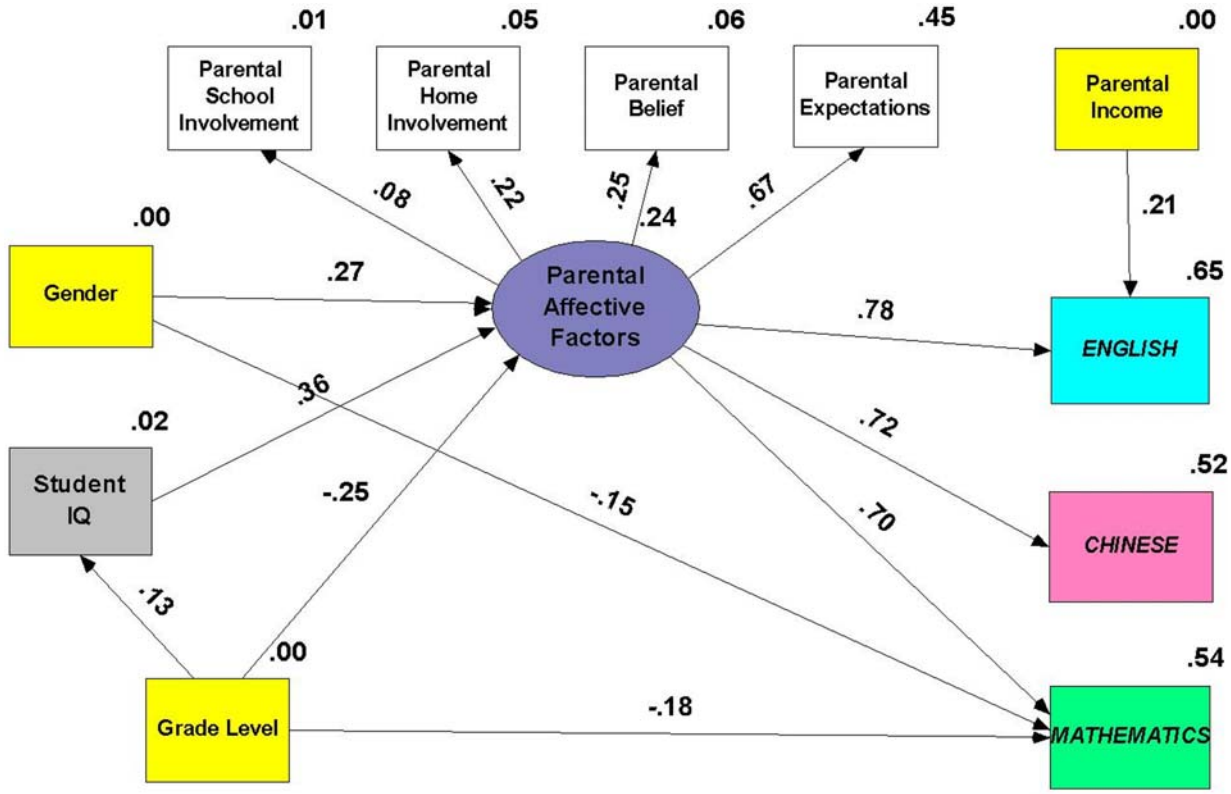

Figure 4. Overall model of parental role for average-ability students (n = 467)
Controlled for grade level, student IQ was fully mediated by parental affective factors, as moderated by gender, in predicting mathematics, English and Chinese achievement. Parental income also significantly and directly predicted English achievement for this group of students, whereas grade level negatively and significantly predicted mathematics achievement.

The model showed that, controlled for grade level and gender, there was a full parental mediation role in the pathway between student IQ and their achievement. Student IQ, which correlated significantly with all the subject achievements initially, did not predict any of the subjects in this model with the present of the intervening parental affective variables. Student IQ was significantly related to parental affective factors, with a path estimate of .36, p = .00 (c.r < 1.96). Parental affective factors were indicated mainly by parental home-involvement, parental belief and parental expectations, with the strongest effect in parental expectations (R^2 = .45). Parental income directly predicted English achievement only, with a path estimate of .21, p = .00 (c.r < 1.96). A significant relationship between student IQ and parental

affective factors along with large pathways between parental affective factors and all the subjects were indicative of a parental mediation model. Gender moderated significantly with parental affective factors whilst, grade level was negatively and significantly related to student IQ and parental affective factors. Grade level also significantly and negatively predicted mathematics achievement.

A bias corrected bootstrap 95% confidence interval estimate on 10,000 empirical sample of the indirect effect of student IQ on each subject achievement was generated to confirm the mediation finding in the average-ability group model. The mathematics achievement pathway produced a significant non-zero interval of .18 to .32, $p = .00$, which provided evidence that the mediation effect was, in fact, reliable and significant. Similar results were found for English achievement (a non-zero interval of .20 to .34, $p = .00$) and Chinese achievement (a non-zero interval of .18 to .32, $p = .00$). This meant that student IQ of average-ability group was fully mediated by parental affective factors in predicting all three subjects' achievement.

Discussion

This study path-modeled the relationship between parental factors and student IQ in predicting students' academic achievement in English, Chinese and mathematics in one Hong Kong Chinese primary school. The main aim of this study was to compare the modeled relationship of parental role in academic achievement between students of high-ability with students of low-ability and average-ability within a context of schooling. Comparison between the three ability groups offered an empirical view of the types of the relationship parents have in advancing their children's academic achievement according to their ability levels. Studies in talent and academic development have suggested that families and parents in particular, have a role to play in advancing students' potential in achievement, and that students of high-ability need as much support and encouragement as any other students (e.g., Chan, 2005; Olszewski et al., 1987; Piirto, 1999). If so, the discussion of the relationship found between student IQ and achievement, and parental role in academic achievement would be important to provide evidence for this study's research paradigm and hypothesis.

Student IQ and Academic Achievement

The three ability groups were different from each other as they showed difference in not only their IQ, but also difference in terms of their grade levels, their subject achievements and the predictive relationships between IQ and academic achievement. The results show that there was a positive linear pattern of grade levels and achievement according to the students'

ability levels as found by previous studies (Stevenson, Lee, Chen, Lummis, et al., 1990; Stevenson, Lee, Chen, Stigler, et al., 1990).

For the average-ability group where student IQ significantly predicted all three subjects' achievement; this finding establishes the general literature's direction which stresses the role of cognitive ability in predicting achievement (e.g. Kytala & Lehto, 2008; Taub, Keith, Floyd, & Mcgrew, 2008). However, for the high-ability group, student IQ had a significant correlation with mathematics achievement only, which shows support for studies that found Chinese students of high-ability generally performed well in mathematics (Dandy & Nettelbeck, 2002a; Stevenson, Lee, Chen, Stigler, et al., 1990).

The low-ability group's student IQ, on the other hand, did not predict any of the subjects' achievement. These findings show that there is a tendency for other variables to play a bigger role in students' achievement for both the high-ability and low-ability students, with the exception of mathematics achievement for high-ability students. The other variables, hence, as hypothesized in this study, could be parental variables especially their expectations, beliefs and involvement.

Parental Role in Academic Achievement

The three ability groups were different from each other also in the levels of parents' beliefs of their children's ability and their expectations of their children's academic achievement. Again as found for students' ability in relation to their grade levels and achievements, levels of parents' beliefs and expectations followed a positive linear pattern in relation to their children's ability. The higher the ability, the higher the beliefs and expectations of the parents – a finding that supports a number research that looked into parents' beliefs and expectations in relation to children's ability (Furnham & Petrides, 2004; Furnham et al., 2002). This meant that the higher-ability students would feel more pressure from their parents in terms of succeeding academically.

Accordingly, Chan (2005) conceded that highly able or gifted Chinese students felt the need to succeed through independent effort that were highly expected by their parents as a sign of excellence. The independent effort meant that parents of high-ability students tended to be less involved in their children's schooling activities and expected their children to be able to regulate themselves to succeed. In the current paper, though the multiple comparisons results showed that there were no significant differences between parental involvements at home and at school between three ability groups, the high-ability students' parents had the smallest mean compared to the other two groups. There was a negative linear trend of parental

involvement in relation to their children's ability. This finding seemed to support the claim made by students in Chan's study, with the exception that in the current study, parents reported the level of involvement and not the students.

Relationships between variables. Examining the intercorrelations results, parental involvement at school seemed to be positively associated with high-ability student IQ, whereas the involvement at home was positively related to their belief of their children's ability. This meant that the parents of high-ability students in this study would want to be involved at school if their child was more able and equally involved at home if they were confident their children were more able. Parents of average-ability students were more involved at school and at home if their children were of lower grade levels. These parents were more involved at home if they believed that their children were able and equally had expectations for their children to achieve. The same parents were more involved at home to ensure success in their children's achievement in all three subjects, especially in English achievement. Parents of low-ability students were more involved at school if their children were in the lower grade levels and if they are boys than girls. The same parents were more involved at home if they believed that their children were able and equally had expectations for their children to achieve. These parents of the low-ability students were also more involved at home to help their children to achieve in English. These results extended studies that found parents were involved with their children based on their own beliefs and expectations (Epstein, 1995; Hong & Ho, 2005).

Parents' confidence in their children's ability comes from different sources (Furnham et al., 2002). Parents of high-ability students showed more confidence in their children's ability as their grade levels increased. Their confidence was also related to their expectations. This finding was common to the other groups of students, except that the average-ability students' parental belief was dependent upon their children's IQ, all achievement levels, grade levels and gender, whereas the low-ability students' parents' beliefs also depended their children's achievement levels in English and their income. The lesser income they had the higher belief they had of their children's ability. These results showed that parents of high-ability students had simpler dimensions of beliefs compared to other groups of students. Similar conclusion could be held for parental expectations, where parental expectations of high-ability students were highly related with the subject achievements and parental income. Parents of the low-ability students showed expectations not only in relation to their income and achievements but also in relation to their children's grade levels. Whereas parents of the average-ability students showed expectations not only in relation to their income and

achievements but also in relation to their children's gender, suggesting higher expectations for girls than boys, extending an earlier study by Wood, Kaplan, and McLoyd (2007), which found similar results.

Parental education and income was instrumental in advancing students' achievement in English for high-ability and average-ability students. Parental education alone was important for low-ability students' achievement in English and average ability students' achievement in Chinese. High-ability students' parental education was also important for their children's Chinese achievement, whereas average-ability students' parental education and income were crucial for their children's mathematics achievement. These findings echoed studies which concluded that parental education level and income influenced children's achievement (Tsui, 2005), especially for English language that would help with the children's future mobility (Cheung, 2008; Lai & Byram, 2003). These findings also show that parental education and income are generally important for students' access to educational opportunities (Hung, 2007; Marjoribanks, 2005).

Achievement models. The comparative achievement models provided empirical evidence for the main hypothesis of this study that the modeled relationship between parental affective factors of different ability groups and their children's ability to achieve would be similar across all abilities. Two of the models – high-ability and average-ability achievement models showed that parental affective factors fully mediated students' ability in predicting the three subject achievements supporting the general finding of S. Phillipson (2009c), which found that parental affective factors influenced students' cognitive ability in predicting achievement in language and mathematics.

The achievement models for all three ability groups showed a substantial loading for parental expectations as an indicator of parental affective factors. This finding showed support for studies that found parental expectations as the common and key predictor of achievement, especially in a Chinese or Asian context of achievement (Neuenschwander et al., 2007; S. Phillipson, 2009a, 2009b, 2009c; S. Phillipson & Phillipson, 2007). However, the achievement models between the three ability groups provided further empirical evidence in the different ways parental expectations, in particular, and parental affective factors interacted with other variables in predicting English, Chinese and mathematics achievement.

The high-ability group achievement model showed that parental expectations alone were instrumental for parental affective factors to mediate students' ability in predicting the subject achievements. High-ability students' ability was shown to be negatively controlled by their grade levels and gender – suggesting that the higher their ability, the students usually came

from a lower grade level and they generally were boys rather than girls. Parental income also significantly moderated parental affective factors. The mediation model for high-ability students was rather straight forward with 23% of parental factors explaining the variance in English, Chinese and mathematics achievement. The mediation finding proves the Vygotskyan perspective (Vygotsky, 1978) on potential development and achievement where parental affective factors, as moderated by parental income, play a key role in mediating students' ability in predicting achievement, especially in English and mathematics.

S. Phillipson (2009a) also found in certain context, parental variables played a more direct role in predicting their children's achievement. Evidence to support this claim was provided by this study's low-ability achievement model where parental affective factors directly predicted achievement of all three subjects. The low-ability group model showed that parental affective factors, as moderated by parental education, directly predicted the achievement subjects. Parental affective factors, significantly indicated by interaction of parental belief and expectations through their home-involvement, were imperative for low-ability students' success in their academic subjects. Girls in this group of students most likely did better in Chinese.

The low-ability students and average-ability students did worse in mathematics as they progressed through their grade levels, a finding that highlights a similar predicament put forward by S. N. Phillipson (2008), where underachievement in mathematics was prominent as Hong Kong students progressed to higher grade levels, especially transitioning into the secondary stream.

The average ability group model showed more complex interactions of other variables with parental affective factors that mediated students' ability in predicting the subject achievements, suggesting that the parents of these students have to consider a lot more variables in their interactions with their children. The average-ability group, controlled for their grade level, had parental factors that were mainly indicated by parental expectations, beliefs and home-involvement mediated students' ability in predicting achievement in the three subjects. Gender, and not parental education or income, moderated parental affective factors in this mediation model. Gender also negatively predicted mathematics achievement to suggest that boys did better at mathematics than girls supporting the general trend of literature (Tsui, 2007) which suggested that boys are overrepresented in mathematics achievement. Parental income played a role in English achievement instead which tended to suggest these parents used their income to provide educational opportunities for pragmatic reasons associated with their future (Cheung, 2008; Lai & Byram, 2003). The mediation finding

proves the Vygotskyan perspective where parental affective factors, as moderated by gender, play a key role in mediating average-ability students' ability in predicting achievement in all three subjects.

Limitations and Conclusion

Despite the fact that the student grades were not derived from standardized tests, the grades were obtained from one school context where consistent grading systems were used for the achievement scores. Controlling for extraneous effect of prior achievements of students in this study would have been useful as well, and this should be a factor taken under consideration for future research.

It was found that, having controlled for grade level and gender, parental affective factors (as indicated by mainly parental expectations and moderated by parental income), fully mediated student IQ in predicting mathematics, English and Chinese achievement for high-ability students. Similar results were found for average-ability students with variations in moderating variables and interactions between parental variables. Parents of low-ability students had a more direct role to play in their children's achievement. These findings show that parents play an important role in predicting student achievement for all ability students as suggested by the Vygotskyan paradigm of potential development. These results confirm parents' importance in supporting and developing children's potential in academic achievement (Morawska & Sanders, 2008), and highlights that the importance of parental role in enhancing student achievement should not be underestimated. Parents should be encouraged to communicate their highest academic expectations to their children, regardless of their ability. The generalizability of the current study to high-ability students in schools from other cultures needs to be further investigated.

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