A COMPARISON OF PERCEIVED PARENTAL INFLUENCE ON MATHEMATICS LEARNING AMONG STUDENTS IN CHINA AND AUSTRALIA

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This paper explores levels of perceived parental influence on mathematics learning among over 700 students in China and Australia. Students in China had stronger perceived parental influences than students in Australia, and while students in China, Chinese speaking students in Australia, and other language speaking students in Australia demonstrated similar levels of perceived parental influence, these three groups of students had higher levels of perceived parental influence than English speaking students in Australia. Possible reasons for the similarities and differences found are discussed.

INTRODUCTION

> My parents come from another country, so my mum makes me do harder work than at school (A Year 5 student's comment on mathematics learning) (Cao, 2004, p.236)

Parents play an important role in influencing students' mathematics learning. Parents from different cultural backgrounds may influence their students learning differently. This paper addressed the issue of parents' role in their children's mathematics learning by comparing parental influence on mathematics learning as perceived by different cultural groups of students in China and Australia.

PARENTAL INFLUENCE IN INTERNATIONAL CONTEXTS

Research on the differences in parental involvement of mathematics learning among different cultural groups has attracted the interest of many researchers. For example, Chen, Lee, and Stevenson (1996) compared students' achievements and their parents' involvement in China and the USA, and found that Chinese parents had higher expectations of their children's performance and spent more time helping their children with school homework than parents in the USA. Mau (1997) investigated differences in parental influence on the academic achievement of Asian immigrants, Asian Americans, and White Americans by using a large representative sample of 10th grade student data in the USA. The findings showed that both Asian immigrant and Asian American parents had higher educational expectations than did White American parents. White American students, however, reported more parental involvement in school activities, such as helping with homework and attending school events, than did Asian immigrant and Asian American students. A recent study conducted by Cai (2003) among over 500 sixth grade students in China and the USA suggested that a larger percentage of Chinese parents reported that they checked

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their children's homework more regularly than did US parents. In contrast, a larger percentage of US parents reported that they often provided their children with reference books and access to libraries. The parents in the two countries did not show significant differences in emotional support for their offspring (i.e., encouraging students to work hard on mathematics).

Even though a rich literature has been produced on parental influences on students' learning of mathematics, in most of the earlier work comparisons were limited to cultural groups within a country, or between people in only two countries. Our literature search did not reveal studies comparing parental influence for the same cultural group in different countries; this study bridges the two approaches and tries to fill the knowledge gap.

RESEARCH QUESTIONS

The purpose of this study was to compare perceived levels of parental influence among different cultural groups of students in China and Australia. The research questions were:

> What are the differences in the levels of perceived parental influence among students from China and students from Australia?
>
> What are the differences in the levels of perceived parental influence among students from different cultural groups?

THE PARTICIPANTS

The participants in this study included 346 primary and secondary school students in China, and 406 primary and secondary school students in Australia. They were distributed at three grade levels: 5, 7, and 9. The students in China were from three primary schools and three secondary schools in Kaifeng, a middle-sized city in Henan Province. The students in Australia were from six primary schools, and seven secondary schools in metropolitan Melbourne. All the participants in China were from Chinese-speaking home backgrounds. Of the students in Australia, 259 were from English-speaking families, 47 were from Chinese-speaking families, and 99 from homes in which other languages were spoken; there were over 30 other languages, with the main ones being Vietnamese, Greek, Italian, Indonesian, Tamil, Arabic, Hindi, and Russian.

THE INSTRUMENT

A Perceived Parental Influence (PPI) scale was developed. Based on the previous work in the parental influence area (Cai, 2003; Poffenberger & Norton,1959), the perceived parental influence measured in this instrument encompassed two aspects: direct involvement, including mother's and father's assistance with homework and difficult problems; and indirect involvement, mother's and father's attitudes towards mathematics, encouragement, and expectations of student learning.

The instrument consisted of 16 items, eight measuring mother's influence on mathematics learning as perceived by students, and eight measuring father's influence.

A four-point Likert scale response format was used. For each statement, the values of 4, 3, 2, and 1 were assigned to the responses: "Strongly Agree", "Agree"(A), "Disagree"(D), and "Strongly Disagree (SD)" respectively.

The Reliability of the Instrument

The reliability analysis of the 16 items of the Perceived Parental Influence (PPI) scale showed that the reliability coefficient (Cronbach Alpha) was 0.876.

Factor analysis was performed to assess the dimensions of the scale. The results are shown in the Appendix. It can be seen from the Appendix that there were four components with Eigenvalues bigger than 1, explaining 66.6% of the total variance. Even though there were items that loaded significantly (>0.3) on Components 2, 3, and 4, all of the items loaded significantly on Component 1. The factor analysis thus indicated that a common construct underpinned the set of items (Hair et al., 1995). Also, since all loadings were in the same direction (all positive), total scores for the scale could be obtained without the need to reverse-score any items.

RESULTS

In this section findings are presented concerning the levels of perceived parental influences on students' learning of mathematics between students from China and Australia, and for students from different cultural backgrounds.

Comparisons between China and Australia

Independent sample t-tests by country were conducted on the mean scores obtained on the *PPI* scale. The results are shown in Table 1. It can be seen from Table 1 that there were significant differences by country in the means on the *PPI* scale for students at each year level and for the whole sample, with students in China having a higher mean score in each case. Effect sizes were medium at grades 7 and 9, and large at grade 5 and overall. The results indicate that there are significant differences in the perceived levels of parental influence between students from the two countries. Overall, and at each grade level, students from China considered that their parents have a stronger influence on their mathematics learning than did the Australian students.

Table 1

Perceived Parental Influence scale: Results of independent samples t-tests for each year level by country

	CHINA			AUSTRALIA					
Grade	N	Mean	SD	N	Mean	SD	t	df	$\eta^{2\clubsuit}$
5	114	3.50	0.36	120	3.18	0.45	6.00***	226	0.13
7	120	3.23	0.45	137	2.94	0.45	5.11***	255	0.10
9	110	3.00	0.44	114	2.68	0.57	4.88***	222	0.09
All	344	3.25	0.45	371	2.94	0.53	8.33***	713	0.11

*** p<0.001

Comparisons by language group

Table 2 shows means and standard deviations for the *PPI* scale among students from the four language groups in China and Australia.

Table 2

Means and Standard Deviations on the Parental Influence scale by language group

Language group	N	Mean	SD
Chinese (CHN[1])	344	3.25	0.45
English (AUS)	235	2.83	0.52
Chinese (AUS)	47	3.11	0.44
Other (AUS)	88	3.13	0.52

[1] CHN = China, AUS = Australia

It can be seen from Table 2 that the students who have the highest mean on the PPI scale are the students from China [Chinese (CHN)], with a mean value of 3.25; next are the other language-speaking students [Other (AUS)] and the Chinese-speaking students in Australia [Chinese (AUS)], with means of 3.13 and 3.11 respectively. The students with the lowest mean on the PPI scale are the English-speaking students in Australia [English (AUS)], with a mean value of only 2.83.

The results suggest that a very strong level of perceived parental influence among the students from China, the Chinese-speaking and the other language-speaking students in Australia; and only slightly strong levels among the English-speaking students in Australia.

$\clubsuit$ Based on Cohen's standard (Cohen, 1988), the effect size is small if η^2 is 0.02, moderate if η^2 is 0.06, large if η^2 is 0.14.]. The effect size is an important index that should be examined to see if a significant test result is of practical significance when sample sizes are large. A small effect size in large samples, even though a significant test result appears, indicates that statistical significant difference is of little practical meaning.

One way ANOVA results (PPI x language group) indicated that there were significant differences in the mean scores on the PPI scale among the students from the four language groups [F (3, 710) = 34.95, p<0.001, η^2 = 0.127]. The results suggest that the differences in the levels of perceived parental influence on mathematics learning by language group are quite large.

Post-hoc Scheffe test results are shown in Table 3. The results suggest that the mean scores for students in China, Chinese-speaking students in Australia, and other language-speaking students in Australia are significantly higher than the mean score for English-speaking students in Australia. However, there were no significant differences in the mean scores among three groups of students: students in China, Chinese- speaking students in Australia, and other language-speaking students in Australia.

Table 3

Post hoc tests on mean differences in the Parental Influence scale among the four language groups

Language (I)	Language (J)	Mean Difference (I-J)
Chinese (CHN)	English (AUS)	0.42***
	Chinese (AUS)	0.13
	Other (AUS)	0.11
Chinese (AUS)	English (AUS)	0.28**
	Other (AUS)	-0.02
Other (AUS)	English (AUS)	0.30***

***p<0.001; **p<0.01

The results reveal that students in China, Chinese-speaking students in Australia, and other language-speaking students in Australia have stronger levels of perceived parental influence than English-speaking students in Australia; however, there were no differences in the levels of perceived parental influence among the same three groups of students.

CONCLUSIONS AND DISCUSSION

Two main conclusions emerged from the comparisons among the groups of students in China and Australia, and among the four language background groups.

First, levels of perceived parental influence were stronger among students in China than in Australia. Second, with respect to the levels of perceived parental influence among students from different language backgrounds, students in China had stronger levels of perceived parental influence than English-speaking students in Australia, but there were no significant differences between the students from China, Chinese-speaking and other language-speaking students in Australia. Chinese-speaking

students in Australia, and other language-speaking students in Australia demonstrated stronger levels of perceived parental influence than did English-speaking students in Australia.

The explanation for the between-country differences may be due to cultural factors. It has been suggested that education has always been considered the most important path to success in Chinese culture, and parents pay particular attention to their children's education (Hess et al., 1987; Chao, 1996). The consistent findings of this study with other studies indicate that this cultural practice is still strongly held in Chinese society.

As for the similarities and differences reflected among the different cultural groups, it seems to suggest that not only cultural factors, but also societal factors play an important role in shaping perceptions of parental influence. The similarities in the levels of perceived parental influence reflected among students in China and Chinese-speaking students in Australia may be attributed to the Chinese cultural emphasis on education. The similarities in the levels of perceived parental influence among Chinese and other language-speaking students in Australia, and the differences between non-English-speaking and English-speaking students in Australia may reflect an immigrant phenomenon. That is, among immigrant families in Australia for whom English is not their first language, parents recognise that education is vital for success in the new society, therefore they strongly encourage their children and have high expectations of them to fulfil their own dreams.

In conclusion, even though this study revealed that there were differences in the levels of perceived parental influences among different groups of students in China and Australia, and postulated explanations for the differences, more work is needed to identify the underlying causes. Other research techniques, such as interviews with parents and students may assist in this task. On the other hand, as parental influence has been identified as influencing mathematics learning outcomes such as attitudes and achievements, it is necessary for educators to disseminate this knowledge more widely so that more parents realise the important role they can play in their children's schooling, and provide greater support and inspiration for their children.

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Appendix

The component matrix and the Eigenvalues of the items for the Perceived Parental Influence scale

Item		Component			
		1	2	3	4
1.	My mother is good at maths	0.40	0.43	0.51	
2.	My mother checks my maths homework frequently	0.56	0.36	0.38	
3.	My mother asks me about my assessment results in maths	0.64			
4.	My mother helps me with some difficult maths problems	0.54	0.46	0.43	
5.	My mother makes me feel that I can do well in maths	0.65			-0.36
6.	My mother tells me that a person must do something carefully in order to do it well	0.65	-0.30		-0.33
7.	My mother tells me a person must work hard in order to do something well	0.63	-0.34		-0.35
8.	My mother expects me to be the best student in maths and other subjects in my class	0.48	-0.60		0.43
9.	My father is good at maths	0.47	0.41	-0.38	
10.	My father checks my maths homework frequently	0.64		-0.31	0.35
11.	My father asks me the assessment results in maths	0.69			
12.	My father helps me with some difficult maths problems	0.61	0.35	-0.46	
13.	My father makes me feel that I can do well in maths	0.72		-0.30	
14.	My father tells me that a person must work hard in order to do something well	0.72			
15.	My father tells me that a person must do something carefully in order to do it well	0.73			
16.	My father expects me to be the best student in maths and other subjects in my class	0.45	-0.63		0.48
Eigenvalue		5.90	2.01	1.55	1.19
% Variance explained		36.86	12.65	9.68	7.45

*Extraction Method: Principal Component Analysis; Loadings less than 0.3 omitted.