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Effects of shared book reading intervention on L2 Chinese reading in ethnic minority kindergartens in Hong Kong

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ABSTRACT

Guided by Grolig (2020)'s bioecological perspective, this research aimed to examine the effects of a shared book reading intervention for ethnic minority kindergarteners learning Chinese as a second language (L2) in Hong Kong. Additionally, it explored the influence of children's initial L2 reading proficiency and home literacy environment (HLE). A quasi-experimental study was conducted with 365 kindergarteners using convenience sampling and stratified random sampling. There were three participant groups: an experimental group consisting of L2 Chinese children from ethnic minority families who received an 8-week intervention, a control group of L2 Chinese children and another control group of Chinese-as-a-first language (L1) children who received business-as-usual instruction. To assess the effectiveness of the shared book reading intervention, pre- and post-test reading outcomes were compared between the experimental and control groups. The study yielded four major findings: (1) Ethnic minority kindergarteners in the experimental group showed significant improvement in their L2 Chinese reading subskills following an eight-week shared book reading intervention. (2) L2 Chinese kindergarteners displayed different initial levels of L2 reading proficiency, with those at low and mid-levels initially gaining more from the intervention compared to those at the high level initially. (3) L2 Chinese kindergarteners with initial high-level of L2 reading proficiency performed on par with their L1 Chinese peers in the post-test of Chinese metalinguistic awareness. (4) The Chinese reading proficiency of L2 Chinese kindergarteners was affected by their HLE, including father's educational background, parents' proficiency in Chinese listening and speaking, and the number of children's books available at home.

1. Introduction

Chinese learning has long been a significant challenge for students learning Chinese as a second language (L2 Chinese), mainly

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ethnic minorities, in the multilingual environment of Hong Kong (Zhou, 2021; Zhu et al., 2023), where Chinese literacy skills are crucial for academic advancement and social upward mobility (Loh & Tam, 2016). Hong Kong's ethnic minorities are predominantly South Asians, and their population has grown rapidly over the past decade (Census and Statistics Department Hong Kong Special Administrative Region, 2022), necessitating more research to address the challenges in L2 Chinese acquisition of the children from ethnic minority families in Hong Kong (e.g., Chan & Rao, 2023; Lau et al., 2020). From a practical perspective, it is crucial to assess and strengthen the Chinese reading proficiency of ethnic minority L2 children in Hong Kong.

Shared book reading is an interactive reading activity typically led by an adult, such as a teacher or parent, engaging with a child or a small group of children (Danis et al., 2000; Reese et al., 2003; Zevenbergen & Whitehurst, 2003; Zucker et al., 2013). In the context of children's L2 acquisition, shared book reading has been shown to predict a range of L2 reading-related outcomes, such as metalinguistic awareness, vocabulary, and word reading (Chow et al., 2010; Hui et al., 2020; Yeung & King, 2016). However, recent research suggests that the significant effects of shared book reading interventions need to be re-evaluated, as some studies have reported contradictory findings. For instance, Noble et al. (2019) reviewed 54 empirical studies and reported an overall small effect size, which contrasted with previous reviews that found medium effect sizes (Flack et al., 2018; Mol et al., 2008).

Differences in the home literacy environment (HLE) and individual child characteristics are widely acknowledged as influential factors in reading development within L2 contexts (e.g., Chan & Rao, 2023; Lau et al., 2020; Zhu et al., 2023). Based on previous research results, scholars have called for more studies in the Hong Kong research context to examine the influence of multiple HLE factors and individual child factors on children's L2 Chinese acquisition, particularly in conjunction with school-based interventions.

Guided by Grolig's (2020) bioecological perspective on shared book reading and language development, this quasi-experimental study reports on the implementation of a shared book reading program for L2 Chinese kindergarteners in Hong Kong and its impacts on their development of Chinese metalinguistic awareness, vocabulary knowledge, as well as word and text reading. We also explore whether the response of L2 Chinese kindergarteners to the shared book reading intervention depends on their initial L2 reading proficiency and their HLE factors. The findings of this research contribute to the empirical evidence from Hong Kong regarding the bioecological framework and the shared book reading approach. Furthermore, it introduces a novel assessment design for L2 Chinese by evaluating sublexical, lexical, and superlexical levels in both pre- and post-tests. In addition, insights into differences in HLE and children's initial L2 proficiency offer valuable implications for enhancing L2 Chinese learning among ethnic minority children in Hong Kong.

2. Literature review

2.1. A bioecological perspective of shared book reading

Grolig (2020) proposes a triad model of language learning through shared book reading by expanding the bioecological model of human development (Bronfenbrenner & Morris, 2006) and the Home Literacy Model (Sénéchal & LeFevre, n2002, 2014). In the triad model, Grolig (2020) describes how the interplay among children, adults, and books influences shared reading activities at the microsystems (i.e., at the childcare center and at home) and also considers the influence of factors within the ecosystem (e.g., parents' socioeconomic status) and the macrosystem (e.g., societal and social classes, as well as educational laws). When compared to Bronfenbrenner and Morris' (2006) bioecological model and the Home Literacy Model, Grolig's (2020) triad model provides three new insights. First, it focuses on the influence of shared book reading on child language development while the previous bioecological model examines human development in general. Grolig (2020) hypothesizes that the interplay among children, adults, and books will result in varying levels of language skills. Second, the triad model emphasizes that both home and school literacy environments matter, whereas the Home Literacy Model focuses solely on the HLE. As mentioned earlier, the triad model also calls for consideration of parents' socioeconomic status regarding the influence of HLE. Third, the triad model provides guidance on assessment methods for researching shared book reading and literacy environments. Inspired by Grolig's model, the rest of the review will synthesize evidence from previous research on school-level shared book reading and its effects on child L2 acquisition, assessment of reading-related outcomes in L2 Chinese for ethnic minority children in Hong Kong, as well as the HLE for this population in particular.

2.2. Shared book reading intervention for child L2 development

Shared book reading, also termed ‘companion reading’ or ‘dialogical reading’ in the literature, is an interactive reading activity typically led by an adult, such as a teacher or parent, engaging with a child or a small group of children (Danis et al., 2000; Reese et al., 2003; Zevenbergen & Whitehurst, 2003; Zucker et al., 2013). Compared with traditional book reading sessions, shared book reading has been shown to significantly enhance children's metalinguistic awareness, vocabulary, word reading, and reading comprehension among both L1 (Aram, 2006; Aram et al., 2013; Droop et al., 2005) and L2 learners (Brannon & Dauksas, 2014; Chow et al., 2010; Hui et al., 2020; Yeung & King, 2016). However, recent research suggests that the significant effects of shared book reading interventions should be re-evaluated, as some studies have reported contradictory findings. For instance, a review by Noble et al. (2019) examining 54 empirical studies revealed that the effect of adult-child shared book reading on language outcomes was considerably smaller than previously assumed. Similarly, the National Early Literacy Panel (NELP, 2008) reported that such interventions had no significant effect on children's alphabet knowledge or phonological awareness, though moderate effects on print knowledge were observed. These inconsistencies might be attributed to several methodological limitations, such as the absence of active control groups, the failure to conduct both pre- and post-tests, and insufficient consideration of a wide range of outcome variables.

In the Hong Kong context, to the best of our knowledge, there is limited empirical study examining the effects of shared book

reading on children's L2 Chinese development (i.e., Chan & Rao, 2024; Sun et al., 2025; Zhou, 2021), despite the existence of pioneer work on L1 Chinese (e.g., Chow et al., 2008) and L2 English shared book reading in Hong Kong (e.g., Hui et al., 2020; Yeung & King, 2016). Zhou (2021) conducted a quasi-experimental study comparing the pre- and post-test scores of three types of intervention for 118 3- to 4-year-old L2 Chinese first- and second-year kindergartners in Hong Kong, namely, shared book reading only (SR), shared book reading in combination with multisensory instruction (SR + MS), and shared book reading in combination with morphological instruction (SR + MA). The researcher found that all three instructional groups improved after a 12-week intervention. SR + MS group excelled in metalinguistic awareness as well as word reading and writing, while SR + MA performed best in vocabulary knowledge. Notably, Zhou (2021) did not include any control group. The effectiveness of shared book reading may depend on assessment methods, as Zhou measured only sublexical (phonological, orthographic, morphological) and lexical (word reading, vocabulary, dictation) outcomes, excluding superlexical levels. Sun et al.'s (2025) study examined the effects of shared book reading intervention on metalinguistic awareness and word and text reading among L2 Chinese children in Hong Kong. Although they included a control group to account for confounding variables, the study exhibited notable methodological limitations: it did not employ a pre-post design, which precluded effective control of baseline differences and hindered accurate assessment of the net effects of the intervention.

It should be noted that, according to the Kindergarten Education Curriculum Guide (Education Bureau of Hong Kong, 2017), kindergarten children in Hong Kong are expected to be able to read story texts. However, few studies have examined the superlexical reading outcomes of L2 Chinese children in the Hong Kong research context. For instance, Cheung (2019) assessed 89 South Asian children using a standardized story-retelling test. The results revealed that ethnic minority L2 Chinese children in Hong Kong faced syntactic and discourse difficulties. Cheung (2019) acknowledged superlexical outcomes' importance but included no interventions or control group. Future studies should assess superlexical outcomes and include experimental and control groups to better evaluate interventions for ethnic minority L2 Chinese kindergarteners.

2.3. Assessing ethnic minority children's L2 Chinese reading subskills in Hong Kong

Previous research tracking ethnic minority children's L2 Chinese reading development has covered a wide range of grade levels, including kindergarten (Chan et al., 2023), primary Grades Two to Three (Zhou & McBride, 2023), primary Grades Four to Five (Wong, 2017), and secondary levels (Liao et al., 2022). At the kindergarten level, Chan et al. (2023) tracked the relationships among orthographic awareness (measured by radical awareness, that is, children's sensitivity to and use of linguistic information contained in Chinese character components; Wong, 2018), single-character reading, and single-character meaning recognition with 56 ethnic minority kindergarteners in Hong Kong over three years (K1 to K3). They found that orthographic awareness and single-character reading at K1 were significant predictors of single-character meaning recognition at K3.

At the primary school level, Zhou and McBride (2023) explored phonological transfer and relations among Cantonese phonological awareness, Pinyin (Mandarin), and English invented spelling in 29 L1 and 34 L2 Chinese-speaking second and third graders in Hong Kong. Their findings indicated that Pinyin invented spelling was uniquely explained by both English invented spelling and Cantonese phonological awareness. Wong (2017) studied Grades Four and Five, examining how character reading and listening comprehension predict L2 Chinese reading in 142 ethnic minority students in Hong Kong. The researcher found that character reading and listening comprehension jointly explained significant variance in reading comprehension, with a notably larger contribution from character reading.

At the secondary level, the study by Liao et al. (2022) expanded on the findings of Wong (2017) by uncovering the interrelationships among character reading, lexical-level orthographic awareness, and reading comprehension with 424 secondary school L2 Chinese learners. Their findings showed that lexical orthographic awareness mediated the relationship between character reading and reading comprehension.

In summary, previous studies with L2 Chinese ethnic minority children have assessed a variety of reading-related outcomes. These include sublexical and lexical-level metalinguistic awareness, such as orthographic awareness (Chan et al., 2023; Liao et al., 2022), phonological awareness (Zhou & McBride, 2023), and morphological awareness (Zhou, 2021). Researchers have also examined sublexical and lexical reading skills, including character reading (Wong, 2017), word reading and vocabulary knowledge (Zhou, 2021), as well as superlexical-level reading comprehension (Liao et al., 2022; Wong, 2017). Despite the insightful findings, few studies have systematically assessed L2 Chinese reading-related outcomes across sublexical, lexical and superlexical levels, which contribute to a comprehensive understanding of the language ability development of L2 Chinese students and validate theoretical models in language learning, such as the bioecological framework (Grolig, 2020).

2.4. Intervention effectiveness for learners with different initial L2 proficiency

The initial proficiency of L2 learners in the L2 has been identified as a key factor influencing the effectiveness of language interventions (Hogan et al., 2024). However, to date, no study has specifically examined the heterogeneity of intervention effects arising from differences in initial L2 proficiency within the Hong Kong research context. Research conducted in other countries presents mixed findings, highlighting the need for further investigation and re-evaluation. For example, Hogan et al. (2024) reported that the impact of a reading intervention on letter and word recognition among sixth- and seventh-grade students whose L1 was Spanish was significantly greater for those with higher levels of English proficiency. Similarly, Lawrence et al. (2012) explored whether English proficiency among language minority middle school students moderated their response to a vocabulary intervention. Their findings revealed that English-proficient students who were exposed to another language at home outperformed both their limited English-proficient peers and English-proficient students from English-speaking homes after receiving the intervention. Comparable results have also been

observed in the studies conducted by Hwang, Lawrence, Mo, and Snow (2014). Contradictorily, the intervention was more effective for students with lower TOSREC[1] scores at pretest (Wagner et al., 2010, as quoted in Hogan et al., 2024).

2.5. HLE factors influencing L2 Chinese children's reading acquisition in Hong Kong

HLE is critical for reading development in L2 Chinese/bilingual children (Zhu et al., 2023; Kuo et al., 2020; Lü et al., 2023; Zhang et al., 2019). For example, for Chinese heritage dual language learners in the USA, Ke et al. (2023) found that Chinese speaking ability mainly depends on parent-child oral exchanges and Chinese print exposure, while Chinese reading ability is linked to oral exchanges and home reading practice. However, most studies focus on Chinese-heritage or Chinese-English bilingual children in North American immersion programs. With regard to the research on the HLE factors affecting L2 Chinese children's reading acquisition in Hong Kong, Shum et al. (2011) might be among the first to document that these children's motivation to learn Chinese is instrumentally driven and there is a lack of adequate family support for learning Chinese.

Recent studies have explored ethnic minority L2 Chinese children's HLE (e.g., Hua et al., 2023; Li et al., 2022; Zhu et al., 2023). Zhu et al. (2023) collected testing and survey data from 390 first-grade L2 Chinese students and their parents in Hong Kong, which consisted of four motivation groups: low-, moderate-, and high-ideal learners and ambivalent learners. Notably, high-ideal learners had significantly higher Chinese language (vocabulary and grammar) test scores than low-ideal learners, but not the other two groups. Follow-up analyses showed parent-child Chinese reading activity was the strongest predictor of students' group memberships, while book quantity was the weakest. Similarly, Li et al. (2022) surveyed 230 L2 Chinese in Hong Kong schools. The results revealed a strong association between early acculturation and later language attainments among the L2 Chinese students. However, Li et al. (2022) asked the participants to reflect on their past experiences in the survey, not tracking their HLE since early school years (i.e., kindergarten years). According to Li et al. (2022), limited empirical evidence is available in the literature to shed light on the relationship between early HLE input and Chinese attainment of L2 Chinese students. Beyond literacy activities and book availability, parents' socioeconomic status (e.g., educational background and family income), parents' own Chinese proficiency, and family language use patterns may also shape young L2 Chinese learners' early literacy development, though these factors have received limited attention in the Hong Kong context (Wang & Tsung, 2022).

Overall, the review above suggests that there is still a debate on the effectiveness of shared book reading programs for children's L2 literacy development, which may be subject to a range of factors such as reading-related outcome assessment, children's initial L2 proficiency that is brought to the childcare environment, and multiple HLE factors including parent-child literacy activities, book availability, parents' socioeconomic status, parents' L2 proficiency, and family language use. In the Hong Kong context, little research[2] has systematically examined the impacts of shared book reading intervention for young kindergarten-level ethnic minority L2 Chinese learners and the potential influence of assessment-, child-, and home-related factors.

2.6. The present study

Despite the growing body of research on shared book reading, several gaps remain in understanding its effectiveness for Hong Kong L2 Chinese kindergarteners. First, although the positive role of shared book reading in children's language development has been widely recognized, the magnitude of its effectiveness remains debated (NELP, 2008; Noble et al., 2019). Meanwhile, existing studies have design limitations, with few employing rigorous quasi-experimental or experimental control designs to systematically assess the reading outcomes of L2 Chinese kindergarteners at the sublexical, lexical, and superlexical levels. Second, initial L2 proficiency is believed to potentially moderate the effects of shared book reading interventions, but research findings are contradictory (Hogan et al., 2024; Lawrence et al., 2012; Wagner et al., 2010), and this moderating mechanism has yet to be validated among L2 Chinese learners in Hong Kong. Third, although recent Hong Kong studies have explored HLE factors among school-age ethnic minority learners (Li et al., 2022; Zhu et al., 2023), the influence of multiple HLE factors on L2 Chinese kindergarteners remains underexplored (Wang & Tsung, 2022), especially regarding how these early inputs moderate children's response to school-based interventions.

Guided by Grolig's (2020) bioecological perspective of shared book reading and language development, the present study addressed these gaps by examining three research questions (RQs):

RQ1: Is shared book reading intervention effective in enhancing L2 Chinese children's reading-related outcomes across meta-linguistic awareness, vocabulary knowledge, as well as word and text reading?
RQ2: Does the effectiveness of shared book reading intervention vary among L2 Chinese children with different levels of initial L2 reading proficiency?
RQ3: To what extent do parents' socioeconomic status, oral language input, and home literacy resources in the HLE influence L2 Chinese children's initial reading proficiency?

Based on the Grolig's (2020) bioecological framework and the literature reviewed above, we propose the following:

[1] TOSREC refers to the Test of Silent Reading Efficiency and Comprehension, a brief, group- or individually administered reading assessment that measures silent reading of connected text for comprehension.

[2] Although Zhou (2021) might have been the first to report a reading-related intervention for L2 Chinese kindergarteners, the study did not include active control groups, and the focus was not on shared reading.

Hypothesis 1. The shared book reading intervention is effective for L2 Chinese children's reading-related outcomes (i.e., meta-linguistic awareness, vocabulary knowledge, word and text reading) in Chinese, indexed by positive changes in pre- and post-test scores.

Hypothesis 2. The effects of shared book reading intervention vary among L2 Chinese children with different levels of initial L2 reading proficiency.

Hypothesis 3. L2 Chinese children's initial L2 reading proficiency is influenced by parents' socioeconomic status, oral language input, and home literacy resources in the HLE.

3. Method

3.1. Research design

To test the three hypotheses above, a quasi-experimental study was carried out: a total of 365 children were recruited from 12 Hong Kong kindergartens. There were three participant groups: an experimental group consisting of L2 Chinese children from ethnic minority families who received an 8-week intervention, a control group of L2 Chinese children, and another control group of L1 Chinese children. The experimental group participated in a Shared Reading Scheme developed by the research team, while the control group continued with the regular Chinese classes provided by their kindergartens. The pre-test was conducted in September 2023 (at the beginning of the semester), the intervention took place from late September to late November, and the post-test was completed in December (at the end of the semester). To assess the effectiveness of the shared book reading intervention, a set of pre- and post-testing reading outcomes was compared between the experimental and control groups (more details are provided below). Considering that children's IQ and age have been shown to have significant effects on cognitive and academic skills (Hua et al., 2023; Wong et al., 2012), both nonverbal IQ and age were controlled as covariates in the analysis to ensure that the effects of the intervention could be accurately assessed without confounding influences. Finally, the HLE information from the parent questionnaire was used to examine the impact of HLE factors on the initial L2 reading proficiency of L2 Chinese kindergarteners.

3.2. Participants

This study employed convenience sampling and stratified random sampling. Among the 12 kindergartens participating in this project, L2 Chinese children were first categorized into three groups (high, medium, and low) based on their past Chinese academic performance as part of the stratification process. Subsequently, children within each group were randomly assigned to either the experimental or control group. A total of 365 kindergarten children participated in the pre-tests. In Hong Kong, kindergartens serve children aged two to six (Education Bureau of Hong Kong, 2017), and the participants in this study were K2 and K3 students aged three to six years old, with a mean age of 4.33 years. Chinese (Cantonese) is the primary language of instruction and communication in these 12 kindergartens. Therefore, L2 children are exposed to Chinese almost throughout their time at school, including daily teacher-student interactions, classroom activities, and dedicated Chinese learning time (excluding English classes). However, these students' families primarily use non-Chinese languages, making the kindergarten environment their main source of Chinese language learning (Education Bureau of Hong Kong, 2017). Of these 12 kindergartens, 6 operate on a full-day schedule (approximately 7.5 h per day), 3 on a half-day schedule (approximately 3 h per day), and 3 offer both full-day and half-day programs. Due to sample attrition and invalid responses, the data from 304 children were analyzed. The final sample included 147 children (48.4 %) in the experimental

Table 1
Demographic information of participants.

Group	Gender		Ethnicity	Age
	Female	Male		
Total	156 (51.3 %)	148 (48.7 %)	China (49) India (19) Nepal (125) Pakistan (50) Philippines (25)	3 year (25) 4 year (128) 5 year (139) 6 year (12)
Experimental L2 Chinese	80 (54.4 %)	67 (45.6 %)	India (13) Nepal (60) Pakistan (38) Philippines (17)	3 year (13) 4 year (64) 5 year (66) 6 year (4)
Control L2 Chinese	54 (50.0 %)	54 (50.0 %)	India (6) Nepal (65) Pakistan (12) Philippines (8)	3 year (12) 4 year (61) 5 year (34) 6 year (1)
Control L1 Chinese	22 (44.9 %)	27 (55.1 %)	China (49)	4 year (3) 5 year (39) 6 year (7)

Note. The numbers in parentheses are percentages. For ethnic minority groups, only the four most populous nationalities are displayed.

group and 157 children (51.6 %) in the two control groups. Of those in the control groups, 108 (68.8 %) came from ethnic minority families, while the remaining 49 children were from L1 Chinese-speaking families. The gender ratios and ethnicity background information are shown in Table 1. The L2 Chinese children's parents were also invited to participate in an HLE survey; 227 valid questionnaires were collected.

3.3. Shared book reading intervention design

3.3.1. Instructional procedures

The shared book reading intervention was conducted in small groups, each comprising six to eight children, and led by two companion reading ambassadors (RAs), who played the role of adults. One RA acted as the primary instructor, responsible for imparting key knowledge points and guiding children through the picture books, while the other served as an assistant, tasked with maintaining classroom order, re-engaging distracted children, monitoring their performance, and providing timely assistance. Each session lasted approximately 30 min and was held weekly. Over eight weeks, each child participated in four shared book reading sessions per book, covering two books, thus receiving about 240 min of reading intervention.

The process of each shared book reading session was divided into four steps. Initially, RAs used multimedia tools like pictures and videos, alongside references to children's life experiences and interests, to stimulate engagement and motivation. They then employed dialogic reading to explore the picture books with the children. Subsequently, key vocabulary and grammar points from the story were taught using various instructional strategies such as morphological analysis, contextual connections, audio-visual aids, and role-playing to teach the orthography, pronunciation, meanings, and applications of Chinese characters and words. After the instructional period, children reinforced their learning through game-based practice. There were two types of end-of-session activities: at the fourth and eighth sessions, the RAs used vocabulary and grammar checklists to evaluate children's command of key vocabulary and grammar points. At the end of the other six sessions, each was concluded with a brief 2-min review, where the newly learned vocabulary and grammar points were summarized and reinforced.

3.3.2. The instructional materials of shared book reading intervention: picture books

Picture books were developed by the research team and applied to the shared book reading intervention. According to the picture book selection criteria proposed by Bergman Deitcher et al. (2019), shared book reading of picture books requires rich illustrations, simple repetitive sentences, and engaging content related to daily life. Consequently, the picture books designed for the intervention utilized high-frequency Chinese words and sentences, and repeatedly emphasized keywords and phrases. The content organization of the picture books thoroughly considered the life experiences of children, initially focusing on their personal and family lives, and then gradually expanding to include their school and community lives. Each book featured a turning point towards the end of the text, which created suspense or surprise and thereby enhanced reading enjoyment. In addition, each picture book was equipped with a briefing section, which provided explanations, exercises, and mini-games related to the words and grammar that appeared in the picture book. These briefings were used in conjunction with the picture books.

Notably, the design of the picture books adhered to the principles of culturally responsive teaching (Kurnia, 2020). The central characters of the stories came from diverse cultural backgrounds. Additionally, many story plots took place in the living environments of ethnic minorities, reflecting the customs and practices of various ethnic groups. For K2 children, the picture book themes included “Who am I?” and “My Favorite Fruit”; for K3 children, the themes were “What is Your Name?” and “My Favorite Food.”

3.3.3. The training of reading ambassadors (RAs)

The shared book reading intervention was facilitated by RAs recruited from universities in Hong Kong. All of them were native Chinese (Cantonese) speakers, and more than half were undergraduate students majoring in education. They underwent an initial training regimen that comprised two sessions: a lecture and a workshop. After this preparatory phase, they began their practical teaching sessions. During the initial four sessions, which covered the first picture book, they received individual guidance from the research team's project assistants. These assistants possessed extensive experience in early childhood or Chinese language education. Once the RAs demonstrated proficiency and could manage their tasks independently, they primarily conducted the sessions on their own. However, to maintain trustworthiness, the project assistants periodically participated in one or two sessions to observe and provide feedback.

3.4. Research instruments

The research instruments in this study included testing instruments used for pre-intervention testing (Chinese metalinguistic awareness [sublexical level], Chinese vocabulary knowledge [lexical level], Chinese word and text reading [superlexical level], nonverbal IQ) and post-intervention testing (Chinese metalinguistic awareness, Chinese vocabulary knowledge, Chinese word and text reading). Two thematic assessment instruments were used: Park-themed and Festival-themed texts. The Park-themed text centered on animals singing and dancing in a park during spring, while the Festival-themed text focused on a bear's family celebrating Chinese New Year with gift-giving and family gatherings. The Park-themed text was used in both the pre- and post-tests as repeated measures to assess metalinguistic awareness, and word and text reading. In addition, transfer post-test was conducted using the Festival-themed text. The aim was to assess the transferability of the intervention and ensure the validity of the study. All the tests were administered by trained project assistants to the child participants individually in a quiet classroom. Considering the linguistic context in Hong Kong, the instructions were given in oral Cantonese and texts were written in traditional Chinese characters. In addition, one parent of

each child was invited to complete a paper-based HLE survey questionnaire during the pre-intervention testing phase (as shown in Table 2 below).

Chinese metalinguistic awareness. This test was adapted from the Chinese Language Usage Evaluation (Chan, 2022) and administered individually. Four types of metalinguistic awareness were measured in Chinese: children's print convention awareness, phonological awareness, orthographic awareness, and morphological awareness. Morphological awareness encompassed three dimensions: morphemic identification, morphemic combination, and morphemic order. The morpheme task (e.g., 蜜蜂) asked children to demonstrate their understanding of the number of characters and syllables in a word (correct answer: 2 characters and 2 syllables); the morphemic combination task (e.g., 樹 'tree' and 木'wood') tested children's understanding of how morphemes can be combined according to semantic or compounding rules (correct answer: 樹木 'forest'; wrong answer: 樹手); the morphemic order task assessed children's awareness of the conventional order of morphemes within compound words (e.g., correct answer: 坐巴士 'take a bus'; wrong answer: 巴士坐). According to the Kindergarten Education Curriculum Guide (2017) in Hong Kong, teachers are encouraged to use theme-based learning and learning through play, include appropriate language learning elements for non-Chinese-speaking children, and help them recognize that one Chinese character corresponds to one sound. Teachers are also encouraged to select words with common components, engage non-Chinese-speaking children in word-building games, and help them understand the relationships and usage of common words. The tasks used in the present study align closely with these recommended practices.

The testing was set up similarly to the shared book reading sessions, during which a research project assistant guided a child participant individually to complete text-related items. For pre-intervention testing, the text theme was *park*; for post-intervention testing, the *park* theme was used for the repeated test, while the *festival* theme was used for the transfer test. Both texts for the *park* and *festival* themes included 39 characters. There were 4 items in each test, with a total possible score of 12. The Cronbach's alpha was .753 for the pre-test, and .676 and .645 for the repeated and transfer post-tests, respectively.

Chinese word and text reading. This test was also adapted from a prototype test of the Chinese Language Usage Evaluation (Chan, 2022). It included five types of items: word reading aloud, text reading aloud, text comprehension, text retelling, and relating the text to life experiences. Similar to the metalinguistic awareness test described above, the Chinese word and text reading tests were repeated for the *park* theme in pre- and post-intervention testing phases. The transfer post-test was based on the *festival* theme. There were 5 items in total, with a maximum score possible of 17. The Cronbach's alpha values for the pre-test ($\alpha = .763$), repeated post-test ($\alpha = .727$), and transfer post-test ($\alpha = .671$) indicated acceptable consistency.

Chinese vocabulary knowledge. There were two parts in this test, namely, sound-word mapping and word-picture mapping. The testing order was randomized across participants. Each part consisted of 23 items, including both single-character and two-character words. In the sound-word mapping part, each child listened to an audio and then selected the corresponding word in traditional Chinese characters out of four choices. In the word-picture mapping part, the children were shown the word in traditional Chinese characters and then asked to select the corresponding picture out of four choices. The maximum score possible for each part was 23. Regarding sound-word mapping, the internal consistency of both the pre-test ($\alpha = .826$) and post-test ($\alpha = .834$) was satisfactory. For word-picture mapping, the Cronbach's alpha values were also acceptable ($\alpha_{pre\text{-}test} = .614$; $\alpha_{post\text{-}test} = .709$).

Nonverbal IQ. Children's nonverbal IQ was assessed using Raven's Colored Progressive Matrices (Raven et al., 1995). In this test, each child was asked to identify the missing element from a given pattern to complete the overall design. The test consisted of 24 items. The total score was 24, and scoring was discontinued if the child answered four consecutive items incorrectly. The Cronbach's alpha was .568, which was considered adequate (Adeniran, 2019; Tan, 2009).

HLE questionnaire survey. The 35-item HLE questionnaire developed by researchers consisted of three parts: demographic information, parents' Chinese proficiency, as well as home language and literacy environment self-evaluation. This demographic information included family monthly income, parents' educational background, children's gender, children's age, the duration of residence in Hong Kong, and other relevant factors. The evaluation of parents' Chinese proficiency covered listening, speaking, reading, and writing skills using a 4-point Likert scale (4 items, $\alpha = .867$). The self-evaluation of the home language and literacy environment included parents' engagement in children's language activities (6 items, $\alpha = .713$) and the number of children's and adult books available at home (2 items, $\alpha = .604$). Items within these two dimensions were treated as continuous categorical variables and evaluated using 5-point Likert scales (Nunnally & Bernstein, 1994). The home language and literacy environment self-evaluation also encompassed family language policies involving parents, siblings, and grandparents (5 items), parents' cultural preferences (1 item),

Table 2
An overview of research instruments.

Intended participants	Pre-intervention tests	Post-intervention tests (repeated)	Post-intervention tests (transfer)
Kindergarteners	Metalinguistic awareness (Text theme: Park)	Metalinguistic awareness (Text theme: Park)	Metalinguistic awareness (Text theme: Festival)
Kindergarteners	Word and text reading (Text theme: Park)	Word and text reading (Text theme: Park)	Word and text reading (Text theme: Festival)
Kindergarteners	Vocabulary knowledge: Sound-word mapping	Vocabulary knowledge: Sound-word mapping	N.A.
Kindergarteners	Vocabulary knowledge: Word-picture mapping	Vocabulary knowledge: Word-picture mapping	N.A.
Kindergarteners	Nonverbal IQ	N.A.	N.A.
Parents	HLE questionnaire survey	N.A.	N.A.

and children's language habits (1 item). Items in these three dimensions were unordered categorical variables.

3.5. Data analysis

As noted above, the final dataset included test results from 304 children and surveys from 227 parents. The tested variables did not exhibit significant deviations from normality, as the absolute values of skewness and kurtosis for all variables did not exceed 3 and 10, respectively (Kline, 2008). In response to the three hypotheses posed above, three major analysis steps were taken: First, to evaluate the effectiveness of the intervention, descriptive analyses were conducted, and effect sizes (Cohen's *d*) were calculated for experimental L2, control L2, and control L1 Chinese groups between pre- and post-tests. In terms of effect size interpretation, an oft-cited rule of thumb is that a Cohen's *d* of .20 indicates a small effect size, .50 represents a moderate effect, and .80 signifies a large effect (Cohen, 2013). It should be noted that in L2 research, an alternative scale has been proposed by Plonsky and Oswald (2014), who consider a *d* value of .60 as generally small, 1.00 as medium, and 1.40 as large. Second, both descriptive and repeated measures analyses were carried out to determine if intervention effects varied among the children from the experimental L2 Chinese group. Cluster analysis yielded three subgroups out of the experimental group, which consisted of children with high-, mid-, and low-level of initial L2 reading proficiency, i.e., the total scores from the pre-test on Chinese metalinguistic awareness, and Chinese word and text reading. We then conducted descriptive analyses and the repeated measures ANCOVA (RM-ANCOVA) among five groups (i.e., three experimental L2 Chinese subgroups, control L2 Chinese and control L1 Chinese groups). Children's nonverbal IQ score and age were treated as a covariate. The last step of data analysis was to identify potential HLE effects on the L2 Chinese children's initial L2 reading proficiency. Among the 255 L2 Chinese children (including both 147 experimental L2 and 108 control L2 Chinese children), 227 parents provided valid responses. All the 227 L2 Chinese children were reclassified into three groups–high, mid, and low—based on their initial L2 reading proficiency using cluster analysis. The HLE factors provided by these 227 parents served as the independent variable, while their children's initial L2 reading proficiency served as the dependent variable. ANOVA was used for continuous variables, and Chi-square tests were used for categorical variables to compare HLE differences between the three L2 Chinese subgroups. All data analyses were performed using SPSS software, version 27.0.

4. Results

4.1. The effects of shared book reading intervention

To examine the outcomes of the shared book reading intervention, we first compared the mean scores between pre- and post-tests (indexed by Cohen's *d*). As reported in Table 3, overall, all three groups (experimental L2 Chinese, control L2 Chinese, and control L1 Chinese) improved their performance in Chinese metalinguistic awareness, vocabulary knowledge, as well as word and text reading over two testing time points, except that the control L1 Chinese group did not change in their performance of metalinguistic awareness in the transfer post-test (Cohen's $d < .001$). The effect sizes for the experimental L2 Chinese group for metalinguistic awareness and word and text reading were almost all larger than the two control groups', especially in the transfer post-test. However, for the two vocabulary knowledge tests (i.e., sound-word mapping and word-picture mapping), the effect sizes were small according to Cohen's (2013) scale, and even negligible based on Plonsky and Oswald's (2014) scale. Notably, the three groups appeared to perform differently in the word-picture mapping tests as the Cohen's *d* values for the experimental L2 Chinese, control L2 Chinese, and control L1 Chinese groups were .239, .056, and .561. In the Discussion section, we revisit this finding by providing rationales on why the experimental L2 Chinese group benefited more in their development of metalinguistic awareness as well as word and text reading, yet still lagged behind the control L1 Chinese group in vocabulary knowledge.

4.2. The moderating effect of L2 Chinese children's initial L2 reading proficiency

As mentioned earlier, we conducted a cluster analysis to explore the different profiles of initial L2 reading proficiency in the experimental L2 Chinese children, which yielded three groups: high-, mid-, and low-level. The Silhouette Measure of Cohesion and Separation value was greater than .50, indicating that the quality of the clustering was good. The means and standard deviations of the experimental subgroups' test performance are reported in Table 4 below.

Regarding the performance in Chinese metalinguistic awareness and Chinese word and text reading, the sizes (Cohen's *d* values) were largest for the low-level experimental L2 Chinese subgroup, followed by the mid-level experimental L2 Chinese subgroup, and the smallest for the high-level experimental L2 Chinese subgroup. In the transfer post-test, the effect sizes for the experimental L2 Chinese subgroup with an initial low level indicated substantial improvement ($d_{MA} = 1.891$; $d_{RC} = 1.682$) even after we adopted the more stringent scale proposed by Plonsky and Oswald (2014). Similarly, for the two Chinese vocabulary knowledge tests, larger effect sizes were observed in the low-level experimental L2 Chinese subgroup as compared to the mid- and high-level subgroups.

The observation above was confirmed by subsequent RM-ANCOVA with nonverbal IQ as a covariate. As illustrated in Table 5 and Fig. 1, the pre- and post-test score changes were more pronounced for metalinguistic awareness as well as word and text reading measured in the transfer post-test among the experimental L2 subgroups with initially low- and mid-levels of L2 reading proficiency. Regarding children's vocabulary knowledge, the mean differences for the initial low-level subgroup were the most significant ($Mean\ difference_{sound} = 1.27$, $p = .002$; $Mean\ difference_{picture} = .98$, $p = .005$).

Table 3
The reading and vocabulary knowledge mean scores of pre- and post-test in experimental L2 Chinese, control L2 Chinese, and control L1 Chinese groups.

Group	Metalinguistic awareness (Park Theme)			Word and text reading (Park Theme)			Transfer post-tests (Festival Theme)				Sound-word mapping			Word-picture mapping		
	Pre-test	Post-test	*d*	Pre-test	Post-test	*d*	MA	*d*	RC	*d*	Pre-test	Post-test	*d*	Pre-test	Post-test	*d*
Experimental L2 Chinese	4.88 (2.67)	6.77 (2.36)	.753	2.24 (3.00)	3.38 (3.35)	.360	6.67 (2.50)	.694	4.55 (3.34)	.730	6.85 (3.28)	8.15 (4.02)	.356	4.67 (2.39)	5.28 (2.73)	.239
Control L2 Chinese	4.44 (2.64)	6.07 (2.38)	.652	1.86 (2.88)	2.93 (3.01)	.365	5.75 (2.33)	.529	3.54 (3.13)	.561	6.33 (3.66)	7.37 (3.63)	.287	4.80 (2.28)	4.93 (2.41)	.056
Control L1 Chinese	9.59 (1.78)	10.33 (1.44)	.462	9.82 (3.31)	11.35 (3.57)	.449	9.59 (2.01)	<.001	11.39 (3.10)	.495	15.45 (4.99)	16.71 (4.76)	.261	8.67 (4.24)	11.20 (4.85)	.561

Note. The numbers in parentheses refer to the standard deviation.
'MA' refers to metalinguistic awareness and 'RC' refers to Chinese word and text reading.

Table 4
The reading and vocabulary knowledge mean scores of pre- and post-test in experimental L2 Chinese (initial low-, mid-, and high-level), control L2 Chinese, and control L1 Chinese groups.

Group	Metalinguistic awareness (Park Theme)			Word and text reading (Park Theme)			Transfer post-tests (Festival Theme)				Sound-word mapping			Word-Picture mapping		
	Pre-test	Post-test	*d*	Pre-test	Post-test	*d*	MA	*d*	RC	*d*	Pre-test	Post-test	*d*	Pre-test	Post-test	*d*
Experimental – L2 Chinese (low)	2.46 (1.25)	5.81 (1.86)	2.132	.19 (.63)	2.17 (2.48)	1.104	5.78 (2.17)	1.891	3.31 (2.57)	1.682	5.64 (2.15)	6.92 (2.55)	.547	4.03 (1.96)	5.02 (2.06)	.497
Experimental – L2 Chinese (mid)	5.78 (1.58)	6.90 (2.24)	.582	2.49 (2.06)	3.46 (2.87)	.391	7.01 (2.51)	.591	4.61 (2.84)	.861	7.17 (2.89)	8.41 (4.23)	.345	4.83 (2.16)	4.99 (2.36)	.071
Experimental – L2 Chinese (high)	9.11 (1.45)	9.26 (2.31)	.080	7.74 (3.14)	6.84 (4.74)	−.230	8.16 (2.50)	−.478	8.21 (4.40)	.126	9.42 (5.37)	11.05 (5.32)	.313	6.05 (3.60)	7.16 (4.65)	.274
Control – L2 Chinese	4.44 (2.64)	6.07 (2.38)	.652	1.86 (2.88)	2.93 (3.01)	.365	5.75 (2.33)	.529	3.54 (3.13)	.561	6.33 (3.66)	7.37 (3.63)	.287	4.80 (2.28)	4.93 (2.41)	.056
Control – L1 Chinese	9.59 (1.78)	10.33 (1.44)	.462	9.82 (3.31)	11.35 (3.57)	.449	9.59 (2.01)	<.001	11.39 (3.10)	.495	15.45 (4.99)	16.71 (4.76)	.261	8.67 (4.24)	11.20 (4.85)	.561

Note. The numbers in parentheses refer to the standard deviation.
'MA' refers to metalinguistic awareness and 'RC' refers to Chinese word and text reading.

Table 5
The mean differences between pre- and post-tests in experimental L2 (initial low-, mid-, and high-level), control L2, and control L1 groups.

Group	Metalinguistic awareness		Word and text reading		Sound-word mapping	Word-picture mapping
	Park Theme	Festival Theme	Park Theme	Festival Theme		
Experimental – L2 Chinese (low)	3.36(.000)***	3.32(.000)***	1.98(.000)***	3.12(.000)***	1.27(.002)**	.98(.004)**
Experimental – L2 Chinese (mid)	1.12(.000)***	1.23(.000)***	.97(.015)*	2.12(.000)***	1.23(.004)**	.16(.641)
Experimental – L2 Chinese (high)	.16(.767)	.95(.142)	−.90(.233)	.47(.536)	1.63(.071)	1.11(.235)
Control – L2 Chinese	1.63(.000)***	1.31(.000)***	1.07(.001)**	1.68(.000)***	1.04(.002)**	.13(.634)
Control – L1 Chinese	.74(.006)**	.00(1.000)	1.53(.000)***	1.57(.001)***	1.27(.013)*	2.53(.000)***

Notes. The numbers in parentheses refer to the p-value, *means $p < .05$, **means $p < .01$, ***means $p < .001$. Nonverbal IQ and age were treated as the covariate.

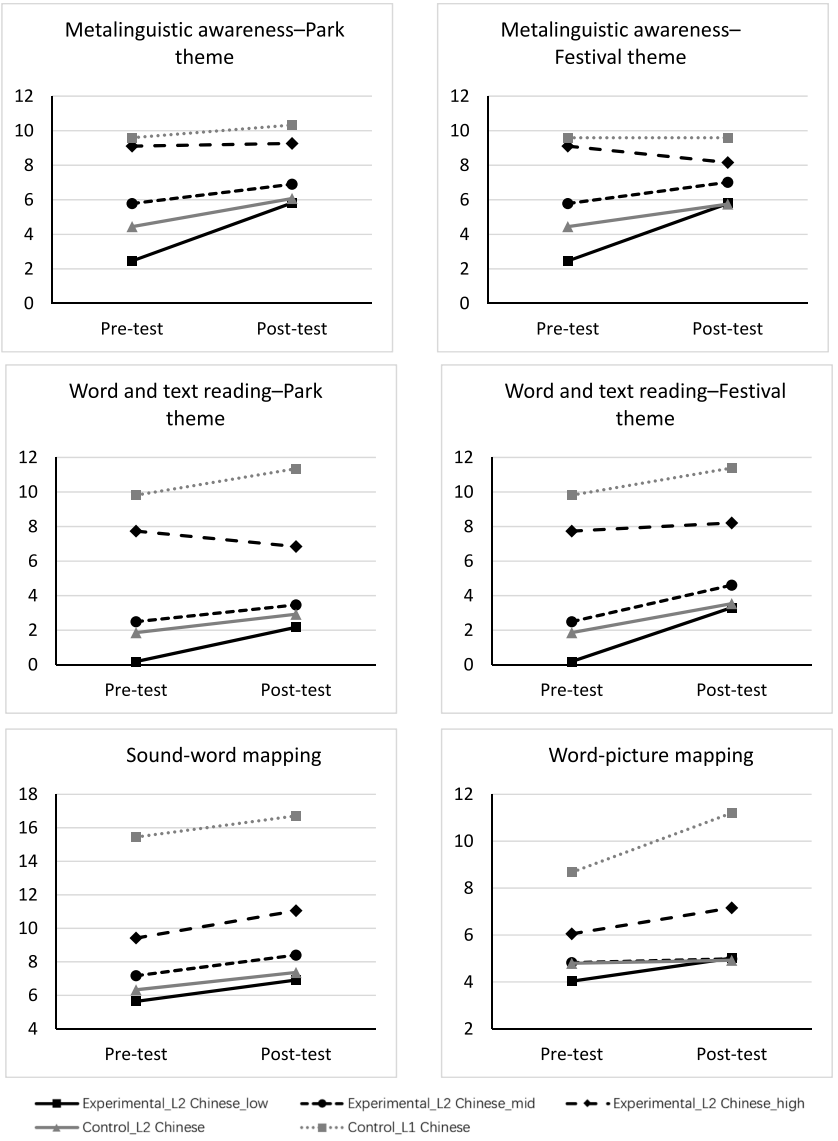

Fig. 1. The score changes from pre-test to post-test based on descriptive analysis results.

4.3. The influence of HLE on L2 children's initial L2 Chinese reading proficiency

Grounded on Grolig's (2020) bioecological perspective on shared book reading and language development, we are interested in the potential influence of a range of HLE factors on the initial L2 Chinese reading proficiency of children from the L2 Chinese groups. The

Silhouette Measure of Cohesion and Separation value of reclassification of 227 L2 Chinese children indicated reliable clustering quality. Then, ANOVA and Chi-square tests were conducted to compare the differences between groups. Only significant results were reported in the following sections. We found that three HLE factors (i.e., parents' educational backgrounds, parents' Chinese listening and speaking proficiency, and the number of children's books at home) seemed to affect L2 Chinese children's initial Chinese reading proficiency.

First, the Chi-square results indicated significant differences in the parents' educational backgrounds among the L2 Chinese groups. Notably, the differences in fathers' educational backgrounds ($\chi^2 = 15.33$, $df = 4$, $p = .007$, Cramer's V = .176) were more pronounced than those of mothers ($\chi^2 = 11.00$, $df = 4$, $p = .026$, Cramer's V = .149). Specifically, a higher proportion of fathers in the high-level L2 Chinese subgroup held university degrees ($N = 14$ [53.8 %]) compared to the mid-level subgroup ($N = 22$ [22.4 %]) and the low-level subgroup ($N = 21$ [23.3 %]). Moreover, a lower proportion of fathers in the high-level subgroup held secondary degrees ($N = 11$ [42.3 %]) than fathers coming from the mid-level subgroup ($N = 69$ [70.4 %]). Also, mothers in the mid-level subgroup were significantly less likely to hold primary-level education ($N = 7$ [7.1 %]) compared to those in the low-level subgroup ($N = 20$ [21.7 %]).

Additionally, the ANOVA results revealed significant differences in parents' Chinese listening proficiency ($F = 6.401$, $p = .002$, $\eta^2 = .054$) and speaking proficiency ($F = 4.199$, $p = .016$, $\eta^2 = .036$) across the three subgroups. Specifically, parents from the high-level subgroup exhibited significantly higher proficiency in listening and speaking compared to the mid-level and low-level subgroups. For listening, the mean differences were .430 ($p = .026$) between the high- and mid-level subgroups, and .674 ($p = .001$) between the high and low-level subgroups. For speaking, the mean differences were .410 ($p = .028$) between the high- and mid-level subgroups, and .540 ($p = .004$) between the high- and low-level subgroups. Interestingly, the results of the descriptive analysis of family language policy revealed that family members from the high-level subgroup consistently used Chinese more frequently in daily life, regardless of which family member was considered (see Appendix A).

Finally, Chi-square results also showed significant differences in the children's number of books in the family among the L2 Chinese groups ($\chi^2 = 17.00$, $df = 8$, $p = .029$, Cramer's V = .131). To be specific, families in the low-level subgroup possessed significantly smaller amounts of children's books than those in the high-level subgroup. About two-thirds of the families in the low-level subgroup ($N = 63$ [67.7 %]) owned between 0 and 10 children's books, compared to approximately one-third in the high-level subgroup ($N = 10$ [37.0 %]) who owned the same range. For collections of 11–50, 51–100, 100–200, and over 200 books, the proportions were higher in the high-level subgroup (see Appendix B), although these differences did not reach statistical significance.

5. Discussion

5.1. Summary of key findings

There were three major findings: first, Hypothesis 1 (*The shared book reading intervention is effective for L2 Chinese children's reading-related outcomes in Chinese, indexed by positive changes in pre- and post-test scores)* was partially confirmed. This was because the experimental L2 group demonstrated positive changes in reading-related outcomes between pre- and post-test (i.e., metalinguistic awareness, word and text reading, and vocabulary knowledge). To be specific, the changes in experimental L2 Chinese children's Chinese metalinguistic awareness, as well as Chinese word and text reading, were larger than those of the control L2 and L1 Chinese groups. Nevertheless, the experimental L2 Chinese group did not exhibit statistically significant improvement in L2 Chinese vocabulary knowledge.

Second, Hypothesis 2 (*The effects of shared book reading intervention vary among L2 Chinese children with different levels of initial L2 reading proficiency*) was confirmed, given that, when compared to the experimental L2 subgroup with initial high level of L2 reading proficiency, the pre- and post-test score changes were more pronounced for metalinguistic awareness as well as word and text reading measured in the transfer post-test among the experimental L2 subgroups with initial low- and mid-levels of L2 reading proficiency, and that the mean difference in vocabulary knowledge between pre- and post-tests was the largest for the initial low-level subgroup.

Lastly, Hypothesis 3 (*L2 Chinese children's initial L2 reading proficiency is influenced by parents' socioeconomic status, oral language input, and home literacy resources in the HLE*) was also confirmed. Specifically, L2 Chinese children with an initial high level of L2 Chinese reading proficiency came from families with more fathers holding university degrees, parents with higher proficiency in listening to and speaking Chinese, more collections of children's books regardless of the written language, and family members using Chinese in their daily life.

5.2. Interpretation of the findings

It is not surprising to find that the shared book reading intervention was more effective for promoting metalinguistic awareness as well as word and text reading than for increasing L2 children's vocabulary knowledge. There might be two possible reasons. For one, the effect of the shared book reading intervention on vocabulary development might take a longer time to surface, yet we only measured vocabulary at two time points. For example, Hood et al. (2008) conducted a three-year longitudinal study from Preschool to Grade Two in Australia and found that shared (parent-child) reading at the Preschool level was related to Grade One vocabulary. For another, the two print vocabulary measures adopted in this study might have contributed to the smaller effect of shared book reading on vocabulary development. Specifically, we focused on L2 children's mappings from sound to print words in L2 Chinese, as well as from print words to pictures (meanings) because L2 Chinese print word recognition has been a challenge for them. If oral vocabulary had also been measured, as in previous studies (e.g., Frijters et al., 2000; Grøver et al., 2020), the developmental trajectory might be different. Additionally, L2 children might have commanded the vocabulary in their L1 but not in L2 Chinese, thus not captured by the

L2 Chinese measures.

A unique finding of this research was that L2 Chinese children had differential responses to the shared book reading intervention, depending on their initial L2 reading proficiency. In addition to reading ability and vocabulary knowledge often measured in the existing literature, we captured L2 Chinese children's diverse Chinese literacy profiles by including a metalinguistic awareness measure as well as word and text reading. The finding that L2 Chinese children with initially lower levels of L2 Chinese reading proficiency benefited more from the shared book reading intervention was consistent with reading interventional studies with young children in other educational contexts (e.g., the UK: Dyson et al., 2018; the USA: Jones et al., 2018). Notably, in this study, L2 Chinese children from the initial high-level group performed on par with the L1 Chinese children in terms of metalinguistic awareness (as shown in Table 4 above), which contradicts the finding in earlier literature that ethnic and language minority children rarely catch up with their language majority counterparts (e.g., August et al., 2009).

Regarding the influence of HLE-related factors, when it comes to parents' educational background, fathers seemed to play a more important role than mothers did. This result corroborates existing literature that emphasizes the role of the father in children's early language and literacy development (for a review, see Varghese & Wachen, 2015). Research has indicated that fathers are more likely to employ complex and diverse language at home, often emphasizing task-oriented activities and reading goals, which may contribute to children's reading development (Pancsofar & Vernon-Feagans, 2006; Varghese & Wachen, 2015). Conversely, mothers are reported to favor simpler and more familiar language use (Varghese & Wachen, 2015). In addition, South Asian men are generally more educated and more engaged in work than South Asian women (Census and Statistics Department Hong Kong Special Administrative Region, 2022), which can also predict their children's reading through related interactive activities (Chan & Rao, 2023). Secondly, parents' Chinese oral proficiency levels were positively correlated with L2 children's initial L2 reading proficiency. This is because oral interaction is the most essential form of engagement within families. Parents with strong oral proficiency tend to use a more diverse range of language, thereby supporting their children's vocabulary development, semantic knowledge, and text reading (Head Zauche et al., 2016; Nippold et al., 2017; Saracho & Spodek, 2010).

5.3. Significance and limitations

The main significance of this research, based on the Hong Kong context, is that it generated new evidence for the field of promoting reading development for ethnic and language minority L2 children: first, shared book reading intervention was found to be more effective for promoting certain L2 reading-related outcomes such as metalinguistic awareness as well as word and text reading in children with initial lower levels of L2 reading proficiency, and ethnic and language minority children with higher levels of L2 reading proficiency performed as well as their native counterparts in target language metalinguistic awareness after they received shared book reading intervention. This result contrasts with earlier research findings which found that ethnic and language minority L2 children rarely catch up with their monolingual counterparts in reading (e.g., August et al., 2009). We further explored the influence of the home language environment and found that L2 Chinese children's initial reading proficiency was statistically influenced by the fathers' educational backgrounds, oral Chinese input at home, and the number of children's books available at home.

Another strength of the research lies in its methodological design when assessing the effectiveness of the shared book reading intervention. Specifically, we included a range of reading-related measurements at the sublexical-, lexical- and superlexical levels such as metalinguistic awareness, vocabulary knowledge, and word and text reading, which allowed us to capture the various literacy profiles in L2 Chinese children whereas previous research might mainly have conducted the profiling based on sublexical- and lexical-level assessments only.

This study has five limitations that invite more research. First, due to feasibility, we could not implement a regression discontinuity design or a randomized control trial design. Researchers may consider these approaches to make stronger causal inferences. Second, this study conducted an overall analysis of kindergarten children aged 3–6, which provided robust evidence of main effects but did not further examine potential differences in intervention responses across age groups (e.g., 3–4 vs. 5–6 years old). Such an overall design may have masked age-specific effects. Future research could be improved by expanding the sample size, adopting longitudinal designs, and systematically exploring the relationship between intervention timing and outcomes, thereby offering more precise age-based guidance for educational practice. The third limitation is the lack of practice observations to measure the specific amount of instructional time allocated to Chinese language learning. Although overall school attendance patterns were documented, the specific amount of time dedicated to Chinese instruction versus other activities was not systematically recorded. Fourth, regarding HLE, we only gathered quantitative data from the parent survey. To gain more insights into the actual oral language and print input among L2 Chinese families in Hong Kong, qualitative data from family interviews or home visits may help. Lastly, we tracked the children's progress at two time points over one semester. Future studies can extend this work by tracking their Chinese language and literacy development over a longer period.

6. Conclusions and implications

While there is a call for a reexamination of the effectiveness of shared book reading instruction on children's language and literacy development, this study, with a focus on ethnic minority kindergarteners in Hong Kong, has affirmed that an 8-week shared book reading intervention is effective for improving ethnic minority children's L2 Chinese reading-related outcomes. Moreover, L2 Chinese children with initial low- and mid-levels of Chinese reading proficiency benefited more from the shared book reading intervention, whereas L2 children with initial high levels of L2 Chinese reading proficiency performed as well as their L1 Chinese counterparts in the post-intervention test of L2 Chinese metalinguistic awareness. We have also identified three important HLE factors associated with

children's early development of L2 Chinese reading proficiency, namely, the father's educational background, daily oral Chinese input, and print input exposure (indexed by the number of children's books at home).

There are several important implications for researchers, school educators and parents who are key stakeholders in promoting Chinese language and literacy development for young ethnic minority children. First, shared book reading intervention can be promoted in both school and homes. Second, by recognizing the significant individual differences in Chinese literacy profiles of L2 Chinese children, it is important for researchers and school educators to assess their Chinese metalinguistic awareness as well as word and text reading in addition to other measures commonly used (e.g., Chinese vocabulary). Third, it is recommended that teachers adopt differentiated instruction. NCS children with initially low L2 proficiency benefited most from metalinguistic awareness training; therefore, teachers should prioritize structured and sequential instruction in Chinese metalinguistic awareness for this group. For NCS children with medium to high initial L2 proficiency, they should be given more challenging reading materials and tasks that promote deeper comprehension and linguistic thinking. Lastly, at the home level, it is important to provide daily Chinese oral input and exposure to children's books for ethnic minority children.

CRediT authorship contribution statement

Mingyao (Michelle) Sun: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Shui Duen Chan:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. **Sihui (Echo) Ke:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Xinhua Zhu:** Writing – review & editing, Writing – original draft, Methodology, Investigation. **Yuan Yao:** Writing – review & editing, Writing – original draft, Methodology, Investigation.

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Appendix A

Table A1
The family language policy among three L2 Chinese subgroups of initial L2 reading proficiency (low-, mid- and high-level)

Family oral language input	Memberships	L2 Chinese (low)	L2 Chinese (mid)	L2 Chinese (high)
Chinese	Father	2(2.1 %)	7(6.8 %)	2(7.4 %)
	Mother	1(1.0 %)	6(5.8 %)	2(7.4 %)
	Siblings	1(1.0 %)	4(3.9 %)	2(7.4 %)
	Grandmother	1(1.0 %)	5(4.9 %)	3(11.1 %)
	Grandfather	1(1.0 %)	6(5.8 %)	3(11.1 %)
Ethnic language	Father	25(25.8 %)	25(24.3 %)	4(14.8 %)
	Mother	24(24.7 %)	24(23.3 %)	6(22.2 %)
	Siblings	16(16.5 %)	14(13.6 %)	3(11.1 %)
	Grandmother	32(33.0 %)	30(29.1 %)	6(22.2 %)
	Grandfather	28(28.9 %)	24(23.3 %)	3(11.1 %)
English	Father	32(33.0 %)	42(40.8 %)	12(44.4 %)
	Mother	33(34.0 %)	43(41.7 %)	9(33.3 %)
	Siblings	41(42.3 %)	43(41.7 %)	8(29.6 %)
	Grandmother	8(8.2 %)	9(8.7 %)	3(11.1)
	Grandfather	9(9.3 %)	12(11.7 %)	5(18.5 %)
Others	Father	34(35.1 %)	25(24.3 %)	9(33.3 %)
	Mother	34(35.1 %)	27(26.2 %)	9(33.3 %)
	Siblings	20(20.6 %)	14(13.6 %)	4(14.8 %)
	Grandmother	18(18.6 %)	15(14.6 %)	5(18.5 %)
	Grandfather	15(15.5 %)	15(14.6 %)	5(18.5 %)

Appendix B

Table B1
The number of children's books at home among three L2 Chinese subgroups of initial L2 reading proficiency (low-, mid- and high-level)

The number of children's books at home	L2 Chinese (low)	L2 Chinese (mid)	L2 Chinese (high)
0–10	63[a] (67.7 %)	57[a, b] (56.4 %)	10[b] (37.0 %)
11–50	24[a] (25.8 %)	36[a] (35.6 %)	12[a] (44.4 %)
51–100	6[a] (6.5 %)	6[a] (5.9 %)	3[a] (11.1 %)
100–200	0[a] (0.0 %)	2[a] (2.0 %)	1[a] (3.7 %)
200+	0[a] (0.0 %)	0[a] (0.0 %)	1[a] (3.7 %)

Note. Letters indicate significant differences between columns at the .05 level.

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