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# Family Effects on Student Achievement in Hong Kong

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We examine the effects of family structures and processes on student achievement in Hong Kong. Specifically, we show that the negative effects of single parenthood in past studies are not universal. In Hong Kong, 4,405 15-year-old students completed a questionnaire, and tests in reading, mathematics and science. We analysed the data using multilevel models of Rasch test scores and Warm estimated indices of questionnaire items. In all subjects, the scores of children living with single parents did not differ significantly from those of children living with two parents. Moreover, students living with no parents had lower reading and science scores than other students, and this effect was mediated by lower family investment and involvement.

## Introduction

Children living with two parents generally outperform children with single parents or stepparents. Children with two parents show higher academic achievement (Cherlin, Furstenberg, Chase-Lansdale *et al.*, 1991), higher teacher evaluations (Bosman & Louwes, 1988), lower dropout rates (Kiernan, 1992), and higher college enrolment rates (Beller & Chung, 1992) than do other children. Explanations for these effects include two-parent families (a) investing more in educational resources; and (b) showing more family involvement (Downey, 1994).

Despite the importance and consistency of these findings in the U.S. and a few western nations, comparable research in non-western countries is rare (Pong, Dronkers, & Hampden-Thomson, 2003). In this study, we aim to narrow this knowledge gap by examining family structure and student achievement in Hong Kong. Unlike the U.S. and other western nations, children in Hong Kong enjoy a collective culture and typically live near a large extended family. Thus, extended family members are expected to offer substantial support in times of need. Furthermore, the most disadvantaged forms of

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single-parenthood—never-married single mothers or teenage childbirths—are rare in Hong Kong. Hong Kong schools also enjoy equal funding from the Government. These factors, taken together, suggest that economic deprivation of children with single parents at school and at home may not be as serious as it is in other countries, and hence might have a weaker effect on student achievement.

This study extends research on the family structure's effects on student achievement in two ways. First, we tested whether these effects are weaker in Hong Kong's families and schools. Several types of non-traditional family structures were examined: children with single mothers or single fathers, those in "blended" families (parent and stepparent), and those not living with any parent. We hypothesised that these children would show lower performance than children from two-parent families. Second, we tested these hypotheses by analysing 4,405 Hong Kong 15-year-olds' mathematics, reading and science scores, and questionnaire responses using advanced statistical methods.

#### *Family Effects on Student Achievement*

Aside from families with two parents, children may live with stepparents, single mothers, single fathers or without parents. In past studies, stepchildren and children of single parents showed similar academic behaviours. They typically attained less schooling than children from two-parent nuclear families (Beller & Chung, 1992). Furthermore, children who lived in a single-parent household for more years performed worse (Krein & Beller, 1988). These three groups of children all outperformed children living with single fathers, who showed worse behavioural and academic problems (Downey, 1994).

Families with two parents typically have higher socio-economic status (SES), invest more in educational resources, spend more time with their children and have larger social networks for their children to tap on than families with single or absent parents. Hence, students living without parents (on their own, with friends or other non-parents) might perform worse than all other students. Children with separated parents may also suffer from less caring stepparents or from conflicts between their separated parents (Amato, 2001). Hence, they may not perform as well academically as students living with their natural birth parents.

Families with two parents typically have more income than other types of families, so they might invest more in educational resources, such as books, calculators, and so forth (Downey, 1994). By doing so, these families give their children more learning opportunities, and hence raise their likelihood of higher academic achievement. Given a fixed income level, buying proportionately more resources that are educational also highlights stronger parental commitment to their children's learning, implicitly suggesting further social rewards and incentives for higher achievement.

Family structure and SES can also affect student achievement through family involvement. Compared to other types of families, two-parent families have more available parent-time than do families with one parent or no parents (Milne, Myers,

Rosenthal, & Ginsburg, 1986). Also, stepchildren may suffer from less caring stepparents, especially during family conflicts (Amato, 2001).

Unlike parents in low SES families, who work multiple jobs to pay for basic necessities, parents in higher SES families can spend more time with their children (Horowitz, 1995). Compared to less educated parents, highly educated parents tend to spend more time with their children (Leibowitz, 1974), more actively monitor and supervise them (Lareau, 1989), and have more information and skills to teach their children (Swick, 1987). More educated parents also generally show better parenting practices, such as aligning social reward structures with academic success (Battin-Pearson, Abbott, Hill, et al., 2000).

Greater family involvement can strengthen children's access to the family's social capital, increase family influence, and enhance children's development in several areas. Parents who spend more time with their children enhance their communication, trust and solidarity, and hence raise the children's access to their parents' social capital (Coleman, 1994). Parents can also help children develop cognitive, social and cultural skills through modelling and through interacting with them (Horowitz, 1995).

Children with two parents also tend to have wider parental social networks than those with fewer parents. Thus, families with two parents tend to have more potential sources of information, more sources of help, and more partners for collective action—in short, more *social capital* for their children than those with single or absent parents (Coleman, 1994). Furthermore, high SES families tend to have social networks comprising highly skilled or educated people (Horvat, Weininger, & Lareau, 2003) who can provide more social and cultural resources for parenting.

#### *Schoolmates' Family Structures, Involvement and Social Networks*

Past research has found that schoolmates' family structures affect a child's academic achievement. When proportionately more schoolmates do not live with two parents, students show lower academic performance (Pong, 1998). Thus, the compositional effect of family structure affects the school environment of *all* schoolmates, not merely *individual* children who directly experience family disruption.

Specifically, Pong showed that students performed worse in reading and mathematics when proportionately more of their schoolmates had single parents or stepfamilies. The SES of schoolmates' parents, school mean parental participation, and number of parental acquaintances all mediated this effect.

### **The Hong Kong Context**

#### *Family Structure in Hong Kong*

Like Singapore and many Asian countries, the numbers of divorces and single parents are rising in Hong Kong (Quah, 2003). Still these numbers are far short of those in the U.S., Canada and other western European countries. Only 9% of Hong Kong

children do not live with two parents (Census and Statistics Department, 2003). Thus, Hong Kong children are less likely to have schoolmates with single parents and are less likely to suffer the double disadvantage of fewer resources both in their own family and in their schoolmates' families.

Hong Kong has few parents who have never been married. Never-married parents are more likely to be poor (79%) or to drop out of high school (34%) compared to other single parents (45% and 15%, respectively, U.S. Bureau of the Census, 1997). Like many East Asian countries, out-of-wedlock births are socially unacceptable and rare in Hong Kong (CSD, 2003; Quah, 2003). Instead, single parenthood typically stems from death of a spouse, a parent living apart on the mainland or, more recently, divorce or separation among younger parents (CSD, 2003). Unlike children of never-married parents, children of widowed or divorced parents enjoyed material possessions, parental involvement and extended family involvement when their parents were married.

Furthermore, Hong Kong's collective culture and small geographical size increases the importance of extended family members. The Chinese culture emphasises collective concerns, especially those of family members, so extended family members are expected to help one another in times of need. They often live nearby and, hence, can readily provide valuable support for single parents.

Like many Asian countries, Hong Kong has fewer single parents, fewer never-married parents, and a larger social network of relatives living nearby (Quah, 2003). These factors suggest that single parenthood might have a smaller negative effect on children in Hong Kong than in western countries.

### *Schooling in Hong Kong*

Hong Kong's school system is mostly free and compulsory, like many other industrialised countries. Unlike decentralised systems such as that of the U.S., however, each Hong Kong school receives exactly the same amount of funding per student—US\$2,180 per primary student and US\$3,252 per secondary student—except for a few international schools that do not receive Government funding (Hong Kong Government, 1997). The equal school funding eliminates the multiplier effect of poorer children going to poorer schools, a phenomenon often seen in the U.S. (Betts, Reuben, & Danenberg, 2000). Ability grouping in Hong Kong occurs at the school level, and student enrolment at particular schools depends on past achievement tests (Biggs, 1996). University places increased steadily from 2% in 1980 to 8% in 1990, and to 18% in 2000.

Schooling tightly predicts income in Hong Kong (McLelland, 1991). Students with the highest university entrance examination scores (regardless of gender) enter elite universities and receive the best job opportunities upon graduation. For example, a high school teacher earns a manual worker's lifetime wages in 15 years while a professor earns it within five years. These economic incentives support Hong Kong parents' high valuation of education (Hau & Salili, 1991).

Hong Kong parents have high academic expectations for their children (Hau & Salili, 1991). Viewing effort as more important than innate ability for success, Hong

Kong parents invest much of their savings in their children's education, including tuition classes after school. At home, many parents actively monitor their children's schoolwork and encourage their children to study hard (Hau & Salili, 1991).

Hong Kong students' collective beliefs reflect these influences. In particular, Hong Kong students want to do well to please both their family and themselves as they believe that their success or failure affects those close to them. They have high standards and believe in studying hard (Hau & Salili, 1991). In this cultural environment, with generally high expectations for educational success, the absence of a parent might affect students' expectations less than it would in other societies.

In this study, we examine the following research questions:

1. How do family structures affect a student's achievement scores?
2. Do family structure effects operate through family investment and involvement?
3. How do schoolmates' family structures affect a student's achievement scores?

Given our review of Hong Kong's cultural environment and school system, we expect family structure to affect student achievement less in Hong Kong than in the U.S.

## Data and Methods

In January 2002, 4,405 15-year-old students from 140 secondary schools in Hong Kong participated in the OECD Program for International Student Assessment (PISA, see OECD, n.d.). International experts from participating OECD countries defined reading, mathematics and science (RMS) literacies, built frameworks for assessing them, created test items and translated them, and piloted them to ensure validity and reliability (for details including reliability and validity checks, see OECD, 2002). PISA defines RMS literacies as the ability to understand, use and reflect on written texts, mathematical concepts, and scientific ideas to achieve one's goals, to develop one's knowledge and potential, and to participate effectively in society. (See example assessment items at the OECD PISA web site: [www.pisa.oecd.org](http://www.pisa.oecd.org).)

Each participating student responded to a 2-hour assessment booklet and a 30–40 minute questionnaire. About half of the booklets did not have mathematics or science test items, so only 2,438 students responded to mathematics test items and 2,437 students responded to science test items.

To answer the above research questions, we must address the following difficulties: (a) test design; (b) representative sampling; (c) questionnaire measurement error; (d) missing data; and (e) clustered data. We address these concerns using (a) balanced incomplete block (BIB) tests and a graded Rasch model; (b) weights adjusted for schools and students; (c) Warm (1989) estimated indices; (d) Markov Chain Monte Carlo imputation; and (e) multilevel analyses.

In OECD–PISA's BIB test, each student only answered a subset of questions from the overall test (*subtest*) to maximise coverage of RMS content while reducing student fatigue and learning effects during the test (Lord, 1980). As each pair of subtests shared overlapping questions, a Rasch model was used to estimate the difficulty of

each item and the achievement score of each student based on the subtest responses (adjusting for the difficulty of each test item and calibrating all test items, Lord, 1980). The student RMS scores estimated by the Rasch models were calibrated to an OECD mean of 500 and a standard deviation of 100 (OECD, 2002). Hence, a score greater than 500 is higher than the OECD mean.

OECD first sampled schools within Hong Kong and then sampled students from the selected schools to represent the number of 15-year-olds in Hong Kong more accurately (stratified sampling to represent a broad spectrum of schools with respect to school types and student academic intake). OECD then weighted the participant test scores and variables accordingly to represent the schools and the 15-year-old student populations. (For sampling details, see OECD, 2002.)

A single question with a limited number of possible responses (for example, *yes* and *no*, or a simple Likert scale) likely measures the underlying construct coarsely, resulting in substantial measurement error. To minimise this measurement error, OECD included multiple measures for each theoretical construct and computed a single value from these measures with a Rasch model (Warm estimates).

Because students did not answer all questions, there were missing data (1%) that could reduce estimation efficiency, complicate data analyses, and bias results (Rubin, 1996). Using Markov Chain Monte Carlo multiple imputation, we addressed these problems more effectively than with other approaches (such as deletion, mean substitution and simple imputation, Rubin, 1996).

Traditional ordinary least squares regressions tend to underestimate standard errors in clustered data (students within schools within countries). To address this issue, we modelled student-, school- and country-level effects with multilevel analyses (Goldstein, 1995).

### *Variables*

Included in the analysis were family structure variables, SES, family process variables, gender, as well as school means of family structure, SES and school academic intake.

Against a baseline family of two parents, family structure binary variables included single mother, single father, one parent and at least one stepparent (blended families), and no parents. Students who lived with no parents lived alone, with friends, or with other non-parents. Number of siblings was also included.

We created an SES congeneric factor from mothers' years of schooling, fathers' years of schooling, and highest job status of parents using a factor analysis on the LISREL software (Joreskog & Sorbom, 2002) to minimise measurement error. OECD (2000) used the Ganzeboom, De Graaf, and Treiman (1992) index to measure the highest job status among a student's parents (ranging from 16–90).

Family process variables included both investment and involvement variables. The indices were constructed from Warm estimates of student responses to several questionnaire items (see OECD, 2002, for details). Family investment indices were derived from student reports on the availability of the following items in their home. For home educational resources, the items were: a quiet place to study, a desk for

study, textbooks, calculators, and a dictionary. For cultural possessions, the items were: books of poetry, classical literature, and works of art. All OECD indices were centred to a mean of 0 and standard deviation of 1, based on data from all participating OECD countries (OECD, 2002).

Family involvement indices were derived from students' reports on how often their parents (or guardians) engaged with them in the specific activities. For social communication, the activities were: discussing how well they were doing at school, eating the main meal with them around a table, and spending time simply talking with them. For cultural communication, the activities were: discussing political or social issues, discussing books, films or television programmes, and listening to music. For family homework support, the students reported how often the mother, father, brothers or sisters worked with them on homework.

We also included gender and school variables. School means of the family structure and SES variables enabled us to test for schoolmate effects on student scores. We also controlled for school academic intake, whose school bands ranged from 1 (*low*) to 3 (*high*)—39.2% attended the lowest banding schools, 34.4% middle banding, and 26.4% high banding.

### *Analysis*

We modelled the RMS literacy scores as follows. We ran multilevel regressions in sequential sets (also known as hierarchical sets) to estimate the variance explained by each set of predictors and to facilitate testing of mediation variables (Cohen & Cohen, 1983). The predictor variables were entered in sets in order of importance and likely temporal occurrence: family structure variables, gender, SES, family investment, family involvement, student variables, and school means of the above variables.

We checked whether each added set of variables was significant with a nested hypothesis chi-square log likelihood test (Cohen & Cohen, 1983). To aid interpretation of the effects of continuous variables, we reported the effect on students' RMS literacy of a 10% increase in each continuous predictor above its mean (10% effect =  $b * SD * [10\% / 34\%]$ ; 1 SD  $\approx$  34%). We also tested for mediation effects using a multilevel version of the Sobel test (Krull & MacKinnon, 2001). If the mediation was significant, we also reported the percentage change in the effect, computed as  $1 - (b'/b)$ . The regression coefficient of the predictor without the mediator in the model is indicated by  $b$ , and  $b'$  is the regression coefficient when the mediator is in the model.

Doing many tests on one set of data could raise the likelihood of a spurious correlation. To address this concern, we used Hochberg's (1988) variation on Holm's (1979) method. We used a significance level of .05 for all statistical tests.<sup>1</sup>

## **Results and Discussion**

### *Descriptive Statistics*

Hong Kong students performed well in all subjects, ranking sixth, first and third for RMS respectively among the 42 countries that participated in the first cycle of PISA

(OECD, 2003). Hong Kong students' mean RMS scores were 525, 560 and 541 with standard errors of 2.9, 3.3 and 3.0 respectively. The standard deviations (84, 92 and 85 for RMS respectively) were much smaller than that of the other OECD countries (100). These results indicate that Hong Kong students tend to receive relatively equal schooling in each of the subjects, compared to students in other OECD countries, and might reflect Hong Kong's policy of equal funding per student.

As basic education was expanded only in the 1980s, many parents did not complete high school (most parents had less than nine years of schooling). Also, the Hong Kong mean for the highest job status in a family (41.7) is about half a standard deviation lower than the OECD mean (48.9, OECD SD = 16; OECD, 2002). Hence, the mean SES in Hong Kong is nearly three-quarters of a standard deviation lower than that of OECD countries (-0.72). In contrast, their cultural communication and cultural activities are about a fifth of a standard deviation higher (+0.22, +0.18) than the OECD mean. (For detailed descriptive statistics, see OECD, 2002.)

Most Hong Kong 15-year-old students lived with two parents (90%). About 5.7% lived with single mothers, about 1% lived with single fathers, about 1% lived in blended families, and 2.5% lived with no parents. Families with single parents or stepparents in Hong Kong differed significantly from those in other countries. Single parents in Hong Kong tended to have higher SES (+0.128 OECD standard deviations) than that of two-parent families. Still, children of single parents had significantly fewer educational resources at home (-0.329). Single parents also tended to provide less social communication (-0.136) and less homework supervision (-0.164) compared to children in two-parent families. Children living with blended parents did not differ much from other children living with two parents except that they tended to receive less homework supervision (-0.552) and enrolled in lower banding schools (-0.384).

Meanwhile, children living with no parents fared worst of all. These children lived in families with fewer home educational resources (-0.483) and less social and cultural communication (-0.540 and -0.052). Furthermore, they tended to receive less homework supervision (-0.474), enrolled in lower banding schools (-0.371), and had more schoolmates with lower SES parents (-0.142).

### *Explanatory Model*

Table 1 shows some of the effects of family structures and processes on RMS scores. (Due to space limitations, only partial models of reading are shown.) We first estimated a null model, which determined the proportions of variance within and between schools. About half of the differences in student achievement were within schools (52%, 45% and 45% for RMS respectively) and about half were between schools (48%, 55% and 55% for RMS). All results discussed below describe first entry into the regression, controlling for the effects of all previously included variables.

The results in Model 1 showed that family structure and gender affected students' RMS scores. The RMS scores of students living with two parents, with one parent or

Table 1. Summaries of six regression models predicting Hong Kong students' reading literacy, and the final models predicting mathematics and scientific literacy (with standard errors)

Predictor	Six multilevel regressions predicting reading literacy							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Maths Model 7	Science Model 8
<i>Family structure</i> (baseline = two-parent family)								
Single parent	3.23 (3.73)	2.54 (3.76)	5.16 (3.80)	5.29 (3.80)	5.38 (3.72)	3.23 (3.73)	-0.33 (4.11)	0.84 (4.16)
Blended family	-1.58 (10.19)	-3.34 (10.29)	-4.76 (10.36)	-4.11 (10.36)	-3.87 (10.14)	-1.58 (10.19)	-2.11 (9.49)	-1.05 (2.87)
No parent	-12.12* (6.05)	-12.39* (6.10)	-8.06 (6.16)	-7.02 (6.17)	-7.01 (6.04)	-12.12 (6.05)	-8.32 (7.33)	-9.44 (5.24)
Girl	9.03*** (2.06)	9.12*** (2.08)	6.93** (2.10)	6.87** (2.10)	6.65** (2.05)	9.03*** (2.06)	-23.04*** (1.53)	-12.16*** (1.54)
SES		4.87*** (1.04)	2.47 (1.08)	2.47 (1.08)	1.80 (1.06)	1.82 (1.06)	2.10 (1.47)	4.10*** (1.19)
<i>Family involvement</i>								
Home educational resources			7.31*** (1.02)	7.29*** (1.02)	7.23*** (1.00)	7.18*** (1.00)	8.54*** (0.79)	7.34*** (0.92)
Social communication			5.54*** (1.19)	5.52*** (1.19)	5.50*** (1.16)	5.50*** (1.16)	1.88 (1.25)	8.53*** (1.72)
Cultural communication			4.35*** (1.16)	4.39*** (1.16)	4.37*** (1.13)	4.29*** (1.13)	6.12*** (0.82)	1.18 (0.79)
Family help with homework			-5.42*** (1.00)	-5.42*** (1.00)	-5.42*** (0.98)	-5.36*** (0.98)	-4.32** (1.52)	-5.83*** (1.25)
<i>School level factors</i>								
% of single parents			-0.81 (0.93)	-0.81 (0.93)	-0.80 (0.78)	0.04 (0.52)	-1.02 (0.67)	-0.75 (0.96)
% of blended families			-5.66 (2.93)	-5.66 (2.93)	-4.98 (2.81)	0.41 (1.46)	-5.04 (2.75)	-5.03 (2.93)

Predictor	Six multilevel regressions predicting reading literacy							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
% living with no parents				-5.12*** (1.25)	-3.57** (1.06)	-1.01 (0.73)	-1.69 (0.92)	1.44 (0.83)
School mean SES					57.49*** (8.01)	16.84** (6.20)	32.20*** (7.53)	36.20*** (8.73)
School academic intake						50.53*** (3.86)	57.40*** (4.22)	52.10*** (2.98)
<i>Explained variance at each level</i>								
School	0.01	0.06	0.16	0.28	0.49	0.80	0.81	0.82
Student	0.01	0.01	0.04	0.04	0.04	0.04	0.05	0.04
Total	0.01	0.03	0.10	0.16	0.26	0.41	0.39	0.39

Note. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

in blended families did not differ significantly. Meanwhile, students living with no parents had significantly lower reading and science scores, consistent with the above mean statistics. Students living with no parents scored about 12 and 17 points lower in reading and science than those in other families. Girls averaged nine points more than boys in reading. However, boys averaged 23 and 14 points more than girls in mathematics and science respectively. Together, family structure and gender accounted for 1% of the differences in student RMS scores.

The results in Model 2 showed that parents' SES affected students' reading scores. Students scored 1.4, 1.4 and 2.4 points higher in RMS for each extra 10% increase in students' parents SES (for example, for reading,  $1.4 = 4.87 * 1.014 * 10\%/34\%$ ; computed from effect of 10% increase =  $b * SD * [10\%/34\%]$ ). Parent's SES only accounted for an extra 2%, 2%, and 4% of the differences in student RMS scores.

The results in Model 3 showed that some types of family investment and involvement affected students' reading scores. Students averaged 2.5, 2.6 and 2.1 points higher in RMS per extra 10% of educational resources at home. This result suggests that family's investment in extra educational resources gave students more learning opportunities on which to capitalise. Students who talked with their parents socially or discussed cultural issues more often scored a bit higher. Students averaged 1.6 and 2.5 points higher in reading and science per extra 10% of social communication; and averaged 1.3 and 1.8 points higher in reading and mathematics per extra 10% of cultural communication with their parents. These results support Ho and Willms' (1996) findings that more communication at home improved student achievement. In contrast, students scored 1.6, 1.3 and 1.7 points lower in RMS when they got 10% more family help on their homework, possibly because lower achievement students asked for and got more family help or because Hong Kong parents with little schooling gave counter-productive help. This result is consistent with studies which showed that homework supervision improved student learning at the primary level but not at the secondary level (Ho & Willms, 1996).

The results in Model 3 showed that family structure effects occurred primarily through family investment and involvement. Controlling for home educational resources, the effect of family structure on students' scores was no longer significant (mediation test:  $z = -2.931, p = .003$ ;  $z = -2.740, p = .006$ ; for reading and science). These results imply that the reading and science literacy of students living without parents was lower because they had fewer educational resources at home. Likewise, students living with lower SES parents had lower scores because their parents invested less in educational resources at home and talked with them less often compared to other students' parents. The effect of SES on reading plummeted by 32% when controlling for home educational resources ( $z = 7.075, p < .001$ ; see computation formula for mediation percentage in the first paragraph of the above analysis section). Controlling for social communication as well rendered the parents' SES effect on reading insignificant ( $z = 5.236, p < .001$ ). The effect of SES on mathematics was also no longer significant when controlling for home educational resources ( $z = 4.463, p < .001$ ). Together, these family structure and process

variables accounted for about 10%, 8% and 11% of the differences in student RMS scores.

Schoolmates affected a student's RMS score through their family structure, SES and past achievement. Students scored 51, 32 and 27 points lower in RMS per extra 10% increase in schoolmates living with no parents (Model 4 shows the effects of a 1% change). Schoolmates' family structures accounted for another 6%, 4% and 2% of the differences among student RMS scores.

Controlling for schoolmates' family structure, schoolmates' family SES also affected a student's RMS score (Model 5). Students scored 17, 19 and 16 points higher in RMS per extra 10% increase in schoolmates' parents SES. Schoolmates' family SES accounted for an extra 10%, 11% and 9% of the differences in student RMS scores. When controlling for schoolmates' parent SES, the effect of schoolmates' family structure on students' reading scores fell by 30% ( $z = -2.606, p = .009$ ), suggesting that the former mediated the latter.

School intake also affected RMS scores (Model 6). Students in higher banding schools scored an average of 51, 57 and 52 points higher per band and accounted for an extra 15%, 16% and 17% of the differences in student RMS scores.

All other predictors showed no significant effects. Altogether, these variables accounted for 41%, 39% and 39% of the variance in student RMS scores (4%, 5% and 4% of the student level variance and 80%, 81% and 82% of the school level variance).

## Conclusion

This study showed two major findings. Family structure effects are not universal, and family investment and involvement mediated the effects of living with no parents and of family SES in Hong Kong. Children living with a single parent or in a blended family did not score significantly lower than children with two parents in Hong Kong. Compared to family structure effects on student achievement in the U.S. and western Europe, those in Hong Kong are very weak (see Pong et al., 2003).

Possible factors that might help explain these weak effects include SES of single parents, Hong Kong's equal school funding policy, and support from the extended family. Unlike single parents in most studies, single parents in Hong Kong had more schooling than those in two-parent families. Still, they had fewer home educational resources and less social communication with their children.

Equal funding of students in Hong Kong schools might be another contributing factor. The high test scores and relatively low standard deviations support the effectiveness of this equal pupil funding policy. To the extent that schools provide students with needed instruction and resources, schools might mitigate the effects of differences in family resources (Coleman, Campbell, Hobson, et al., 1966).

A third possibility is the collective culture and nearby extended family network in Hong Kong. In a collective culture, nearby family members are expected to help out in times of need. As Hong Kong is geographically small and has an advanced transport system, most family members can visit each other relatively quickly. The paucity of single parents without extended family members in Hong Kong is a methodological challenge to the testing of this hypothesis in Hong Kong.

Family investment and involvement mediated the negative effects of living with no parents and of SES on students' reading achievement. Students living with no parents tended to have fewer home educational resources and less social and cultural communication, which in turn correlated with their lower reading scores. Controlling for the effects of family investment (including SES and home educational resources), living with no parents had no significant separate effect on student achievement.

Likewise, students whose parents had lower SES also had fewer home educational resources and less social and cultural communication. These latter variables mediated the effect of family SES on student achievement. Controlling for these mediating variables, family SES also had no significant additional effect on student achievement.

Admittedly, the present findings are limited because they are correlational. Also, the findings are limited to the sample of 15-year-olds in Hong Kong, and results might differ substantially for other age groups.

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### Notes

1. Space restrictions required omission of several ancillary tables. All results are available from the authors upon request.

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