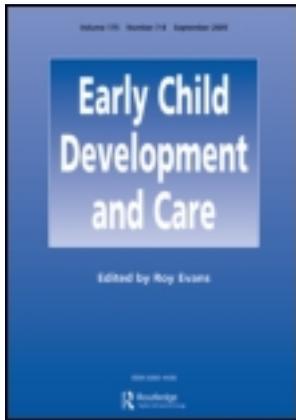


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Relationships between receptive vocabulary in English and Cantonese proficiency among five-year-old Hong Kong Kindergarten children

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There is little consensus among different early childhood education stakeholders in Hong Kong on whether it is beneficial or detrimental for children to receive an English bilingual education before the age of 6. This longitudinal study investigated the issue of potential ‘detrimental effects of learning English’ on Hong Kong kindergarten children’s performance in L1 (Cantonese) and L2 (English) over a six-month period. The sample consisted of 53 children, 29 of whom went to international schools and received 90 minutes of daily in-class English instruction, and 24 of whom went to local schools, and received 20 minutes of daily in-class English instruction. Analyses of the relationship between L1 and L2 development showed *no* evidence that learning a second language is detrimental to the learning of the first. This was despite the large difference in the amount of in-school instruction time the children who went to local vs. international schools received. Children in the international schools vastly outperformed those in the local schools in English. We found no evidence that learning a second language is detrimental to learning more general cognitive skills. The results provided very weak evidence for the opposite. Thus, learning English as a second language in Hong Kong before the age of 6 did not harm children’s learning in any way.

Keywords: Hong Kong kindergarten English lessons; second language learning effects

Introduction

The issue of bilingual education in the Hong Kong early childhood context is contentious. There seems to be no consensus among different stakeholders of early childhood education on whether it is beneficial for children to receive before the age of 6 language inputs in two languages: a first language (L1) plus a second language (L2). Some believe that there are detrimental or subtractive effects to learning English in the early years, whilst others think that there are considerable social or economic factors which override such concerns and others believe there are cognitive advantages to early bilingual learning.

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The largest public stakeholder in the debate is the Hong Kong Education Bureau (HKEDB). The HKEDB has made a number of statements pertaining to when an L2 should be introduced and what effects it would have on the child. In terms of what should be taught, they suggest that the primary focus of pre-primary education should be on the development of the mother tongue. In various public documents, HKEDB and its advisory body (2003; Standing Committee on Language Education and Research (SCOLAR), 2003a, 2003b) have stated that the mother tongue is the most natural language for the expression of thoughts and feelings. Introducing an L2 in the early years might hamper young children's cognitive growth. They also suggested that children are most ready to learn a second language once they have mastered an L1. This idea was based on the assumption that children can transfer their language learning skills to an L2. In other words, the mastery of one's L1 could favour the development of an L2.

A problem arose for the HKEDB in implementing their ideas because all kindergartens in Hong Kong are privately run. They are free to design their own curricula, and this almost always includes English language learning. Thus, the HKEDB could not make it illegal for kindergartens to teach English to young learners, and had essentially no choice but to offer an alternative to what they believed was best practice at that time. Thus, they suggested that children could learn English informally through stories, songs and games and that the focus of second language learning should be on motivation and the use of language to achieve communicative functions. For further details, see the *Guide to the pre-primary curriculum* (HKEDB, 2006).

The great majority of Hong Kong parents believe that an early start in learning English will provide their children with a scholastic head start in later life. This is especially important in Hong Kong, as high English language proficiency is seen to be related to social mobility (Baker & Jones, 1998; Bolton, 2000; Lai & Byram, 2003; Wong, 2009). Also, before the removal of the Medium of Instruction (MOI) policy, originally introduced in 1997, which stipulated that 75% of Hong Kong secondary schools must use 'Chinese' as the MOI (the policy did not make it specific whether 'Chinese' referred to Cantonese or Putonghua, the official language of China), parents believed that by introducing English to their children in the early years, they might increase their children's chance of admission into an English-medium secondary school in the future (Koong, 2008). Because going to these schools is generally considered prestigious in Hong Kong, the majority of parents want kindergartens to offer bilingual education.

Kindergartens in Hong Kong, apart from adapting to the existing context by becoming 'bilingual', have had to modify their language curricula both to accommodate the expectations of the government (i.e. introducing English informally through stories, songs and games, as suggested by the *Guide to the pre-primary curriculum*) and also to meet the needs of families. Parents want their children to have a solid foundation in English learning so that their children would have a greater chance of being admitted into good primary schools and thereafter into the English-medium secondary schools. To try to do this, the local kindergartens, with English exposure time ranging from 40 minutes to 100 minutes per week, often make use of locally published textbooks which focus on shared-reading, rhymes and phonics. In contrast, the international kindergartens provide English exposure time for at least half of a school's contact hours. They tend to adopt story books from overseas, and they teach the various learning areas in early childhood (e.g. numeracy, science and technology, arts, PE, etc.) in English.

Whilst bilingual education has become a reality in the Hong Kong early childhood setting, there is a lack of local studies which actually examine the validity of the views expressed above, namely:

- (1) Is the learning of English in early childhood detrimental to the development of Cantonese (L1 for most children in Hong Kong)?
- (2) Does early bilingual education have a negative impact on children's cognitive development?
- (3) Does mastery of Cantonese promote the learning of English?
- (4) Does early exposure to English result in increased proficiency in kindergarten and later years?

At present, the existing local studies or reports tend to focus on:

- (1) methods of English language teaching (see Ng, Chiang, and Kong (2005) which illustrates how to teach English with the use of an integrative approach, and Chow, McBride-Chang, and Cheung (2010) for the effects of parent-child reading in English as a second language);
- (2) important elements of early English learning, such as pronunciation (see Wong & MacWhinney, 2009), phonological awareness (Wong, 2009), morphological awareness (McBride-Chang, Wagner, Muse, Chow, & Shu, 2005) and oral language (Wong, 2009);
- (3) quantity and quality of exposure to different languages in the kindergarten settings (Leung & Lim, 2009).

The present small-scale longitudinal study aimed at studying kindergarten children's performance in L1 (Cantonese) and L2 (English) over a six-month period in Hong Kong. A cognitive measure (non-verbal reasoning) was also included in the analyses. To restrict our scope, we limited our investigation to questions 1 and 2 listed above, namely whether the learning of English in early childhood is detrimental to the development of Cantonese and whether early bilingual education has a negative impact on children's cognitive development. These two questions are highly related as both pertain to the extent that learning English causes detrimental or subtractive effects on other aspects of performance.

A review of the existing literature did not seem to us to support a supposition that learning an L2 in early childhood is detrimental to learning an L1. Indeed, Honig and Xu (2012) have reported that Mandarin-speaking children who had spent at least two years in entirely English-speaking classrooms in the USA were about at the same level in receptive Peabody Picture Vocabulary Test-IV (PPVT) scores as native English-speaking young children and, up to age 6, their PPVT scores in Mandarin were at the same level as children in China. So far there has been no definitive study which showed that early bilingualism per se results in poor L1 development. With respect to vocabulary development, Pearson, Fernández, and Oller (1993) found no evidence for a slower vocabulary growth rate among English-Spanish bilingual toddlers (aged below 30 months) in comparison to their monolingual peers after analysing the former's receptive and expressive vocabulary in the two languages. With respect to grammatical development, Paradis and Genesee (1996) investigated the potential interference between the grammars of French-English bilingual children, aged 2-3 years. They concluded that bilingual children showed no evidence of transfer, acceleration,

or delay in acquisition. Finally, more recent research findings suggest that language development (in L1 or L2) is largely mediated by children's early life experiences and that these are modified by a number of situational factors, such as parent-child relationships and socio-economic status (Hoff, 2003, 2006). Some scholars view bilingualism as an additional environmental variable, alongside SES and other factors, which can alter the quantity and quality of parent-child interactions which in turn could modify young children's learning outcomes (Hoff, 2006).

Bilingualism and cognitive development

With respect to the relationship between bilingualism and cognitive development, research conducted in the first half of the twentieth century (Darcy, 1946) concluded that bilingualism was associated with cognitive disadvantages. Grosjean (2010) reviewed early research about the linkage between mental retardation and bilingualism. A re-analysis of the original published findings has revealed that the results from those earlier bilingual studies were not conclusive because there were important confounds, such as the fluency of the bilingual subjects in the language used in the cognitive tests and the children's socio-economic status. Hakuta and Diaz (1985) and Bialystok (2010) have reviewed methodological flaws in the earlier studies. More recent findings show that the degree of bilingualism, measured in terms of the relative strength between the two languages acquired by the bilinguals, is related to cognitive advantages. For example, Hakuta and Diaz (1985) noted in their six-month longitudinal study of 124 Spanish-English bilinguals that the degree of bilingualism was a statistically significant predictor of the learners' scores in the Raven's Progressive Matrices (Raven, 1956). In more recent cognitive processing studies, reviewed by Bialystok (2010), bilingualism appears to lead to a 'slight' cognitive advantage in the area of executive functioning. Bilingual subjects appeared to perform significantly better than their monolingual peers in situations heavily dependent on selective attention to stimuli (i.e. attentional control) or the inhibition of distracting signals.

Method

Participants

We recruited 53 five-year-old Hong Kong-born Cantonese-speaking children from five kindergartens in Hong Kong. Three were local kindergartens in which the children were exposed to English for 20 minutes per day (out of three hours) and Cantonese was used as the method of instruction for the rest of the schools' contact hours. The two remaining kindergartens were international kindergartens in which English was used as the method of instruction for half of the school's regular contact hours. There were 29 boys and 24 girls in the sample (Table 1).

Subject recruitment

We first obtained permission for children to participate in the study from the kindergarten principals. Next, we gave the parents of children letters requesting their children's participation. We then selected children randomly from the pool of children whose parents had given their consent at each school. Data collection was divided into two

Table 1. Subject characteristics ($n = 53$).

Characteristics	Numbers	Percentage
<i>Gender</i>		
Male	29	54.7
Female	24	45.3
<i>School type</i>		
International	24	45.3
Non-international	29	54.7
	M	SD
Age in years	5.1	0.6

phases. The first phase (Time 1, baseline, henceforth T1) involved the administration of the cognitive measure, the Cantonese (L1) measure, and the English (L2) measure (explained later in the method section). The participating children were tested *individually*, during regular school hours, over two sessions in their own kindergarten by three professional speech therapists across a three-week period in the first term of the children's third year of kindergarten education. The English measure was administered in the first session, and the Cantonese and the non-verbal reasoning measure were administered in the second. The total testing time in the first phase for each child was on average, 35 minutes. The second phase (Time 2, six-month follow-up, henceforth T2) involved the administration of the same Cantonese and English measures over two sessions. Total testing time for each child was, on average, 30 minutes in T2, the second phase.

Demographic data

We encountered difficulties in collecting the demographic data of the participating children, as parents appeared reluctant to provide sensitive information such as their monthly household income and employment category in a non-anonymous study. Despite the lack of such data, communication with the principals, however, showed that participating children from the international schools tended to come from middle- to high-income families, whereas the children from the local kindergartens tended to come from low- to middle-income families.

Language measures

We administered two standardised language tests to the participating children, once at T1 and once at T2, with an approximate six-month interval between the two. The first test used was the PPVT (Dunn & Dunn, 2007), which is an extensively used measure of children's receptive vocabulary in English with high reliability and the PPVT is widely used in both L1 and L2 testing conditions. Test-takers listen to verbal instructions, and then they point to the picture (out of four options) that matches the target word in the instructions. Longitudinal research has shown a good correspondence between the results of this test and learners' future reading scores in English (Snow, Porche, Tabors, & Harris, 2007). To make sure that the participating children were able to understand the nature of the testing procedure, the initial instruction was given in

Cantonese. The test only began once it was clear that the participants were able to understand the ensuing tasks.

The second language measure was the Reynell Developmental Language Scale-Cantonese. This is a translated version of the original Reynell Developmental Language Scale in English (Reynell & Huntley, 1985). The Cantonese version was normed in Hong Kong (Reynell & Huntley, 1987) and has been widely used by Hong Kong speech therapists since the late 1980s for assessing the language proficiency of young Cantonese-speaking children. There are two parts to the test: language reception and language expression. The scores for language reception (RDLS-R) and expression (RDLS-E) are reported separately in the ensuing analyses and not combined into a composite score, as we wanted to evaluate the effects of Cantonese reception and expression on the English measure.

Cognitive measure

Sets A and B of the Raven's Standard Progressive Matrices (Raven, 1956), which measure a person's non-verbal IQ or reasoning skills, were administered to the children at T1, and a composite score was then computed. We chose this measure because robust differences were found between bilinguals and monolinguals using this measure in the Peal and Lambert (1962) study, and between the more 'balanced' bilinguals and weak bilinguals in Hakuta and Diaz's (1985) longitudinal study.

Statistical analyses

All analyses were conducted using SPSS version 19.0 (SPSS Inc., Chicago, IL, 2011). Raw rather than normalised scores were used in the analysis because we were interested in whether children got better (or potentially worse) over time, and normalising scores based on the age of the children would have prevented this examination.

Results

Initially, we checked the results for outliers in the difference scores between T1 and T2 for the two RDLS measures and the PPVT. There were two difference values that were greater than 2.5 SDs away from the mean in both the RDLS-E and RDLS-R tests. These items were removed from the analysis. No outliers were found with PPVT difference scores. The means and standard deviations for the different measures can be found in Tables 2 and 3. As can be seen, there are some differences between the international and local schools, with children going to the international schools having slightly higher Raven's and RDLS-R scores, and vastly higher PPVT scores.

To examine the data, we first ran simple correlations on the RDLS, PPVT, and Raven's scores (Table 4). As expected, there were strong correlations between T1 and T2 for all three measures examining language performance. Across the tests, however, the results were weaker, with RDLS-E and RDLS-R measures being only moderately correlated. Also, there were weak to moderate correlations between PPVT and Raven's scores. There were also weak correlations between RDLS-R and PPVT scores, although the same was not true of the RDLS-E scores. This latter finding suggests that having a higher receptive Cantonese vocabulary might potentially help children learn English, unlike having a higher expressive Cantonese vocabulary.

Table 2. Descriptive statistics for the test score measures at T1 and T2 ($n = 53$).

Measure and Time	M	SD
<i>PPVT</i>		
T1	35.8	20.5
T2	40.6	22.2
<i>RDLS-R</i>		
T1	58.8	3.8
T2	60.6	4.1
<i>RDLS-E</i>		
T1	65.9	6.4
T2	68.3	5.5
<i>Raven</i>		
T1	12.5	2.6

Notes: RDLS-R, Cantonese version of the Reynell Developmental Language Scale-Reception; RDLS-E, Cantonese version of the Reynell Developmental Language Scale-Expression; PPVT, Peabody Picture Vocabulary Test-IV; Raven, aggregated scores for Raven sets A and B; T1, baseline; T2, six-month follow-up.

Table 3. Test score measures in PPVT, RDLS-E and RDLS-R at the baseline T1 and six-month follow-up T2 and Raven composite score at T1, by school type (local/international kindergartens).

Measure and time	Local		International		<i>p</i> -Value
	M	SD	M	SD	
<i>PPVT</i>					
T1	18.8	8.9	49.9	17.1	<0.001
T2	22.7	13.3	55.5	16.3	<0.001
<i>RDLS-R</i>					
T1	57.6	2.7	59.9	4.1	0.022
T2	59.3	3.6	61.8	4.2	0.030
<i>RDLS-E</i>					
T1	64.6	6.4	66.9	6.4	0.21
T2	66.9	5.9	69.4	5.0	0.10
<i>Raven</i>					
T1	11.6	2.0	13.3	2.9	0.021

Notes: RDLS-R, Cantonese version of the Reynell Developmental Language Scale-Reception; RDLS-E, Cantonese version of the Reynell Developmental Language Scale-Expression; PPVT, Peabody Picture Vocabulary Test-IV; Raven, aggregated scores for Raven sets A and B; T1, baseline; T2, six-month follow-up. *p*-Values were estimated by using independent samples *t*-tests. Levene's test for equality of variance was used to test assumptions of equal variances by subgroup.

Table 4. Correlations of all variables.

Measures	1	2	3	4	5	6	7
1. RDLS-R, T1	1.00						
2. RDLS-R, T2	0.737**	1.00					
3. RDLS-E, T1	0.404**	0.409**	1.00				
4. RDLS-E, T2	0.471**	0.472**	0.720**	1.00			
5. PPVT, T1	0.347*	0.313*	0.172	0.152	1.00		
6. PPVT, T2	0.294*	0.284*	-0.046	0.025	0.898**	1.00	
7. Raven, T1	0.153	0.136	0.052	0.021	0.398**	0.325*	1.00

Notes: RDLS-R, Cantonese version of the Reynell Developmental Language Scale-Reception; RDLS-E, Cantonese version of the Reynell Developmental Language Scale-Expression; PPVT, Peabody Picture Vocabulary Test-IV; Raven, aggregated scores for Raven sets A and B; T1, baseline; T2, six-month follow-up.

* $p < .05$.

** $p < .01$.

Possibly, some children are better able to focus on receptive word learning, since the PPVT is a receptive measure.

Whilst the correlation between the PPVT and the Raven's scores is interesting, it could potentially be an artefact of the two groups that were used and the fact that the international group scored higher on both the PPVT and Raven's scores. Because of this, we split the data set into international and local categories (Table 3) and re-examined the correlations on these variables. There was only one correlation of the four examined that was significant even at an uncorrected level (local students at T1, $r = .46$, $p = .012$). This suggests that children who were better at English also had higher Raven's scores. Further analysis showed that the Raven's scores were also not significant predictors of the increase in scores from T1 to T2 in either of the groups. Thus, the most it seems reasonable to conclude from the correlation between the results of the PPVT and Raven's matrices is that we have very weak evidence that scoring more highly on Raven's matrices might be predictive of the extent to which children are likely to have learned English as a second language if they are not exposed to it for long periods at school.

Does learning English affect Hong Kong kindergarteners' Cantonese language scores?

Apart from simple correlations, a stronger test of whether learning a second language affects performance in the native language is to see whether the increase in Cantonese language scores is affected over time. This gets around a potential problem with our data in that the international students, who tend to come from more privileged backgrounds than the local students, might actually have their Cantonese language skills affected by learning English. This may not appear in the data, however, because the higher aptitude for learning Cantonese that they could potentially have had due to their higher Raven's scores and family background factors would lead to a higher score but this would then be cancelled out at least in part if their Cantonese was affected by them learning more English.

To examine this question, we first wanted to ascertain that the children in the international schools really were more proficient at English than those in the local schools.

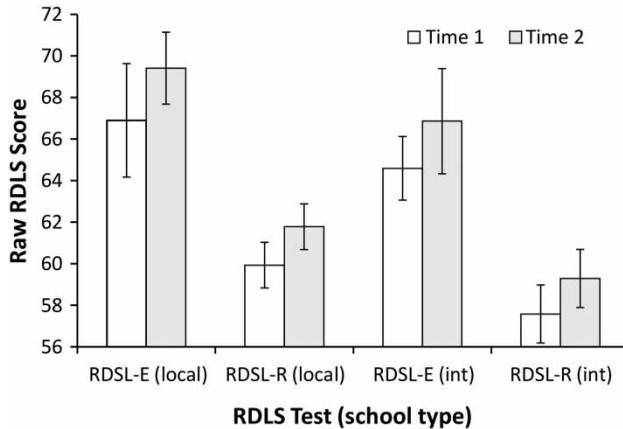


Figure 1. Mean expressive (E) and receptive (R) scores on the Reynell Developmental Language Scale-Cantonese for children in local and international schools. Error bars represent $\pm 2SE$.

We therefore ran a 2 (School type) \times 2 (PPVT score at T1 and T2) analysis of variance (ANOVA). The results showed that children in the international schools performed better than those in local schools, $F(1, 51) = 55.35, p < .001, \eta^2 = .60$, and that children got better at English over time, $F(1, 51) = 12.10, p < .001, \eta^2 = .19$. Curiously, the interaction was not significant, $F < 1, \eta^2 = .008$, suggesting that the extra amount of instruction the children in the international schools received did not help them learn more quickly than the children in the local schools.

Given the results of the PPVT, we conducted a 2 (School type) \times 2 (Task, RDSL-E and RDSL-R) \times 2 (Time) ANOVA to examine whether learning English affects the acquisition of Cantonese. The results showed that there was a significant main effect of Time, $F(1, 51) = 10.61, p < .005, \eta^2 = .17$, but no significant main effect of School type, $F(1, 51) = 1.44, p = .24, \eta^2 = .028$, nor was the interaction between School type and Time significant, $F < 1, \eta^2 = .006$ (Figure 1). These results suggest that *both groups of children got significantly better at Cantonese, despite the relatively short six-month test-retest period*. Of greater interest is the fact that despite the international students having been exposed to far less Cantonese, there appeared to be no significant detriment in their Cantonese performance. If learning English had impaired them in a meaningful way, a significant interaction should have been found. *Thus, learning English did not decrease these children's Cantonese scores.*

Does learning English affect Hong Kong kindergarteners' cognitive scores?

Apart from whether learning a second language affects the learning of the first, we were also interested in whether learning a second language affects cognitive development in general.

Given that earlier studies (e.g. Hakuta & Diaz, 1985; Hakuta, Ferdman, & Diaz, 1987) suggested that the degree of bilingualism is related to non-verbal reasoning skills, our final analysis involved the use of a regression model to test whether such a relationship applies to our Hong Kong sample. Whilst our simple demographic data suggests that this is not true, as the international students had slightly higher Raven's scores than the local ones, this

could potentially be a confound due to the selectivity of the international schools. That is, the international students may simply have performed better on Raven's tests because they were, overall, slightly more proficient at these for reasons not relating to language. We therefore examined whether Cantonese language ability, as measured by the RDLS-R and RDLS-E scores can predict Raven's scores of the international and local school students separately. The results from the international schools were not significant $r = 0.22$, $F < 1$, nor were the results from the local schools, $r = 0.33$, $F(2, 24) = 1.34$, $p = 0.14$, nor were any of the individual predictors in either of the two regressions, all $p > .1$.

Discussion

We began our study with the concern that important decisions were being made for young children in Hong Kong in terms of their language development, despite the fact that there were not enough quantitative studies which have investigated the relationships between L1 and L2 development in the Hong Kong early childhood context. We were particularly interested in the topic of possible subtractive effects of learning English in the early years and the claims that (a) the learning of English is detrimental to the development of Cantonese and (b) early bilingualism may impair cognitive development.

With respect to the first question, we noted (measured in terms of scores from the Reynell Developmental Language Scales) that, *the Cantonese proficiency of learners from international kindergartens did not differ significantly from their peers attending local kindergartens, despite the former's higher intensity of exposure to English during school contact hours*. This suggests that a higher intensity of English exposure in the kindergarten years may not have a negative impact on Cantonese development. This was further confirmed via data examining the development of Cantonese over a six-month period, which showed that both groups similarly increased in Cantonese performance.

With regard to the second question, *we found no evidence for a detriment in cognitive performance caused by bilingualism*. This is generally consistent with more recent findings from other language combinations (such as the English–Spanish combination in the Hakuta and Diaz [1985] study). We also obtained very weak evidence that the degree of bilingualism is a significant positive predictor of non-verbal reasoning skills in some circumstances. A positive relationship was found between Raven's and PPVT scores for children who were exposed to a relatively small amount of English in their schools. Whilst our results were very weak, this should not be seen as a surprise as this is a common finding. For example, Bates, Benigni, Bretherton, Camaioni, and Volterra (1979) found that grammatical development was not associated with Piaget's object permanence task, and Cheung et al. (2004), using a similar population as ours, found that children's mastery of syntactic structures did not contribute uniquely to theory-of-mind development. It is worthwhile noting that in the worst case, all this suggests is that bilingualism is not necessarily beneficial to cognitive development in general; the data do not suggest that it is detrimental.

In our attempt to address the two research questions above, we also came across a number of interesting findings which deserve further discussion. First, we found that an increase in Cantonese language scores in our current dataset was only weakly associated with English PPVT scores. The receptive scores in Cantonese were significantly associated with the English PPVT scores, and not with the expressive scores. This

may indicate a general ability of some children to succeed at receptive word learning, since the PPVT is a receptive measure.

A second result of interest was that school type appears to be associated with children's performance on the English PPVT but not the Cantonese measures. That is, the children attending international kindergartens generally had a much higher PPVT mean score at both T1 and T2 than the children attending local kindergartens, although both made a similar level of progress over the two time points we examined in our study. Note that SES was lower for the local kindergarten children, and SES family factors may well account for the differences. Despite this latter result, which suggests that at least the level of progress is similar between the two groups, the overall differences are worrying. The lower level of English performance of the children from the local schools may impact them negatively if they end up going to a primary school that teaches in English, particularly if a particular level of ability in English is needed to learn particular subject matter (e.g. maths), rather than if English is just learnt for its own sake, which is generally the case in these local kindergartens. Note that this is important in Hong Kong, because it is common for parents to want their children to go to an English-speaking school even if the child's English level is low. These results suggest that teachers in local schools may want to work more closely with low SES families to help parents learn creative ways in which to motivate their children's English language learning, such as taking them to library storytime and puppet shows in English or taking English videos from a library for their children to enjoy.

Conclusion

This study has made a number of contributions to the area of research concerning the issue of the possible subtractive effects of English learning in the Hong Kong early childhood setting. Our results provide no evidence for this at all. Learning English in the early years was not damaging to L1 and to overall cognitive development. Despite these findings, there are some major limitations of the current study. First, the associations that we have observed in the study could have been due to our relatively small sample size. If there really are very small subtractive effects, then obviously large samples would be required to find them although, presumably some parents would still prefer early child fluency in English. Second, we were not able to collect SES data so that we could not definitively evaluate the effects of this potential confound. Because of small sample size, no potential gender effects could be examined. A larger study and further data would therefore be helpful to deepen our knowledge of the relationships between L1 and L2 development in children's early years in Hong Kong.

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