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# Enhancing Chinese reading in ethnic minority kindergarteners in Hong Kong: A bioecological approach to shared book reading interventions

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## Abstract

Shared book reading is a fundamental component in learning of Chinese as a second language (L2), but its effectiveness requires further empirical exploration and support. Scholars emphasise the examination of both parental and child characteristics alongside school-based interventions. Guided by the bioecological framework, this study included three groups: an experimental group of ethnic minority[3] kindergarteners in Hong Kong and two control groups of L2 and first language (L1) Chinese children[4]. A sixteen-week shared book intervention was

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[3] According to official data released in Hong Kong (Census and Statistics Department Hong Kong Special Administrative Region, 2022), most ethnic minorities in Hong Kong are referred to as "non-Chinese Asians," as they account for about 80% of the minority population. Among the ethnic minorities in Hong Kong, Filipinos make up the largest group (32.5%), followed by Indonesians (22.9%). Other ethnic minorities include Indians (6.9%), Nepalese (4.8%), Pakistanis (3.9%), Thais (2.1%), Japanese (1.7%), and Koreans (1.4%), among others. In addition, 9.9% of Hong Kong's ethnic minorities are Whites.

[4] Under Hong Kong's "Biliteracy and Trilingualism" language policy, "spoken Chinese" includes Cantonese and Mandarin, while "written Chinese" refers to Chinese printed in traditional Chinese characters. Learners whose first language is Cantonese or Mandarin are referred to as "learning Chinese as a first language (L1)". On

implemented. ANOVA and MANCOVA analyses of data from 161 children and 35 parents showed significant gains in metalinguistic awareness and word and text reading among the experimental group. The structured intervention was particularly effective in enhancing metalinguistic awareness, enabling L2 children to perform similarly to L1 children in post-tests. Additionally, fathers' oral proficiency in Chinese and children's use of ethnic languages positively impacted word and text reading. This study enriches the bioecological framework and offers insights for promoting L2 Chinese reading.

***Keywords:*** Shared book reading intervention; L2 Chinese reading; Bioecological framework in language learning; Home literacy environment; Individual factors and L2 acquisition; Children's L2 development; Ethnic minority kindergarteners; Kindergarten Chinese literacy intervention; Ethnic minority child language development; L2 child metalinguistic awareness

## Introduction

Chinese belongs to the Sino-Tibetan language family and serves as the official language of China, including the regions of Hong Kong and Macau. Mandarin Chinese and Cantonese Chinese are two of the major varieties of the Chinese or Sinitic language (Handel, 2015; Liu, 2010). Learning Chinese as a second language (L2) has been gaining increasing attention in recent years in Hong Kong (e.g., Zhou, 2021; Zhu et al., 2023).

Following the implementation of the "Biliteracy and Trilingualism" policy[5] after 1997, Chinese reading skills have become crucial for academic advancement and social mobility in Hong Kong (Loh et al., 2016). This necessity has led to growing demands from ethnic minority children to learn to read Chinese (Li & Chuk, 2015). The ethnic minority population in Hong Kong primarily comprises Filipinos and Indonesians, followed by Whites, Indians, Nepalese, Pakistanis, and others (Census and Statistics Department Hong Kong Special Administrative Region, 2022). According to the latest statistics, the number of ethnic minorities in Hong Kong reached 619,568 in 2021, accounting for 8.4% of the total population, representing a significant increase of 37.3% compared to 2011.

Moreover, an increasing number of ethnic minority children are born and attend school in Hong Kong (Census and Statistics Department Hong Kong Special Administrative Region, 2022). For these children, reading Chinese in a multilingual environment poses significant challenges due to factors such as limited family involvement, linguistic differences, and a lack of support and resources (Education Bureau of Hong Kong, 2019; Massing et al., 2013). These challenges highlight the need for further research to address issues in children's L2 Chinese acquisition, particularly in Chinese reading in Hong Kong (e.g., Chan & Rao, 2023; Lau et al., 2020).

Shared book reading is considered a key approach for L2 acquisition, encompassing metalinguistic awareness, vocabulary knowledge, and reading skills (Chow et al., 2010; Hui

the other hand, learners whose first language is not Chinese and who study it as a second language are referred to as "learning Chinese as a second language (L2)".

[5] The "Biliteracy and Trilingualism" policy refers to the promotion of proficiency in written Chinese and English, as well as spoken Cantonese, Putonghua (Mandarin), and English. It is implemented primarily by government institutions, schools, businesses, media, and the general public in Hong Kong, where these languages are recognised as the official and mainstream languages.

et al., 2020; Yeung & King, 2016). However, the effectiveness of shared book reading on L2 acquisition requires further empirical supportive evidence and re-evaluation due to contradictions in previous research results (e.g., Noble et al., 2019). Moreover, in Hong Kong, previous studies have predominantly evaluated effectiveness through sub-lexical and lexical level tests, neglecting the super-lexical level.

Differences in the home literacy environment (HLE) and individual child factors are widely recognised for their impact on L2 acquisition (e.g., Chan & Rao, 2023; Lau et al., 2020; Zhu et al., 2023). In the Hong Kong research context, factors such as parent-child interaction, the number of books at home, positive attitudes toward Chinese reading, socioeconomic status, and children's age have been identified as influential in L2 Chinese acquisition (e.g., Chan & Rao, 2024; Hua, 2023; Li et al., 2022; Zhu et al., 2023). Based on these differences, scholars argue that more research should focus on the characteristics of parents and children (e.g., demographic information, language proficiency, as well as daily language input and output), and examine how these factors, combined with school-based interventions, influence L2 Chinese acquisition.

Using the bioecological framework (Grolig, 2020), this quasi-experimental study reports the implementation of a shared book reading project for L2 Chinese kindergarteners in Hong Kong and its impact on their Chinese reading development including both Chinese metalinguistic awareness as well as Chinese word and text reading. We also explore how differences in HLE (e.g., parents' oral and writing proficiency in Chinese) and individual child factors (e.g., gender and daily language use) interact with the school-based intervention project. The findings of this research could potentially enrich the empirical evidence from Hong Kong concerning the bioecological framework and shared book reading approach. Additionally, findings related to differences in HLE and at the individual child level provide insightful implications to further enhance the L2 Chinese learning of ethnic minority children in Hong Kong.

## Literature Review

### *Shared Book Reading Intervention for Children's L2 Development*

Shared book reading, also termed as 'companion reading' or 'dialogical reading' in the literature, refers to the practice of sharing or reading a book with a child. This includes sharing books with preschool children before they have begun to read themselves and reading books with older children, whether individually or in groups (Noble et al., 2019; Reese et al., 2003; Zucker et al., 2013). Compared to traditional book reading sessions, shared reading has been demonstrated to significantly enhance the language development for first language (L1; Aram et al., 2013; Chow et al., 2008) and L2 learners (Chow et al., 2010; Hui et al., 2020; Yeung & King, 2016), in areas such as metalinguistic awareness, vocabulary knowledge, word reading, and text reading. More importantly, the shared book reading intervention has been shown to be effective for the development of language skills over the long term on the children (Noble et al., 2019).

Although a considerable amount of research has been conducted in this area, several issues remain unresolved. Firstly, the effects of shared book reading on children's language development have yielded contradictory findings. For instance, Noble et al. (2019) reviewed 54 empirical studies and reported an overall small effect size, which diverged from previous

reviews reporting moderate effects (Flack et al., 2018; Mol et al., 2008). These discrepancies may be attributed to methodological differences, such as the exclusion of control groups and the lack of pre-assessment measures (Flack et al., 2018; Mol et al., 2008). Furthermore, some studies found no significant effects on some specific dimensions of language development (National Early Literacy Panel, 2008). Therefore, the effects of such interventions should be reassessed using rigorously designed research methodologies.

Secondly, it remains unclear whether the intervention of shared book reading is equally effective for children with different individual characteristics and contextual factors, which are considered potential moderators of the intervention's impact (Noble et al., 2019). Several studies have suggested that factors such as children's age and gender (Bus et al., 1995; Vandermaas-Peeler et al., 2012), children's initial proficiency in the target language (Fitton et al., 2018), the quality and quantity of language exposure at home (Hamilton et al., 2021; Tian et al., 2024), and parental socioeconomic status (Hayes & Berthelsen, 2020; Tian et al., 2024) can significantly influence the effectiveness of shared book interventions, while other studies have not found such effects (e.g., Noble et al., 2019). These contradictory findings call for future studies to explore these moderating variables to understand how different contexts and individual differences can shape the outcomes of such interventions.

Thirdly, previous research has predominantly focused on L2 outcomes at the sub-lexical or lexical levels. Sub-lexical outcomes mean phoneme sequences that form part of a known lexical item or morpheme (Jones & Witherstone, 2010). Previous studies focus on areas such as phonological, orthographic, and morphological awareness at the sub-lexical level (Zhou, 2021), and word reading, vocabulary, and word dictation at the lexical level (Zhou, 2021). However, reading comprehension at the super-lexical level, a complex and multidimensional skill involving both linguistic and cognitive processes, has been increasingly emphasised by educational policymakers and scholars (e.g., Education Bureau of Hong Kong, 2017; Patil, 2022). More research is warranted to explore outcomes at the super-lexical level--defined as meaning-bearing units whose semantic properties cannot be reduced to the meanings of individual lexical items (Schroeder et al., 2015).

*Assessing L2 Chinese Children's Chinese Reading Outcomes in Hong Kong*

In Hong Kong, most empirical studies have focused on bilingual children with English as their second language (e.g., Cheung et al., 2010; McBride-Chang et al., 2006), while research on L2 Chinese children's reading has been gaining scholarly attention in recent years. Among the previous studies, the majority have focused on improving L2 Chinese children's sub-lexical and lexical level outcomes through various teaching methods. Metalinguistic awareness is an important area of study at the sub-lexical level, which refers to the analytical ability to reflect upon and manipulate formal properties of language and the attentional control of the mental mechanisms that operate language processing (Bialystok, 2001; Bialystok & Ryan, 1985). For example, Zhou (2021) conducted a twelve-week intervention with 118 L2 Chinese children in Hong Kong. She divided the L2 Chinese children into three experimental groups: shared reading (SR), shared reading combined with multisensory instruction (SR+MS), and shared reading combined with morphological instruction (SR+MA). She found that the SR+MS group outperformed the other two groups in their development of L2 Chinese metalinguistic awareness (phonological awareness, homophone awareness, and orthographic discrimination), as well as in word reading and writing (word reading, vocabulary knowledge, and word dictation). Additionally, the SR+MA group performed best in vocabulary knowledge.

Another example is the research by Lau and colleagues (2020), which found that 44 L2 Chinese kindergarteners from ethnic minority families in Hong Kong who received an eight-week intervention of Chinese literacy performed significantly better than the control group at post-test in morphological awareness, word reading, and writing when taught using either Copying and Morphological Awareness Training (CMAT) or the Integrative Perceptual Approach (IPA). Similar research findings were also reported in studies by Chan and Rao (2024), Leung and Cheung (2020), Zhou et al. (2017), Zhou and McBride (2015) and others. As mentioned above, Chinese sentence and text reading is crucial for continuous language development for L2 Chinese children, highlighting the need for further research to focus more on this area.

**Super-lexical outcomes as a focus.** A small number of researchers have focused on testing the super-lexical reading outcomes of L2 Chinese children in Hong Kong. For instance, Wong (2017) investigated the relationships between Chinese reading comprehension and its two component processes—Chinese character reading and listening comprehension—using a longitudinal study. The study involved 142 senior primary ethnic minority children in Hong Kong who were learning Chinese as a second language. The reading comprehension tests were primarily adapted from the *Hong Kong Attainment Test* (*HKAT*), a local standardised test for Grade 1 and Grade 2 levels, published across various years (Educational Research Section of the Hong Kong Education Department, 1989a, b, 1999a, b). The test items focused either on: 1. The sentence level, requiring participants to complete sentences by filling in characters or words (in multiple-choice or cloze formats), or 2. The passage level, requiring them to answer questions about a short passage (in multiple-choice or short-answer formats). The findings revealed that both component processes significantly influenced the reading comprehension of L2 Chinese children during the year of the study and the following year. Another research conducted by Zhu and his colleagues (2023) used a testing instrument based on the List of Chinese Lexical Items and the List of Chinese Grammatical Usage Items from previous studies (Chan, 2007; Ke & Chan, 2017), and aimed to assess L2 Chinese children's comprehension and use of Chinese vocabulary, phrases, and sentences. However, the previous research did not include any intervention or control groups.

*Home Literacy Environment and Children's Individual Factors on L2 Chinese Acquisition in Hong Kong*

Home literacy environment (HLE) refers to literacy activities or the availability of literacy resources at home which can be used to facilitate children's literacy development (Puglisi et al., 2017), and are widely recognised for their impact on children's language development in L2 contexts (e.g., Chan & Rao, 2023; Lau et al., 2020; Wang & Tsung, 2022; Zhu et al., 2023).

In recent years, more research has focused on how HLE affects L2 Chinese acquisition in Hong Kong, particularly emphasising the effectiveness of parent-child interactions. For example, Chan and Rao (2024) conducted a home-based intervention involving 78 kindergarteners from ethnic minority families in Hong Kong. Parents in the experimental group received training on shared book reading activities with their L2 Chinese children. The results showed that higher-quality parent-child reading interactions enhanced children's intrinsic reading motivation and oral vocabulary in L2 Chinese. In addition, factors such as the number of Chinese books at home, positive attitudes toward Chinese reading (Zhu et al.,

2023), and the family's socioeconomic status (Chan & Rao, 2023) have also been identified as influential in L2 Chinese acquisition.

However, existing research appears to overlook the role of parental traits, such as their reading ability (Hart et al., 2021; Liu & Chung, 2024). More fundamentally, the parental language and reading skills are likely to determine the amount and quality of shared reading, ultimately affecting children's L2 competence (Grolig, 2020; Mol & Bus, 2011; Zhu et al., 2023). Moreover, while much of the research focuses on home-based interventions in Hong Kong (e.g., Chan & Rao, 2024; Lau et al., 2020), school-based interventions are equally important for language development. The complex relationships between HLE factors and school-based interventions remain unclear, particularly in terms of how HLE factors might moderate the effectiveness of these interventions.

At the individual child level, age has been widely discussed as a critical variable influencing L2 Chinese acquisition outcomes in Hong Kong (e.g., Hua et al., 2023; Li et al., 2022) and in other L2 contexts (e.g., Huang, 2014). On the one hand, the age of initial onset of L2 Chinese exposure is negatively correlated with L2 proficiency (Li et al., 2022). For example, Hua et al. (2023) found that the earlier one begins learning Cantonese, the more proficient one becomes, based on survey data from 260 primary and secondary students. Li and Chuk (2015) reported similar findings. On the other hand, age also reflects generation status, which refers to the children's age of arrival and length of residence (Li et al., 2022). For example, Cheung (2019) found that South Asian children born in Hong Kong performed better than those who arrived after age six, though there was no significant difference between the early- and late-arrival groups. Another important factor is the country of origin. For instance, Hua and colleagues (2023) found that Cantonese proficiency among participants from India and Pakistan was significantly higher than that of participants from Nepal and the Philippines.

Based on the existing research results, scholars have called for future studies on L2 Chinese acquisition in Hong Kong to consider learner variables such as gender, ethnicity, and HLE in order to account for variability in learners' outcomes and to assess both the short- and long-term impacts of interventions (Lau et al., 2020; Li et al., 2022; Zhu et al., 2023).

*Perspective of the Bioecological Framework*

As a pivotal model in language acquisition, Grolig (2020) proposed a tripartite interactive framework for language learning through shared storybook reading. This model emphasises the dynamic interaction between individual development and environmental factors over time, highlighting the significance of individual differences in this interplay. Specifically, the model focuses on the interaction between three core elements: The child, the adult (usually a parent or teacher), and the book. In the contexts of the HLE and childcare literacy environment (CCLE), the dynamic interaction of these elements plays a crucial role in influencing language development.

Grolig's model was developed based on the bioecological model of human development (Bronfenbrenner & Morris, 2006) and the Home Literacy Model (Sénéchal & LeFevre, 2002; 2014), offering three key advances over previous frameworks (Bronfenbrenner & Morris, 2006; Sénéchal & LeFevre, 2002, 2014). First, it underscores the significance of both the HLE and CCLE in language development, guiding the inclusion of both school-based interventions and HLE factors in this study. Second, the model emphasises the interactive relationship between the children, the adult, and the book, offering a more comprehensive

perspective on how these elements influence language development during shared reading. The adult is encouraged to adjust the interactions (e.g., book selection, question difficulty) based on the child's language skills and prior knowledge. Moreover, the child's interest, motivation, and engagement in the shared book are predictive of their language development and reading performance before they become independent readers (Frijters et al., 2000; Hume et al., 2015). Third, it highlights individual differences, noting that the child's cognitive function, working memory, and vocabulary, along with the adult's reading interests and book characteristics (e.g., grammar, narrative structure), are critical in explaining the effects of shared reading on language skills. Grolig emphasises that parents' language and reading abilities are particularly influential in the HLE, determining the quality and frequency of shared reading.

## The Present Study

Our intervention and research design were grounded in the bioecological framework (Grolig, 2020). In this study, school-based shared book reading interventions (Reading Scheme project) were implemented, with the instruction tailored to the characteristics of the children, the books, and the intervention teachers. When evaluating effectiveness, HLE factors were considered potential moderating factors. The shared book reading approach used in this study, developed by the researchers, was based on Bergman Deitcher et al.'s (2019) principles, incorporating rich illustrations, simple repetitive sentences, and engaging, relatable content connected to daily life. The intervention project was delivered by Reading Ambassadors (RAs), who were trained by the research team and assumed the adult role of 'teacher'. The intervention lessons began with multimedia tools and references to children's interests to stimulate engagement. RAs used dialogic reading to explore picture books, followed by teaching key vocabulary and grammar through strategies like morphological analysis, audio-visual aids, and role-playing. Children reinforced learning with game-based practice.

To address the gaps in previous research, this study aimed to evaluate the effectiveness of a shared book reading intervention on L2 Chinese kindergarteners from ethnic minority families in Hong Kong. Additionally, this research sought to explore how differences in HLE and children's individual characteristics moderate the intervention's effectiveness. This research serves as a pilot study for The Hong Kong Jockey Club Charities Trust's "C-for-Chinese@JC in Kindergarten Sector to Cultivate Culturally Responsive Education" project.

### *Hypotheses*

Three hypotheses were proposed:
**Hypothesis 1**: The school-based shared book reading intervention is effective for the experimental L2 Chinese children's reading (i.e., metalinguistic awareness as well as word and text reading) in Chinese, as indicated by significant differences compared to the control L2 Chinese group's scores in the post-test.
**Hypothesis 2**: The experimental L2 Chinese children's home literacy environment factors (i.e., parental oral and written proficiency in Chinese) moderate the effectiveness of the school-based shared book reading intervention.
**Hypothesis 3**: The experimental L2 Chinese children's individual-level factors (i.e., gender and daily language use) moderate the effectiveness of the school-based shared book reading intervention.

## Methodology

### *Participants*

A total of 161 L2 and L1 Chinese kindergarten children participated in this study. After rigorous data quality checks, all participants' data were verified to be complete and authentic, meeting the inclusion criteria. These children were in their second and third years of kindergarten, aged between 5 and 6 years. They were from 20 kindergartens in Hong Kong. The participants were divided into three groups: 1. The experimental group, consisting of L2 Chinese children from ethnic minority families; 2. The control group of L2 Chinese children; and 3. The control group of L1 Chinese children. L2 Chinese children were first categorised into three levels—high, medium, and low proficiency—according to their previous Chinese scores. Within each level, L2 Chinese children were then randomly assigned to either the experimental group or the control group. Students' gender and age were also taken into consideration during the grouping process. As a result, the experimental L2 Chinese group consisted of 97 children (60.2%), the control L2 Chinese group consisted of 47 children (29.2%), and the control L1 Chinese group consisted of 17 children (10.6%).

Additionally, parent survey data were collected, yielding 35 valid responses from the parents of children in the experimental L2 Chinese group. According to information provided by the parents, their children's nationalities were as follows: India (22), Pakistan (9), Bangladesh (1), the Philippines (1), the United Kingdom (1), and Portugal (1). These children's daily languages were ranked as follows: English (15), Hindi (14), Urdu (5), and Pashto (1). All participants or their guardians were informed of the research objectives, content, data usage and storage, and have provided written consent.

### *Procedures*

To test the three hypotheses, a pilot quasi-experimental study was conducted with a total of 161 participants from kindergartens in Hong Kong. Among the three groups in this study, the experimental L2 Chinese group participated in a sixteen-week shared book reading intervention, while the control L2 Chinese and L1 Chinese children followed the regular kindergarten Chinese lessons. All three groups completed a Chinese reading post-test, which included assessments of Chinese metalinguistic awareness as well as Chinese word and text reading. Among the experimental L2 Chinese group, some parents were invited to complete a survey, and 35 valid responses were received.

For the shared book reading intervention, the experimental L2 Chinese children participated in our Reading Scheme project, which ran for sixteen weeks, with sixteen half-hour lessons each week. RAs led the shared reading sessions using four books, designed by the researchers according to the principles outlined by Bergman Deitcher et al. (2019). All the shared books were written in traditional Chinese, and the lessons were conducted in Cantonese which is used as the medium of instruction at the children's schools.

The intervention project was conducted in groups, with each group consisting of six to eight children, led by two RAs. One RA acted as the primary instructor, responsible for teaching key concepts and guiding the children through picture book reading. The other RA served as an assistant, maintaining classroom order, re-engaging children who lost focus, monitoring their performance, and providing assistance as needed.

The intervention was divided into four parts. First, RAs used multimedia tools like pictures and videos, as well as references to children's experiences and interests, to spark engagement and motivation. Next, they employed dialogic reading to explore the picture books with the children. Vocabulary from the story was then taught through strategies such as morphological analysis, contextual connections, audio-visual aids, and role-playing to cover the forms, pronunciations, meanings, and applications of Chinese characters. Finally, children reinforced their learning with game-based practice, and each session ended with a brief two-minute review to summarise and reinforce the newly learned vocabulary. For children in their second year of kindergarten (K2), the themes of the picture books were "Who am I?" "Birthday Gift" "My Favourite Fruit" and "Dad Takes the Subway to Work," while for children in their third year of kindergarten (K3), the themes were "What is Your Name?" "Guess What" "My Favourite Food" and "I'm Almost Late".

To enhance cultural acceptance, the characters in the shared books were drawn from different ethnicities, such as Southeast Asians and South Asians. The content of the intervention books and the teaching methods were carefully designed to respect the diverse cultures of various ethnic minority groups, which could enhance their cultural self-identity. Additionally, the research team collaborated with school teachers to explain the study's design principles, process, and data collection details to parents. Efforts were made to eliminate potential cultural bias, ensuring the study adequately addresses issues of cultural sensitivity.

*Measurements*

**Chinese metalinguistic awareness.** Children's Chinese metalinguistic awareness was assessed using a park-themed test paper, adapted from the *Chinese Language Use Evaluation* (Chan, 2022) and informed by the framework for the Chinese learning process of non-Chinese speaking preschool students in Hong Kong (Lam et al., 2018). The texts for the park theme included 39 characters and assessed four dimensions of Chinese metalinguistic awareness: awareness of print conventions, sound awareness, awareness of Chinese word features, as well as radicals and Chinese characters. The test consisted of 4 items with a total possible score of 12. The Cronbach's alpha was .642, indicating adequate internal consistency (George & Mallery, 2003; Nunnally, 1978).

**Chinese word and text reading.** Similar to reading awareness, the children's Chinese word and text reading were also assessed using a park-themed test paper, adapted from the *Chinese Language Use Evaluation* (Chan, 2022). The assessment covered five dimensions: Chinese word read aloud (read aloud), text read aloud (read aloud), text read aloud (read understanding), text retelling, and relating text to life experiences. There were 5 items in total with a maximum possible score of 17. The Cronbach's alpha was .817, indicating good internal consistency.

**Parent Survey.** The parent survey in this study aimed to identify potential impact factors at both the individual and HLE levels. It gathered demographic information on the children, including age, gender, nationality, and daily language use, as well as their initial Chinese proficiency, which was categorised into three levels. Additionally, the survey examined the HLE-related factors, assessing parents' oral and written proficiency in Chinese, which were classified into two tiers. Participating parents were provided with a bilingual survey questionnaire in both Chinese and English, and they could respond in the language they were most comfortable with. There were nine items in the parent survey (see Appendix A).

*Data Analysis*

As previously mentioned, the dataset comprised test results from 161 children and survey responses from 35 parents. A descriptive analysis was initially conducted to address the first research hypothesis. The dependent variables in both the experimental and control groups were approximately normally distributed, as indicated by absolute skewness and kurtosis values not exceeding two (Kim, 2013; Tabachnick & Fidell, 2019).

Following this, a one-way analysis of variance (ANOVA) was carried out to examine potential differences in Chinese metalinguistic awareness as well as Chinese word and text reading between the experimental L2 Chinese, the control L2 Chinese and L1 Chinese groups in the post-test. Levene's test of equality of error variances revealed that the significance values for metalinguistic awareness, as well as word and text reading, were below .05, indicating a violation of the assumption of homogeneity of variances. In contrast, the significance value for the overall reading score exceeded .05, thus satisfying the assumption of homogeneity. Consequently, Tamhane's T2 post hoc test was utilised (Field, 2013).
A multivariate analysis of covariance (MANCOVA) was conducted to address the second and third research hypotheses. This method is particularly effective in studies that involve strict experimental control, such as accounting for confounding variables, when assessing the impact of experimental manipulations (Field, 2013). To ensure the accuracy of the MANCOVA and to account for potential influences of children's age (in months), nationality, and initial Chinese proficiency (see the Literature Review), these three variables were included as covariates. This approach helped control for confounding factors that might affect post-test scores, thereby enhancing the robustness of the analysis by minimising biases associated with individual differences in age, nationality, and baseline Chinese proficiency. To validate the MANCOVA results, Levene's test of equality of error variances was used to assess the homogeneity of variances. The *p*-values for Chinese metalinguistic awareness and Chinese word and text reading scores were above .05, confirming that the assumption of equal variances across groups was met, which supported the validity of the MANCOVA findings. Consequently, Wilks' lambda was utilised in the multivariate test to examine the overall impact of the independent variables on the two dependent variables (Cramer & Howitt, 2004). Based on these results, a test of between-subject effects was subsequently conducted to further explore the specific impact of the independent variables on each dependent variable. Post hoc comparisons following MANCOVA were performed to investigate between-group differences further.

Given the results of the homogeneity of variances test, the Least Significant Difference (LSD) method was chosen for these post hoc analyses (Rogers, 1999). In the MANCOVA, partial $\eta^2$ (eta squared) was used to measure effect sizes, as it estimates the proportion of variance in the dependent variables explained by the independent variable(s) while controlling for other variables. According to Cohen (1988), partial $\eta^2$ values of .01, .06, and .14 represent small, medium, and large effects, respectively. A 95% confidence interval was used in all analyses, which were conducted using SPSS 27.0.

## Results

*The Effectiveness of the School-based Reading Intervention*

The descriptive analysis of the post-test results revealed that children in the experimental L2 Chinese group achieved higher scores in both Chinese metalinguistic awareness ($M$ = 9.15) and Chinese word and text reading ($M$ = 7.63) compared to the control L2 Chinese group (see Table 1).

Table 1. *Descriptive Analysis Results for the Post-test (N=161)*

| Groups | Chinese metalinguistic awareness | | | | Chinese word and text reading | | | | Total score | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *S* | *K* | *M* | *SD* | *S* | *K* | *M* | *SD* | *S* | *K* |
| Experimental L2 Chinese group (97) | 9.15 | 2.01 | -.51 | -.28 | 7.63 | 5.40 | .36 | -.85 | 16.78 | 6.80 | .25 | -.89 |
| Control L2 Chinese group (47) | 7.79 | 2.89 | .001 | -.99 | 4.89 | 4.28 | 1.02 | 1.12 | 12.68 | 6.68 | .53 | -.09 |
| Control L1 Chinese group (17) | 9.41 | 2.24 | -.48 | -.81 | 10.41 | 2.90 | .57 | -.76 | 19.82 | 4.65 | .14 | -.74 |

*Note.* *M* represents the mean score. *SD* represents the standard deviation. *S* represents the skewness, and *K* represents the kurtosis.

ANOVA results further confirmed the intervention's effectiveness. Overall, for the total score, a significant main effect of group assignment was found, $F$ (2, 158) = 9.54, $p < .001$, $\eta^2 = .11$, indicating significant differences in post-test total scores across the three groups. As shown in Table 2, post hoc comparisons using Tamhane's T2 demonstrated that the experimental L2 Chinese group performed similarly to the control L1 Chinese group (*Mean difference* = -3.04, $p = .084$) and significantly outperformed the control L2 Chinese group (*Mean difference* = 4.10, $p = .003$).

Specifically, for Chinese metalinguistic awareness, ANOVA revealed a significant main effect of group assignment, $F$ (2, 158) = 6.18, $p = .003$, $\eta^2 = .07$, confirming significant differences in post-test metalinguistic awareness scores across the groups. Post hoc comparisons indicated that the experimental L2 Chinese group scored significantly higher than the control L2 Chinese group (*Mean difference* = 1.37, $p = .014$), with no significant difference between the experimental L2 Chinese and control L1 Chinese groups (*Mean difference* = -.26, $p = .961$). This suggests that the intervention helped L2 Chinese children improve their Chinese metalinguistic awareness to a level comparable to L1 Chinese children. Regarding Chinese word and text reading, ANOVA also showed a significant main effect of group assignment, $F$ (2, 158) = 9.27, $p < .001$, $\eta^2 = .11$. Post hoc analyses revealed significant differences among the three groups: the experimental L2 Chinese group outperformed the control L2 Chinese group (*Mean difference* = 2.74, $p = .004$), while native Chinese-speaking children still performed significantly better than both the experimental L2 Chinese (*Mean difference* = 2.78, $p = .010$) and control L2 Chinese groups (*Mean difference* = 5.52, $p < .001$).

Table 2. *Post Hoc Comparisons Between Three Groups Following ANOVA (N=161)*

| Comparison | Mean difference | *SE* | Sig. | 95% CI (Lower) | 95% CI (Upper) |
|---|---|---|---|---|---|
| Chinese metalinguistic awareness | | | | | |
| Experimental L2 Chinese group vs. control L2 Chinese group | 1.37* | .47 | .014 | .22 | 2.51 |

| | | | | | |
|---|---|---|---|---|---|
| Experimental L2 Chinese group vs. control L1 Chinese group | -.26 | .58 | .961 | -1.76 | 1.25 |
| Control L2 Chinese group vs. control L1 Chinese group | -1.63 | .69 | .069 | -3.34 | .09 |
| Chinese word and text reading | | | | | |
| Experimental L2 Chinese group vs. control L2 Chinese group | 2.74** | .83 | .004 | .72 | 4.75 |
| Experimental L2 Chinese group vs. control L1 Chinese group | -2.78* | .89 | .010 | -5.00 | -.56 |
| Control L2 Chinese group vs. control L1 Chinese group | -5.52*** | .94 | <.001 | -7.85 | -3.18 |
| Total score | | | | | |
| Experimental L2 Chinese group vs. control L2 Chinese group | 4.10** | 1.19 | .003 | 1.20 | 7.01 |
| Experimental L2 Chinese group vs. control L1 Chinese group | -3.04 | 1.32 | .084 | -6.39 | .31 |
| Control L2 Chinese group vs. control L1 Chinese group | -7.14*** | 1.49 | <.001 | -10.85 | -3.43 |

*Note. SE* stands for standard error. *Sig.* represents the significance level. *means $p < .05$, **means $p < .01$, ***means $p < .001$. *95% CI* stands for a 95% confidence interval.

*The Moderating Role of HLE Differences and Individual Differences*

The MANCOVA results offered insights into potential influencing factors from the home literacy environment and child-specific variables on children's L2 reading in Chinese. The multivariate tests revealed the overall effects of the independent variables on the combined dependent variables. Follow-up tests of between-subjects effects examined the specific impact of each independent variable on individual dependent variables. Post hoc comparisons were conducted to further investigate significant group differences identified in the MANCOVA.

Among the 35 valid parental questionnaires analysed in this study, all the mothers' oral and written proficiency in the Chinese language was rated as 'poor', which lacked variability. Consequently, these variables were not included as independent variables in the MANCOVA analysis. Variables that do not vary cannot explain outcomes; thus, removing such variables can reduce noise and make the results more interpretable without compromising statistical power, and helps maintain the robustness and reliability of the model. The multivariate test results are presented in Table 3.

Table 3. *Multivariate Test Results (N=35)*

| Effect (Wilks' lambda) | Value | *F* | Hypothesis *df* | Error *df* | Sig. | Partial $\eta^2$ |
|---|---|---|---|---|---|---|
| Father's oral proficiency in Chinese | .73 | 4.87* | 2.00 | 26.00 | .016 | .273 |
| Father's written proficiency in Chinese | .81 | 3.00 | 2.00 | 26.00 | .067 | .187 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Child's gender | .96 | .51 | 2.00 | 26.00 | .605 | .038 |
| Child's daily language use | .86 | 2.21 | 2.00 | 26.00 | .130 | .145 |
| Child's age | .93 | 1.03 | 2.00 | 26.00 | .372 | .073 |
| Child's nationality | .81 | 2.98 | 2.00 | 26.00 | .068 | .187 |
| Child's initial Chinese proficiency | .59 | 9.00** | 2.00 | 26.00 | .001 | .409 |

*Note. F* refers to the F-statistics, used to test whether the differences among group means are statistically significant. *Sig.* represents the significance level. *means $p < .05$, **means $p < .01$, ***means $p < .001$. *Partial* $\eta^2$ (eta squared) measures effect size, and the values of .01, .06, and .14 indicate small, medium, and large effects, respectively.

The multivariate test results revealed that the father's oral proficiency in Chinese had a significant effect on their child's L2 Chinese reading [Wilks' $\lambda = 0.73$, $F$ (2, 26) = 4.87, $p$ = .016, partial $\eta^2 = .273$]. It is noteworthy that the effect of the child's initial Chinese proficiency on reading was also significant [Wilks' $\lambda = 0.59$, $F$ (2, 26) = 9.00, $p$ = .001, partial $\eta^2 = .409$], indicating that this covariate played a crucial role in the model by reducing confounding effects and thereby enhancing the effectiveness of the analysis.

Following the multivariate tests, univariate tests (i.e., between-subject effects) were conducted to delve deeper into the specific effects of different factors on the dependent variables (see Table 4). For Chinese metalinguistic awareness, none of the factors showed a statistically significant effect. However, the father's written proficiency in Chinese [$F$ (1, 27) = 2.35, $p$ = .137, partial $\eta^2 = .080$] approached significance and demonstrated moderate effect sizes (the post hoc comparison results for Chinese metalinguistic awareness are presented in Table 5.).

In contrast, for Chinese word and text reading, the father's oral proficiency in Chinese [$F$ (1, 27) = 4.50, $p$ = .043, partial $\eta^2 = .143$] and the child's daily language use [$F$ (1, 27) = 4.58, $p$ = .042, partial $\eta^2 = .145$] were statistically significant predictors, each demonstrating large effect sizes. Specifically, children whose fathers had higher oral proficiency in Chinese (*Mean difference* = 7.67, $p$ = .043) and those who used an ethnic language daily (mainly Hindi and Urdu; *Mean difference* = 2.24, $p$ = .042) demonstrated better performance in Chinese word and text reading as compared to English speakers (see Table 6). These findings underscore the influence of parental language proficiency and children's daily language use on distinct aspects of reading development, suggesting that these factors may impact different types of reading tasks in varied ways.

Table 4. *Results on tests of between-subjects effects (N=35)*

| Impact factors | Sum of squares | *df* | Mean square | *F* | Sig. | Partial $\eta^2$ |
|---|---|---|---|---|---|---|
| Chinese metalinguistic awareness | | | | | | |
| Father's oral proficiency in Chinese | 1.31 | 1 | 1.31 | .38 | .545 | .014 |
| Father's written proficiency in Chinese | 8.17 | 1 | 8.17 | 2.35 | .137 | .080 |
| Child's gender | 1.74 | 1 | 1.74 | .50 | .486 | .018 |
| Child's daily language use | 5.10 | 1 | 5.10 | 1.47 | .236 | .052 |
| Child's age | 4.25 | 1 | 4.25 | 1.22 | .279 | .043 |
| Child's nationality | 10.61 | 1 | 10.61 | 3.05 | .092 | .102 |
| Child's initial Chinese proficiency | 1.03 | 1 | 1.03 | .30 | .591 | .011 |
| Error | 93.89 | 27 | 3.48 | | | |
| Total | 2462.00 | 35 | | | | |
| Corrected total | 124.97 | 34 | | | | |
| Chinese word and text reading | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Father's oral proficiency in Chinese | 34.22 | 1 | 34.22 | 4.50* | .043 | .143 |
| Father's written proficiency in Chinese | 3.20 | 1 | 3.20 | .42 | .522 | .015 |
| Child's gender | 8.00 | 1 | 8.00 | 1.05 | .314 | .037 |
| Child's daily language use | 34.80 | 1 | 34.80 | 4.58* | .042 | .145 |
| Child's age | .07 | 1 | .07 | .01 | .925 | .000 |
| Child's nationality | 46.27 | 1 | 46.27 | 6.08* | .020 | .184 |
| Child's initial Chinese proficiency | 106.97 | 1 | 106.97 | 14.07** | .001 | .343 |
| Error | 205.32 | 27 | 7.61 | | | |
| Total | 998.00 | 35 | | | | |
| Corrected total | 405.54 | 34 | | | | |

*Note.* $R^2_{metalinguistic\ awareness}$ = .249 (Adjusted $R^2_{metalinguistic\ awareness}$ = .054), $R^2_{word\ and\ text\ reading}$ = .494 (Adjusted $R^2_{word\ and\ text\ reading}$ = .362). *df* stands for degrees of freedom. *F* refers to the F-statistic, used to test whether differences among group means are statistically significant. *Sig.* represents the significance level, *means $p < .05$, **means $p < .01$, ***means $p < .001$. *Partial* $\eta^2$ (eta squared) measures effect size, and the values of .01, .06, and .14 indicate small, medium, and large effects, respectively.

Table 5. *Post Hoc Comparison Results for Chinese Metalinguistic Awareness Following MANCOVA (N=35)*

| Comparison | Mean difference | *SE* | Sig. | 95% CI (Lower) | 95% CI (Upper) |
|---|---|---|---|---|---|
| Father's oral proficiency in Chinese | | | | | |
| High level versus Low level | -1.50 | 2.45 | .545 | -6.52 | 3.52 |
| Father's written proficiency in Chinese | | | | | |
| High level versus Low level | 3.15 | 2.05 | .137 | -1.07 | 7.37 |
| Child's gender | | | | | |
| Male versus Female | .49 | .69 | .486 | -.93 | 1.91 |
| Child's daily language use | | | | | |
| Ethnic language versus English | .86 | .71 | .236 | -.60 | 2.31 |

*Note. SE* stands for standard error. *Sig.* represents the significance level, *means $p < .05$, **means $p < .01$, ***means $p < .001$. *95% CI* stands for a 95% confidence interval.

Table 6. *Post Hoc Comparison Results for Chinese Word and Text Reading Following MANCOVA (N=35)*

| Comparison | Mean difference | *SE* | Sig. | 95% CI (Lower) | 95% CI (Upper) |
|---|---|---|---|---|---|
| Father's oral proficiency in Chinese | | | | | |
| High level versus Low level | 7.67* | 3.62 | .043 | .25 | 15.09 |
| Father's written proficiency in Chinese | | | | | |
| High level versus Low level | -1.97 | 3.04 | .522 | -8.20 | 4.26 |
| Child's gender | | | | | |
| Male versus Female | 1.05 | 1.02 | .314 | -1.05 | 3.15 |
| Child's daily language use | | | | | |
| Ethnic language versus English | 2.24* | 1.05 | .042 | .09 | 4.39 |

*Note. SE* stands for standard error. *Sig.* represents the significance level, *means $p < .05$, **means $p < .01$, ***means $p < .001$. *95% CI* stands for a 95% confidence interval.

## Discussion

There were three main findings in this research. First, the sixteen-week shared book reading intervention was effective in improving Chinese reading among L2 Chinese children from ethnic minority families in Hong Kong. The post-test scores of the experimental L2 Chinese children were higher than those of the control L2 Chinese group in both Chinese metalinguistic awareness and Chinese word and text reading. In fact, the experimental L2 Chinese group's metalinguistic awareness was comparable to that of L1 Chinese children in the post-test. This finding fully supports the first hypothesis of this study.

Secondly, with regard to how HLE factors moderate the intervention's effectiveness, fathers' oral proficiency in Chinese was found to be a key influencer, particularly on their children's Chinese word and text reading. This partially confirmed the second hypothesis.

Lastly, L2 Chinese children's daily language use was also identified as influencing the intervention's effectiveness, with ethnic language users performing better in Chinese word and text reading. However, gender was found to have no effect. These findings partially confirmed the third hypothesis.

### *The Shared Book Reading Intervention is Effective in Enhancing L2 Chinese Children's Metalinguistic Awareness*

Initially, the shared book reading intervention was found to be effective for L2 Chinese children in the Hong Kong context, with improvements in metalinguistic awareness being greater than those in word and text reading. Two potential reasons may explain this result. First, as a sub-lexical skill, metalinguistic awareness serves as the foundation for reading. Its development is structured, following specific rules that require purposeful training and can be directly taught (Gombert, 1992; Zipke, 2011). In contrast, the development of word and text reading relies not only on metalinguistic awareness but also on the accumulation of vocabulary and background knowledge (Cain et al., 2004; Webb & Chang, 2015). Second, it might also be due to the evaluation tool being more sensitive to metalinguistic awareness. The structured nature of development facilitates systematic improvement and can be more easily captured by the assessment tool.

Notably, the experimental L2 Chinese child group performed similarly to native Chinese-speaking child group in metalinguistic awareness in the post-test. This finding differs from previous results, which have shown that ethnic and language minority children rarely catch up with their language-majority counterparts (e.g., August & Shanahan, 2006). One possible explanation is the high malleability of children's metalinguistic awareness. As discussed, its structured developmental characteristics enable systematic improvement through targeted training, as evidenced by the rapid enhancement of L2 Chinese children's metalinguistic awareness after shared-book reading intervention.

Another reason could be the cross-language transfer of metalinguistic awareness. As early as 1993, Durgunoğlu and colleagues, in a study involving 27 children, proposed that Spanish-speaking children's phonological awareness in Spanish could predict their English word identification and subsequently enhance their L2 literacy. Similar results have been consistently found in subsequent research (e.g., Koda, 2008; McBride-Chang et al., 2004). Specifically, regarding Chinese acquisition, Wang et al. (2006) indicated that, even after accounting for the effects of Chinese-based predictors, English morphological awareness of

compound structures still contributed to variance in both character reading and reading comprehension in Chinese. Therefore, the experimental L2 Chinese children's metalinguistic awareness in their first language may have transferred to Chinese learning, which provides another explanation for their similar performance to L1 Chinese children.

*Fathers' Oral Proficiency in Chinese Moderates the Effectiveness of Reading Interventions in L2 Chinese Children's Word and Text Reading*

In terms of the influence of HLE differences on L2 Chinese kindergarteners' reading, the fathers' proficiency in Chinese had a more profound moderating effect on the intervention's effectiveness compared to the mothers', aligning with earlier research (e.g., Baker, 2014; Hoff, 2006; Varghese & Wachen, 2015). Previous studies suggest that fathers tend to use more complex and varied language at home, and they often focus more on task-related activities and reading objectives, which can enhance children's reading (Pancsofar & Vernon-Feagans, 2006; Varghese & Wachen, 2015). In contrast, mothers tend to use more simple and familiar language (Varghese & Wachen, 2015).

Beyond gender differences, the unique context of Hong Kong further explains this finding. Ethnic minority men are generally more educated and more engaged in the workforce than ethnic minority women (Census and Statistics Department Hong Kong Special Administrative Region, 2022) due to differences in cultural norms, gender roles, economic demands, and social support. This increases the likelihood that fathers use more complex language and engage in more frequent, higher-quality language interactions with their children, which in turn predicts better reading performance (Baker, 2014; Tamis-LeMonda et al., 2012; Varghese & Wachen, 2015). The particular research context also helps explain why the mothers from ethnic minority families in this study generally had lower proficiency in Chinese.

Specifically, fathers' oral proficiency in Chinese has a stronger influence on children's reading development than their written proficiency, particularly in predicting children's L2 Chinese word and text reading. As the primary mode of communication, oral language proficiency plays a key role in family interactions and can enhance the accurate input of the target language (Weisleder & Fernald, 2013). In both daily conversations and storytelling tasks, parents tend to use more diverse spoken language (Nippold et al., 2017). Therefore, fathers with higher oral proficiency in the target language can support their children's vocabulary development, semantic knowledge, and text reading (Britto et al., 2006; Head Zauche et al., 2016; Hoff, 2003; Saracho & Spodek, 2010). Our findings further confirmed previous, though limited, research (e.g., d'Apice & von Stumm, 2020; Gilkerson et al., 2018). For instance, d'Apice and von Stumm (2020) used digital audio recorders to observe 107 children and their families over three days, alongside other measures to assess the children's language abilities, cognitive abilities, and parents' literacy behaviours, among other factors. Their results indicated that the adult spoken language to which children were exposed accounted for 12% of the variance in their language abilities, whereas parents' literacy behaviours were not.

In terms of why fathers' oral proficiency in Chinese particularly influences their children's word and text reading rather than metalinguistic awareness, the above explanation also applies. Oral input typically occurs in natural contexts, such as daily conversations or storytelling, which often lack professional and systematic language training. This kind of input is more beneficial for the development of children's vocabulary, semantic knowledge,

and text reading (d'Apice & von Stumm, 2020). Metalinguistic awareness, on the other hand, is an abstract concept that requires deliberate attention and explanation from teachers, along with specific teaching strategies, such as self-talk, prediction, and decoding skills (Alegria et al., 1982; El Euch & Huot, 2015). This seems challenging for non-professional parents from ethnic minority backgrounds.

*Ethnic Language Daily Use Moderates the Effectiveness of Reading Interventions in L2 Chinese Children's Word and Text Reading*

This study found that ethnic-language-speaking children showed greater improvement in Chinese word and text reading compared to their English-speaking counterparts. In this study, the daily languages predominantly used by ethnic-language-speaking children were Hindi and Urdu. The concept of a heritage language is understood as one that is spoken by ancestors and passed down within a community (Cummins, 2005). For ethnic minority children, Hindi and Urdu are recognised as heritage languages (Bhatt, 2018), while English has played a significant role since colonial times (Gargesh, 2019). There is extensive empirical evidence supporting the interdependence across languages (Cummins, 2001). Students utilise the conceptual knowledge of their heritage language to comprehend L2 input, which in turn interacts with and influences the heritage language (Cummins, 2005). Speakers of the heritage language can accrue considerable family cultural capital and community social capital, which are closely linked to heritage language literacy and subsequently affect L2 literacy (Lo-Philip, 2010).

The analysis did not find that gender moderated the effectiveness of the reading intervention for L2 Chinese children. In contrast to international research from other countries (Chiu et al., 2017), which highlights gender differences in language acquisition, the influence of gender on ethnic minority children's L2 Chinese acquisition in Hong Kong appears to be more complex and contradictory. On the one hand, given the patriarchal culture in ethnic minority families and relatively low socioeconomic status in Hong Kong, boys have often been assumed to outperform girls in L2 Chinese learning (Gu, 2015; Gu et al., 2019). On the other hand, more recent research suggests that girls may actually outperform boys. For example, Gu et al.'s (2022) study of 881 South Asian immigrant adolescents in Hong Kong found that girls reported higher proficiency in Chinese reading and writing compared to boys. The findings of this study indicate that female children from ethnic minority families are increasingly gaining educational capital and opportunities in Hong Kong, thereby reducing gender differences. However, considering that girls typically develop language skills faster than boys during early childhood (Davies, 2004), more educational attention should be given to ethnic minority girls in Hong Kong to counteract gender discrimination, marginalisation within the family, and other barriers (Gu et al., 2022).

## Significance and Limitations

The findings of this study provide new empirical evidence on the impact of the shared book reading intervention on L2 Chinese acquisition among ethnic minority children in Hong Kong. Firstly, this research enriches the bioecological framework developed by Grolig (2020) by demonstrating how family and school contexts influence children's L2 learning. The study confirms that HLE enhances children's L2 word and text reading through cumulative interaction, while school-based shared book interventions systematically improve their metalinguistic awareness.

Remarkably, the shared book reading interactions enabled L2 Chinese children to perform on par with L1 Chinese children in metalinguistic awareness during the post-tests. This contrasts with earlier findings that ethnic and language minority children rarely catch up with their language-majority counterparts (e.g., August & Shanahan, 2006). The research also explores potential reasons for this, including the high malleability of children's metalinguistic awareness and language transfer effects.

Secondly, this study addresses research gaps regarding how parental and individual differences affect L2 Chinese acquisition in Hong Kong (Hart et al., 2021; Lau et al., 2020; Li et al., 2022; Liu & Chung, 2024; Zhu et al., 2023). Specifically, it was found that fathers' oral proficiency in Chinese and children's daily use of ethnic languages could positively moderate the effectiveness of school-based interventions, particularly in enhancing Chinese word and text reading abilities.

Lastly, this study reassesses the effectiveness of shared book reading by exploring its impact across sub-lexical, lexical, and super-lexical levels, unlike previous research which focused only on the sub-lexical and lexical levels. This approach has allowed us to capture diverse literacy profiles among L2 Chinese children and to identify varying patterns of intervention influence.

This study has several limitations that highlight the need for further research in this area. First, our research only conducted a post-test. Although we employed stratified random sampling based on L2 Chinese children's initial Chinese proficiency and controlled for this as a covariate in the MANCOVA, the absence of a pre-test means we were unable to fully assess the children's baseline proficiency. This limitation may have introduced some bias. Therefore, future research should incorporate both pre- and post-tests to better account for initial differences before the reading intervention.

Second, this study explored how differences in the HLE and individual characteristics moderate the effectiveness of school-based interventions. However, we included and confirmed only a small number of factors. Future research should incorporate more related influences (e.g., the number of books at home, children's motivation, and self-efficacy) to provide a more detailed understanding of the bioecological framework.

Third, this study did not address the cultural and systemic barriers that may affect the scalability of the intervention, limiting its generalisability across diverse contexts. Future research should explore how cultural attitudes and systemic constraints, such as resource availability and policy support, might influence the broader implementation of this approach. Finally, the limited sample size of parents has led to potential sampling bias. Although it is true that ethnic minority women in Hong Kong generally have lower educational attainment, a larger and more diverse sample should be incorporated into the study to mitigate the overrepresentation of specific group characteristics and enhance the external validity of the findings.

## Implications

This study highlights several important implications for researchers, school educators, and parents, who are key stakeholders in promoting Chinese language and literacy development among young ethnic minority children. Firstly, the shared book reading intervention should

be promoted in Hong Kong. During these sessions, facilitators must also focus on the children's accumulation of Chinese words and sentences. Secondly, given the differences in the HLE, there is a need to enhance both the quantity and quality of parent-child oral interactions, such as shared reading, storytelling, role-playing, and describing daily routines. Additionally, girls from ethnic minority families should consistently receive equal educational resources and family attention.

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**Declaration of research ethics**
All procedures in this research have been approved by the Ethics, Diversity and Inclusion Committee of The Hong Kong Polytechnic University [approval number: HSEARS20240226003].

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## Appendix

### Parent Questionnaire

1. 孩子年齡（請填寫月份）： Child's age (please specify in months):

_____

2. 孩子性別（請選擇其中一項）： Child's gender (please select one):

- ☐ 男 (Male)
- ☐ 女 (Female)
- ☐ 不方便透露 (Prefer not to say)

3. 孩子國籍： Child's nationality:

_____

4. 孩子的日常用語： Child's daily language use:

_____

5. 在孩子參與本項目之前，他的中文水平： Child's initial Chinese proficiency before participating in this programme:

- ☐ 不好 (Poor)
- ☐ 一般 (Average)
- ☐ 很好 (Good)

6. 爸爸的中文口語水平：Father's oral proficiency in Chinese:

- ☐ 不好 (Poor)
- ☐ 好 (Good)

7. 爸爸的中文書面語水平： Father's written proficiency in Chinese:

- ☐ 不好 (Poor)
- ☐ 好 (Good)

8. 媽媽的中文口語水平： Mother's oral proficiency in Chinese:

- ☐ 不好 (Poor)
- ☐ 好 (Good)

9. 媽媽的中文書面語水平： Mother's written proficiency in Chinese:

- ☐ 不好 (Poor)
- ☐ 好 (Good)