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Research Article

The Cognitive Skills and Achievement Gap among Children from Different Ethnic and Cross-National Marriage Families in Taiwan

Chunn Ying Lin

Department of Early Childhood Education, National Dong Hwa University

*Corresponding author: Chunn Ying Lin, Department of Early Childhood Education, National Dong Hwa University, Shoufeng, Hualien, Taiwan, Republic of China. Tel: +88638634900, Fax: +88638634890; E-mail: aying@mail.ndhu.edu.tw

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Abstract

Numerous studies have found a learning gap between minority students and non-minority students, and such gap is associated with lower socioeconomic status and insufficient educational resources. Recently, however, Taiwan has a considerable number of children of cross-national married families in all levels of schools. These children are likely to fall behind their peers in learning; however, researchers have limited understanding of how the family composition of different ethnic or cross-national marriages may affect children's cognitive skills at the preschool stage and later academic achievements. This study investigated the above issue using a sample consisting of 627 5th grade elementary school students and their parents in Taiwan. Results showed that children of families where both parents are aboriginal, or one is aboriginal and the other is non-minority, are given relatively fewer learning resources at the preschool stage. Their cognitive skills and learning achievements are significantly poorer. The aboriginal family children perform particularly poorer in learning achievement. Compared to non-minority children, children of cross-national marriages families lag behind in cognitive skills, which is mainly due to a lack of learning resources at the preschool stage, but are able to narrow the academic achievement gap when they get to the 5th grade.

Keywords: Academic Achievement; Cognitive Skills; Cross-National Marriages; Ethnicity; Learning Gap

Background

Several researchers have demonstrated that students' learning performance and academic achievement is positively related to future educational and occupational success [1,2], and is usually negatively related to substance abuse, delinquency, emotional adaptation and behavioral problems [3,4]. Therefore, promoting the positive development of learning among students is always a significant educational issue, and has inspired the attention of many researchers and policy makers [1,5].

Over the last few decades, researchers have become increasingly concerned about the early development and learning gap between disadvantage and non-disadvantage students, and this issue has become priority of national education [6]. This is a fact for children growing up in low-income or minority families who experienced high extents of learning failure and backward progress [2,3,7-10]. How to lessen racial learning gaps is now a most main purpose of educational policy and management. For instance, the aim of No Child Left Behind Act (NCLB) in the U.S. is to narrow the learning gap between high- and low-performing children, raising achievements among racial and ethnic minorities [6].

In the U.S., the considerable gap in learning performance and academic achievement between Black, White, or other immigrants' children is the most imperious problems facing American society. For example, Black children account for about one half of the standard deviation behind their White compeers on standardized reading and mathematics exams, and racial academic achievement gap are increased by about one tenth of a standard deviation during each school year [11]. The phenomenon of learning outcomes (such as cognitive skills, academic achievement, etc.) of ethnical or racial gaps have also been supported by several empirical studies [12-14]. Although the existence of this Black-White and other immigrant children's learning gap is unquestionable, its origins remain the focus of considerable debate among researchers and educators, as well as educational or social welfare policy makers [7].

A lot of research works were helpful to understand the depth of the influential paths of the learning performances of ethnical

and racial gaps. First, several researchers have found that gaps in learning performance between ethnic or racial groups are probably associated with the family learning resources and educational environment. These studies have discovered that children from families with high socioeconomic status will have better learning achievement than families of low socioeconomic status and minority groups [4,7,15]. In addition, family education resources (such as parents' education involvement at home, number of books, amount of leaning equipment, participation in after school or long vacation learning activities, etc.), parenting style, and family relationship have significant effect on the learning achievement gap of children from different ethnical and racial [5,13,16-18]. In the whole, the proportion of minority students from low socioeconomic status family is higher than their non-minority count parts in many countries. Consequently, these children might face more challenges and weakness in learning process and outcomes associated with low family socioeconomic status.

Furthermore, the learning achievements of ethnical or racial gaps might already be obvious at the preschool stage and result in the dissimilarity of early learning resources or education experience. Some studies have indicated that early education experience at the preschool stage has significant influence on a young child's cognitive skills, and social and behavioral dimensions, as well as later academic achievement. If children have good learning experiences and plentiful educational resources during the preschool stage, it will positively affect their cognitive skill, school outcomes, and development in future [8,19]. Moreover, Lin and Chen [1] also found that adolescents with better learning performance in early childhood had greater growth in later academic achievements. In addition, when preschool children had a good family learning environment, it benefited their cognitive skill development during the preschool stage, improved their reading interest, and self-education expectations. This consequence might further improve children's learning achievements, and these advantaged children had considerably higher learning growth levels than children without such advantages. Additionally, Bali and Alvarez [20] also documented that the Black-White achievement gap begins before the first grade, and the gap continues to grow as students' progress through the school system. Lee and Burkham [21] also illustrated that starting early in elementary school, ethnic minority children experience a significant gap in their academic achievement relative to their White compeers in the U.S.

Similar to Western research results, Taiwan's studies also found that minority children, such as aboriginal groups higher proportion from low-income families, lacked family educational resources or have fewer opportunities to participate extra-curriculum activities after school or in long vacation period at the elementary or secondary education stage. This result would mean aboriginal children have notably lower learning performances and achievements than their non-aboriginal counterparts [5]. However, little researches has be done on "whether early educational environment and experience have remarkable effects on children's later learning ethnical gap" until recently.

In addition, due to rapid changes in the structure of the mating market over the last 20 years, numerous foreign females from Mainland China and Southeast Asian nations (i.e. Indonesia, Vietnam, Philippines, Cambodia, etc.) have immigrated into Taiwan via cross-national marriage. These immigrants are officially called "the new inhabitants" in Taiwan. Through agents, many males in Taiwan enter into cross-national marriages with foreign females from remote districts or low-income families. These Taiwanese males usually have low socioeconomic status or come from social minority communities. Additionally, cross-national married couples might encounter difficulties because power is not reciprocal with each other, or they have great differences in cultures, values, educational attitudes, and parenting styles. Consequently, children from cross-national marriage families usually face many challenges and difficulties, including language barriers, potential discrimination, changes in family and friend's relationships, and negotiating identity across two different culture [22-24]. All may have disadvantages in their children's learning performance and academic achievement in the future, which is similar with the aboriginal students' situation of learning dilemma in Taiwan. However, for some foreign mothers who have better English competency and educational background, it is understandable that they might be able to more involve in their children's education and thus shrink the learning disadvantages after they adapt to the local life, culture and language.

Today, such new inhabitant children account for a considerable portion of students in all levels of schools in Taiwan, making it necessary for academic bodies, which are primarily concerned with differences in students' learning performances between aboriginals and non-aboriginal groups, to adjust their focuses to include the new inhabitants of cross-national marriage families. Although exploration of the learning difficulties of the ethnical and cross-national marriage gap is valuable, little details are known regarding the influential mechanism or the mediating effect of early educational experience on the learning gaps between different ethnic groups and cross-national marriage families. Furthermore, given a lack of relevant research results for verification and dissimilar cultural contexts, the discoveries and explanations of learning performance of the ethnical gap in the West may not be entirely applicable in Taiwanese society, and thus, it is necessary for this study to engage in further analysis and investigation.

Hypotheses

Based on the above considerations, the aims of the current study were to examine the relationships of early educational experience and learning gaps (including cognitive skills at the preschool stage and academic achievement at the 5th grade) between

ethnical and cross-national marriage groups in Taiwan. According to relative studies [5,7,13,18,25,26] the assumption proposed in this study is that "aboriginal and inhabitant children have poorer educational resources and environments at the preschool stage due to poor family economic status, leaving them with poor cognitive skills when they enter elementary school. Furthermore, aboriginal and inhabitant children perform significantly poorer in academic achievements than other non-aboriginal and non-inhabitant children in the 5th grade of elementary education". New inhabitant children, much like aboriginal children, may have no advantages of family and learning environment when they study in kindergarten, which is also disadvantageous to children's cognitive skills and learning achievements in the future. However, such hypothesis requires the confirmation of further analysis.

In order to improve the learning disadvantages of minority or new inhabitant students, promote educational opportunities with equal footing, and carry out social justice, additional support becomes the essential directions of many national education policies. This study is based on an innovative, continuous, and integrative approach. Results can contribute to the researcher's examination of the adequacy of Taiwan's education and welfare policies for the disadvantaged.

Method

Participants

The analysis sample for this study includes children come from Taiwan between age of 10 and 11 who had valid questionnaire data and their semester achievement assessment at the time of the survey in 2013. In total, there were 627 pieces of valid student and parent data. Among the subjects, 45.4% were boys and 54.6% were girls. The family finance conditions at the preschool stage of child were given 1-4 points according to the level of wealth, and the mean was 2.66 (SD=0.50), which indicated that most family finances were not bad.

Measures

(Table 1) shows the design and scoring methods for each variable in this study. All variables used in this study are grounded into two types:

- Student individual characteristics, such as ethnicity, gender, and academic achievement.
- Family background and characteristics, including family financial conditions, and preschool family educational resources.

Among them, some variables were listed as having missing data because the answers were unsuitable, unclear, or the meaning of the subject could not be discerned. However, since there were many variables in current analysis, either list wise or pair wise deletion would cause massive losses in the subjects, resulting in an enlarged sampling error, the loss of useful information, a lower statistical test power, and a weakened accuracy of the parameter estimation values. Therefore, this study used the regression imputation method for data imputation.

Variable	Description	Metric
Ethnicity	This measure is divided into three categories: Non-minorities, aboriginals (Minorities), and cross-national marriages (Minorities).	Non-minorities = 0 (as reference category)
Child's gender	What is the child's gender?	1=boy 0=girl (as reference category)
Family finance condition	What is the financial condition of the family when the child studied in the 5th grade?	Items range from 1 to 4. 4=Wealthy families, 1=poor families
Instruction of learning	How often did you or your spouse teach the child to learn new knowledge at home before entering primary school?	Items ranged from 1 to 4. 4=everyday, 1=hardly ever
Company during study	How often did you or your spouse sit with the child to study before entering primary school?	Items ranged from 1 to 4. 4=everyday, 1=hardly ever.
Purchases of books	How often did you or your spouse purchase books for your child to read before entering primary school?	Items ranged from 1 to. 4=very often, 1=hardly ever.
Art activities	How often did you or your spouse allow your child take part in art activities before entering primary school?	Items ranged from 1 to 4. 4= very often, 1= hardly ever.
Years in Preschool	How many years did your child study in preschool before entering primary school?	0=lowest years 5=highest years
Talent courses	How many talent courses did your child participate in before entering primary school?	There are 11 items applied to the measurement of talent courses, as based on multiple choice. Such as "foreign language", "dancing", "music", "writing", etc. The respondents check the items and add them up to understand the participating situation in talent courses. A large value indicates that the young child has more opportunity to learn various talent courses.

Preschool cognitive skills	Before elementary school, how did your child perform in the following?	There are 11 items applied to the measurement of cognitive skills, as based on multiple choice. They included "Could the child do easy arithmetic, recognize Chinese phonetic symbols or simple Chinese characters, recognize English letters, distinguish colors, shapes, and sizes, memorize poems of the Three Character Classics", etc. The respondents checked the items and add them up to understand the preschool performance in the cognitive skills of toddlers. A large value indicates that the toddler has strong cognitive skills.
Academic achievement	The achievement estimation values from the semester grades (including Chinese, math, social studies, and science) in 5th grade students' survey in May 2013.	The learning achievements of each subject differ according to different scoring criteria in each class. Therefore, taking a class as a group, this study standardized students' learning achievements; then made linear transformation in scores where the mean value is 85 and the standard deviation is 4.

Table 1: Variable Measurement.

Analysis Strategy

We conducted regression-based analysis to investigate the cognitive skills and achievement gap among children of cross-ethnic or cross-national marriages and its influential mechanism. A series of hierarchical regression analysis was used with different groups of predictors in the analytical model, first with only ethnicity, then with ethnicity and controls for children's gender, family financial conditions, and preschool family educational resources, and finally with children's cognitive skills at the preschool stage added. In this study, we hypothesize that, when family background, and children's personal characteristics are included, the remained learning gap between minorities (included aboriginal, new inhabitants and non-minorities) would be reduced when early educational environment and experience is held constant. Namely, the main purpose of this study is to examine the mediating pathways through which early educational experience mediates the ethnic and cross-national marriage groups gap of students' learning performance.

Results

Descriptive Analysis

(Table 2)shows the result of the descriptive statistics of minority students (aboriginal children and those from families of cross-cultural marriage) and non-minority students in Taiwan, regarding the students' gender, family financial conditions, family education resources, preschool cognitive skills, and learning achievement in the 5th grade. In the different groups, about 42-49% of the students were male students, and about 51-58% were female. As to family financial conditions (4-point scale), the non-minority families were wealthier (M= 3.11, SD=0.62), while the aboriginal families tended to encounter financial difficulties (M= 2.57, SD=0.78). In addition, as to the offering of preschool family education resources, families of cross-national marriage were the most helpless about learning instruction. Aboriginal families lacked the preschool family education resources, followed by families of cross-national marriage. Non-minority families provided the richest family educational resources.

Ethnicity	Non-minorities				Minorities (aboriginal)				Minorities (Cross-national marriages)			
Variable	N	%	Mean	SD	N	%	Mean	SD	N	%	Mean	SD
Student's gender												
Boy	244	48.9			42	42			13	46.4		
Girl	255	51.1			58	58			15	53.6		
Family financial status	499		3.11	0.62	100		2.57	0.78	28		2.89	0.5
Instruction of learning	499		3.03	1.02	100		2.75	1.11	28		2.71	1.12
Company of study	499		3.04	0.78	100		2.7	0.89	28		2.75	0.84
Purchase of books	499		2.59	0.93	100		1.78	0.9	28		2.29	1.15
Art activities	499		2.28	0.88	100		1.84	0.89	28		2.07	1.05
Years in preschool	499		2.56	0.91	100		2.15	1.04	28		2.36	1.09
Talent courses	499		2.04	1.43	100		1.15	0.59	28		1.32	0.98

Preschool cognitive capacity	499		7.48	2.58	100		5.04	2.83	28		5.36	3.19
Chinese grades	499		84.96	9.69	100		81.88	9.72	28		85.09	8.86
Math grades	499		85.63	9.09	100		81.14	11.85	28		83.21	11.07
Social grades	499		85.49	9.59	100		81.15	11.10	28		83.79	11.05
Science grades	499		85.9	9.15	100		78.19	11.17	28		84.79	9.69
English grades	499		86.59	8.1	100		77.57	11.17	28		86.05	5.74
Semester grades	499		85.79	7.49	100		79.99	8.72	28		84.58	7.78

Table 2: Descriptive Statistics for Gender, Family Background, Preschool Family Education Resources, and Children's Academic Achievements by Ethnicity.

As to preschool cognitive skills, non-minority children were the best (M= 7.48, SD=2.58), followed by children from families of cross-national marriage, and the last were aboriginal children (M= 5.04, SD=2.83). Finally, as to 5th grade learning achievement, the non-minority children were significantly prominent, and the aboriginal students showed the most inferior performance. Based on the analytical results of the previous items, this study found that the non-minority students' families were significantly wealthier at the preschool stage, their families provided richer learning resources and their cognitive skills was better. Their 5th grade learning achievement was also more significant. Children from families of cross-national marriage were the second highest regarding family education resources and student learning performance. Children from aboriginal families had the fewest resources and lowest learning performance.

Multivariate Analysis

According to the theoretical framework proposed by this study, after controlling for the effects of gender, family financial conditions and family education resources, the researcher probed into the differences between non-minority and minority children regarding preschool cognitive skills and effect on 5th graders' learning achievement. Table 3 shows the effects of the predictor variables on the students' preschool cognitive skills. Table 4 shows the effects of the predictor variables on 5th graders' learning achievement. Table 5 is the analysis on mediating variables such as family financial conditions and family education resources (as dependent variables).

Ethnical Differences in Preschool Cognitive Skills

In Model 1 of (Table 3), after including students' gender as a control variable, the researcher demonstrated that the cognitive skills of children from families of cross-national marriage at the preschool stage was significantly inferior to that of children from non-minority families (B = -2.14, SE = 0.51, $p < .05$). The gap between aboriginal children and non-minority children was even more significant (B = -2.47, SE = 0.29, $p < .05$). In Model 2, family financial conditions were included. It was found that when the families were wealthier, the children's cognitive skills were even better. In Model 1, the gap between the cognitive skills of minority children from families of cross-national marriage and aboriginal people at the preschool stage and that of non-minority children was relatively reduced after including family financial conditions. However, it was significantly lower than that for non-minority students (B = -1.97, SE = 0.51, $p < .05$, and B = -2.05, SE = 0.30, $p < .05$). The explained variance (R Square) of Model 2 reached 0.153. In Model 3, family education resources were included as a mediating variable in order to estimate the effects of the variables on preschool cognitive skills. According to the result, when the children studied in a preschool and the parents spent more time studying with them, taking them to art activities, or when the children studied in a preschool for more years and learned more talent courses after school, their cognitive skills would be better. However, the parents' instruction and purchase of books did not significantly influence the children's preschool cognitive skills. In the analytical model, after including preschool educational resources, the inferior cognitive skills of children from families of cross-national marriage and from aboriginal families was reduced (the B values were reduced from -1.97 and -2.05 to -1.48 and -1.34, respectively) by 24.87% and 34.63%. The result showed that the minority children's inferior preschool cognitive skills could be due to their families providing fewer educational resources. In Model 3, the effect of family financial conditions was reduced by 47.44% after including family education resources. The result showed that the minority children had an inferior cognitive skill at the preschool stage. The reason could be in that their families were not wealthy and they lacked the educational resources for learning. The variance of the model (R Square) was increased to 0.293.

	Preschool cognitive skills	Preschool cognitive skills	Preschool cognitive skills
	Model 1	Model 2	Model 3
	B (SE)	B (SE)	B (SE)
Non-minority (reference)			
Cross-national marriage	-2.14(0.51) **	-1.97(0.51) **	-1.48(0.47) **
Aboriginal	-2.47(0.29) **	-2.05(0.30) **	-1.34(0.29) **
Boy	-0.37(0.21)	-0.39(0.21)	-0.30(0.19)
Girl(reference)			
Family financial status		0.78(0.16) **	0.41(0.15) **
Instruction of learning			0.13(0.11)
Company of study			0.44(0.15) **
Purchase of books			0.23(0.13)
Art activities			0.46(0.14) **
Years in preschool			0.28(0.11) **
Talent courses			0.24(0.08) **
R^2	0.121	0.153	0.293
N	627	627	627
* p < .05 ** p < .01			

Table 3: The Effect of Ethnicity, Family Background, and Preschool Family Education Resources on Preschool Cognitive Capacity.

Ethnical Difference of 5th Grade Learning Achievement

In Model 1 of semester grades, as shown in (Table 4), the students' gender was included as a control variable. According to the analytical result, among the minority children, the grades of the children from families of cross-national marriage were not significantly lower than those of the non-minority children. However, the aboriginal students' grades were significantly inferior to those of the non-minority students (B = -5.84, SE =0.85, p <.05). In Model 2, family financial conditions were included. The results demonstrated that family wealth positively influenced the students' semester grades in the fifth grade (B=2.10, SE=0.47, p <.05), and the inferiority of the aboriginal students was reduced (the B value was reduced to -4.17). In Model 3, family education resources were included as a mediating variable, and the researcher examined the effects of this variable on learning achievement. It was found that when parents purchased more books, or when the children studied in a preschool for more years and participated in more talent courses, their grades would be better. However, the parents' instruction, keeping the children company while studying, and taking children to participate in art activities did not have a significant effect. In addition, the positive effect of family wealth on students' grades in the model was reduced. The B value was reduced from 2.10 to 1.39. The inferiority of the aboriginal students' grades was also reduced, with the B lowered by 21.58% to -3.27. The result suggested that the aboriginal students' learning performance was inferior to that of the non-minority students, and the reason could be that their families were less wealthy and they lacked part of preschool family education resources. This study further validated the mediating mechanism as shown below.

	Semester grades (1)	Semester grades (2)	Semester grades (3)	Semester grades (4)	Chinese grades(1)	Chinese grades(2)	Chinese grades(3)	Chinese grades(4)
	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)
Non-minority (reference)								
Cross-national marriage	-1.21(1.49)	-0.76(1.48)	0.05(1.45)	1.03(1.43)	0.07(1.86)	0.49(1.85)	1.27(1.83)	2.22(1.82)
Aboriginal	-5.84(0.85) **	-4.71(0.87) **	-3.27(0.89) **	-2.38(0.89) **	-3.25(1.05) **	-2.20(1.09) *	-0.61(1.12)	0.25(1.13)
Boy	-0.54(0.62)	-0.57(0.61)	-0.42(0.59)	-0.22(0.58)	-2.51(0.77) **	-2.54(0.79) **	-2.37(0.75) **	-2.17(0.74) **
Girl (reference)								
Family financial status		2.10(0.47) **	1.39(0.47) **	1.12(0.47) *		1.94(0.59) **	1.17(0.60) *	0.91(0.60)
Instruction of learning			-0.18(0.33)	-0.27(0.32)			-0.26(0.41)	-0.35(0.41)
Company of study			0.28(0.45)	0.02(0.45)			-0.20(0.57)	-0.48(0.57)
Purchase of books			0.97(0.39) *	0.81(0.39) *			1.30(0.50) **	1.15(0.49) *

Art activities			0.36(0.42)	0.05(0.41)			0.59(0.53)	0.30(0.53)
Years in pre-school			0.77(0.33) *	0.58(0.32)			0.83(0.41) *	0.64(0.41)
Talent courses			0.56(0.25) *	0.40(0.25)			0.55(0.32)	0.39(0.32)
Preschool cognitive capacity				0.67(0.12) **				0.64(0.16) **
R^2	0.071	0.1	0.15	0.189	0.03	0.047	0.089	0.113
N	627	627	627	627	627	627	627	627
* p < .05 ** p < .01								

	Math grades (1)	Math grades (2)	Math grades (3)	Math grades (4)	Social grades (1)	Social grades (2)	Social grades (3)	Social grades (4)
	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)
Non-minority (reference)								
Cross-national marriage	-2.39 (1.88)	-2.06 (1.87)	-1.33(1.87)	-0.29(1.86)	-.169 (1.90)	-1.18(1.88)	-0.35 (1.87)	0.64(1.86)
Aboriginal	-4.42(1.06) **	-3.59(1.10) **	-2.42(1.14) *	-1.47(1.15)	-4.32(1.07) **	-3.05(1.11) **	-1.81(1.15)	-0.92 (1.15)
Boy	1.11(0.77)	1.09 (0.77)	1.24(0.77)	1.45(0.76)	0.31(0.78)	0.27(0.77)	0.42(0.77)	0.62(0.76)
Girl(reference)								
Family financial status		1.53(0.60) **	0.86(0.61)	0.57(0.61)		2.36(0.60) **	1.71(0.61) *	1.43(0.61)*
Instruction of learning			-0.36(0.42)	-0.45(0.42)			-0.15(0.42)	-0.24(0.42)
Company of study			0.43(0.59)	0.12(0.58)			0.66(0.59)	0.37(0.58)
Purchase of books			0.54(0.51)	0.37(0.50)			0.61(0.51)	0.45(0.50)
Art activities			0.51(0.54)	0.18(0.54)			0.45(0.54)	0.26(0.54)
Years in pre-school			0.58(0.42)	0.38(0.42)			0.65(0.42)	0.46(0.42)
Talent courses			0.64(0.33) *	0.47(0.32)			0.69(0.33)*	0.54(0.32)
Preschool cognitive capacity				0.71(0.16) **				0.67(0.16) **
R^2	0.032	0.042	0.069	0.098	0.026	0.050	0.077	0.103
N	627	627	627	627	627	627	627	627
* p < .05 ** p < .01								

	Science grades (1)	Science grades (2)	Science grades(3)	Science grades (4)	English grades (1)	English grades (2)	English grades (3)	English grades (4)
	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)
Non-minority (reference)								
Cross- national marriage	-1.10 (1.87)	-0.55(1.85)	0.22 (1.83)	1.23(1.82)	-0.95(1.67)	-0.49(1.66)	0.43(1.63)	1.39(1.62)
Aboriginal	-7.68(1.06) **	-6.30(1.09) **	-4.87(1.12) **	-3.95 (1.12) **	-9.52(0.95) **	-8.38(0.98) **	-6.67(0.99) **	-5.81(0.99) **
Boy	0.52(0.77)	0.48(0.76)	0.59(0.75)	0.80(0.74)	-2.14(0.69) **	-2.17(0.68) **	-1.99(0.67) **	-1.80(0.66) **

Girl (reference)								
Family financial status		2.55(0.59) **	1.88(0.60) **	1.61(0.59) **		2.12(0.53) **	1.32(0.53) *	1.07(0.53) *
Instruction of learning			0.81(0.41)	-0.01(0.41)			-0.20(0.37)	-0.28(0.36)
Company of study			0.44(0.57)	0.14(0.57)			0.06(0.51)	-0.22(0.51)
Purchase of books			0.97(0.50) *	0.81(0.49)			1.42(0.44) **	1.27(0.44) **
Art activities			0.72(0.53)	0.41(0.52)			-0.07(0.47)	-0.36(0.46)
Years in preschool			0.87(0.41) *	0.67(0.41)			0.92(0.37) *	0.74(0.36) *
Talent courses			0.17(0.32)	0.01(0.32)			0.76(0.28) **	0.61(0.28) *
Preschool cognitive skills				0.68(0.16) **				0.64(0.14) **
R2	0.08	0.107	0.144	0.17	0.148	0.169	0.217	0.243
N	627	627	627	627	627	627	627	627
* p < .05 **p < .01								

Table 4: The Effect of Ethnicity, Family Background, Preschool Family Education Resources, and Preschool Cognitive Skills on 5th Grade Learning Achievement.

In Model 4 of semester grades, as shown in (Table 4,)this study tried to find if preschool cognitive skills played a mediating role in the group differences for learning achievement. First, it was found that cognitive skills positively influenced grades (B = 0.67, SE =0.12, p <.05). The effects of coming from an aboriginal family, family wealth, and preschool family education resources were lowered after including cognitive skills. For instance, the gap between the grades of aboriginal students and those of non-minority students was reduced from 3.27 to 2.38. The result showed that preschool cognitive skills was a moderator in the effect mechanism of the group difference for the semester grades.

This study further explored the students' grades in Chinese, mathematics, society and science. The findings were similar to the analytical results of the models for the total semester grades of different models. Only the effects of preschool educational resources on the grades for different subjects and the significance level were different. However, the effects were all positive. In addition, this study found that the preschool cognitive skills of students from families of cross-national marriage were significantly inferior to those of the non-minority students. Nevertheless, after the fifth grade, their subject grades and semester grades were not significantly different with those of the non-minority students.

Mediators

Subsequently, this study tried to clarify the role of family financial conditions and preschool family education resources on preschool cognitive skills and the effect mechanism of group differences in elementary learning achievement. In the analysis, the mediating variables were all treated as dependent variables, and the analysis was based on multiple regression.

As shown in (Table 5), it was found that aboriginal families were significantly less wealthy (B = -0.54, SE =0.07, p <.05). Table 5 also demonstrates that in Model 1 of instruction, company of study, purchase of books, art activities, years in preschool and talent courses, the aboriginal families were significantly inferior to the non-minority families. In Model 2 of the previous preschool family education resources, this study included family financial conditions and demonstrated that when the children's families were wealthier, they would provide richer family education resources. After including family financial conditions in the analysis, the aboriginal students' preschool family resource inferiority was reduced. The result showed that the aboriginal students' preschool educational resources were fewer because their families were less wealthy. In the analysis of Table 3, it was found that when the families were wealthier, their preschool family education resources would be richer and the children's preschool cognitive skills would be more significant. Better preschool cognitive skills was the key factor for better learning achievement in the 5th grade. Based on the analytical results of Tables 3, 4, and 5, this study concluded that in comparison to non-minority students, the aboriginal students tended to come from poor families,

and they significantly lacked family educational resources. Hence, their preschool cognitive skills were inferior. When they were in the 5th grade, their learning achievement was significantly inferior to that of the non-minority students.

	Family financial status	Instruction of learning (1)	Instruction of learning (2)	Company of study (1)	Company of study (2)	Purchase of books (1)	Purchase of books (2)
	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)
Non-minority (reference)							
Cross-national marriage	-0.22(0.13)	-0.31(0.20)	-0.31(0.20)	-0.29(0.16)	-0.26(0.16)**	-0.31(0.18)	-0.26(0.18)
Aboriginal	-0.54(0.07)**	-0.28(0.11)*	-0.26(0.12) *	-0.35(0.09)**	-0.26(0.09)**	-0.82(0.10)*	-0.68(0.11)*
Boy	0.02(0.05)	-0.03(0.08)	-0.03(0.08)	-0.02(0.06)	-0.02(0.06)	-0.06(0.08)	-0.06(0.07)
Girl(reference)							
Family financial status			0.03(0.06)		0.16(0.05)**		0.25(0.06)**
R^2	0.087	0.012	0.012	0.028	0.004	0.094	0.012
N	627	627	627	627	627	627	627
	Art activities (1)	Art activities (2)	Years in preschool (1)	Years in preschool (2)	Talent courses (1)	Talent courses (2)	
	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	
Non-minority (reference)							
Cross-national marriage	-0.22(0.17)	-0.17(0.17)	-0.20(0.18)	-0.17(0.18)	-0.72(0.26)**	-0.62(0.25)*	
Aboriginal	-0.45(0.10)**	-0.33(0.10)**	-0.41(0.10)*	-0.33(0.11)*	-0.90(0.14)**	-0.66(0.15)**	
Boy	-0.05(0.07)	-0.05(0.07)	0.03(0.08)	0.03(0.08)	-0.16(0.11)	-0.17(0.10)	
Girl(reference)							
Family financial status		0.22(0.05)**		0.14(0.06)*		0.44(0.08)**	
R^2	0.034	0.006	0.034	0.033	0.068	0.113	
N	627	627	627	627	627	627	
* $p < .05$ ** $p < .01$							

Table 5: The Effect of Ethnicity, Student's Gender, and Family Financial Status on Preschool Family Educational Resources.

Conclusion and Discussion

Issues related to learning achievement difference have been highly concerned by many researchers, and study on the ethnic gap of student achievement is an important research topic in multicultural societies [6,10,12]. In Taiwan, some studies have demonstrated that the educational achievement of aboriginal children is significantly inferior to that of non-minority children. However, the factors for this difference require further exploration. In addition, in the last 20 years, males with inferior social and economic status in Taiwan have tended to marry females from the countries of Southeast Asia and from rural China. The percentage of cross-national marriage has increased in Taiwan, and more of their children have entered schools. Although these children are still the minority, the percentage is growing. Taiwan lacks research findings on the comparison of the learning gap between children fromfamilies of cross-ethnic group/national marriage, and more exploration is required. Moreover, since the type of cross-national marriage in Taiwan is unique, findings of foreign studies may not apply. Does the effect of cross-ethnic group/national marriage on learning exist in childhood? Will it influence the later learning achievement? These questions represent an important research gap which should be supplemented, and the results could serve as a reference for multicultural educational policies, instructional practice, or equal educational opportunities.

This study found that aboriginal students had a significant gap with non-minority students regarding preschool cognitive skills and learning achievement in the 5th grade. The main reason was that when aboriginal students were in preschool, they lacked family educational resources which caused their preschool cognitive skills to become inferior, and which negatively influenced their learning achievement in the 5th grade. Based on the previous findings, the amount of preschool educational resources significantly and continuously influenced the learning performance [5,8,19]. The aboriginal students were considerably inferior, which showed that it is necessary for the government of Taiwan to be concerned about aboriginal students at different educational stages

and provide more effective educational resources [5].

Noticeably, compared to non-minority children, the children from families of cross-national marriage had insufficient preschool educational resources, such as parents' company and talent courses. Their preschool cognitive skills were considerably lower than that of non-minority children. This finding obviously showed that high quality early educational experience and care have important effects to narrow the learning ethnical gap, thereby partly supporting the research results from some Western countries [7,19,20] and the research hypothesis of this study.

However, at 5th grade, the learning achievements of children from families of cross-national marriage were not significantly different from that of the non-minority students. This suggests that the learning inferiority of the children from families of cross-national marriage at the early stage would be reduced with the increase of age. Only learning performance during childhood was significantly inferior. Therefore, the phenomenon of mothers from countries with inferior economies negatively influencing their children's learning should not be exaggerated. In families of cross-national marriage, the mothers spend years to obtain I.D. cards and jobs, and they share the family's financial burden. Many mothers from Southeast Asia have difficulty in assisting with their children's learning since they are not fluent in Mandarin. Even Chinese spouses who are exposed to the same culture and customs encounter the problem of cultural adaption. When fathers undertake the financial burden of the family, mothers should be responsible for their children's education. However, immigrate mothers always have difficulty in cultural and language adaption and they have fewer resources [23,24]. Their children's early learning inferiority is understandable. Nevertheless, with the progress of time, foreign spouses begin to fit into society and have fewer language difficulties. Since they are mostly well educated, after obtaining I.D. cards, they can considerably improve the family's finances by working. They can also provide their children with more learning resources. Some spouses from Southeast Asia (i.e. Philippines) have the advantage of English proficiency than local parents, which might enhance their children's English achievement. In addition, with the active assistance of minority support polices and measures in Taiwan, the learning inferiority of children from families of cross-national marriagecan be reduced.

According to findings of this study, the learning inferiority of the children from families of cross-national marriage exists at the preschool stage. If children can be assisted at this time, this inferiority will be reduced faster. For instance, it could be possible to reduce the time needed for foreign mothers to acquire I.D. cards and rights of employment. This would not only improve the family financial situation but also allow them to fit into Taiwan society by enhancing their relationships with colleagues and friends at work. It could also help them obtain information related to their children's education and parenting. Institutions for foreign spouses could design growth and support network courses that would allow them to fit into society sooner and reduce their children's learning inferiority. It seems that aboriginal students' learning performance is continuously inferior, and that welfare and educational policies related to aboriginal students and families are ineffective. They should be modified and improved.

Limited and Further Research

Although our analytical approach provided new insights regarding the effect of early educational experience on student's learning ethnical gap, there are several limitations that need to be considered and possibly addressed in the further research.First, this study was concerned about the learning differences of students from families of cross-ethnic group/national marriage. However, differences between cities and villages, public and private schools, and family structures (completeness of family) will influence student learning and will increase the learning gap between students from different families and schools. By exploring these important topics, it will be possible to probe into related issues and propose specific suggestions for educational policy. In addition, this study proposed early family education resources to explain the learning gap of children from families of cross-ethnic group/national marriage; however, the research scope was not broad enough. The students' identification with ethnic group and nationality, ethnic discrimination, and anti-social cultural consciousness will influence the ethnic gap of student learning. These points require further investigation. Moreover, by tracing different times and performing a longitudinal analysis of the learning gap of children from families of cross-ethnic group/national marriage, this study explored the influential mechanism. Future researchers can also focus on the effect on advanced study, employment, occupation, salary and social status, which are critical issues in educational research.

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