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# Extra-Curricular Activities and Children's Bilingual Language Learning in Singapore

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**Abstract**

Extra-curricular activities (EAs) have become a billion-dollar industry in Asia, and many parents in Singapore enroll their children in enrichment classes to improve English and mother tongue language performance. Despite the heavy investment, it remains unclear how much children could benefit from such exposure. The present study examines this issue with 123 English–Mandarin bilingual children aged four to five. The number of hours children spent in language-related EAs, together with a set of internal factors (e.g., non-verbal intelligence) and external factors (e.g., home input), were used to predict children's receptive vocabulary and word-reading skills in both languages using path models. Results show that 36% of the children attended English or Mandarin enrichment classes. Participation in English enrichment classes was not significantly associated with children's English receptive vocabulary or English word-reading skills. In contrast, Mandarin enrichment classes were significantly associated with better Mandarin word-reading performance. The differential effects of enrichment classes may reflect the bilingual context of Singapore, where English dominates daily communication while Mandarin is mainly learned as a subject in preschool and receives relatively limited exposure outside school. The findings highlight the importance of considering sociolinguistic context when evaluating the effectiveness of language enrichment programs.

**Keywords:** extra-curricular activities; bilingual children; socioeconomic status; threshold hypothesis; relative weight hypothesis; receptive vocabulary; word reading

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## 1. Introduction

Child participation in extra-curricular activities (EA)—structured, adult-supervised programs emphasizing skill-building through regular participation (Mahoney et al., 2005)—has become widespread across Asian societies such as China, South Korea, Singapore, and Japan. In Singapore, the education system employs early academic tracking: students take the Primary School Leaving Examination at age 12, and their scores determine placement into academic ortechnical, secondary school pathways. This high-stakes exam has intensified demand for supplementary education from early childhood, driving household spending on private tuition from S$1.1 billion (2013) to S$1.8 billion (2023)—a approximately 64% increase, with average monthly household expenditure rising from S$79.90 to S$104.80 (Singapore Department of Statistics, 2024).

Despite this substantial investment, empirical research on EA effectiveness for young bilingual children's language development remains limited. EA participation encompasses

multiple dimensions: breadth (number of activity types), intensity (participation hours), duration (length of involvement), and engagement (behavioral, emotional, and cognitive investment) (Bohnert et al., 2010). This study focuses on intensity, operationalized as total weekly participation hours, as it directly captures children's exposure to specific learning environments and provides a quantifiable measure of educational investment. Specifically, we examine language-specific EA participation among English–Mandarin bilingual preschoolers in Singapore, investigating factors that predict participation and how participation affects dual language development.

### 1.1. Singapore's Bilingual Context and the Role of Language-Specific EA

To address these questions, we must first understand Singapore's unique linguistic landscape. Singapore adopts a bilingual policy of English plus mother tongue languages, with official emphasis on balanced bilingualism. The country officially recognizes four languages—English, Mandarin Chinese, Malay, and Tamil—with English serving as the primary language of education, administration, and interethnic communication, while the other three languages are designated as mother tongue languages within the school system. In practice, language use is unequal, with English dominating social life and the mother tongue language being relegated to cultural reservation (Lee & Phua, 2020; Tan & Ng, 2011). The 2020 population census shows that 48.3% of residents' most frequently spoken language is English, compared to 29.9% for Mandarin (Singapore Department of Statistics, 2021). This imbalance is more pronounced among younger cohorts, with 61% of young parents (26–35 years old) primarily using English (Mathews et al., 2020).

As a result, children receive abundant English input from multiple sources—schools, families, and media—with many using English as the primary home language (Sun et al., 2021). From Primary 1 (age six or seven), English becomes the sole medium of instruction in government schools, further reinforcing its dominance in children's daily experience. In contrast, mother tongue language exposure remains relatively limited, confined largely to school curricula and home use (Curdt-Christiansen, 2016; B. C. Ng et al., 2024; Sun et al., 2022, 2023). For Chinese Singaporean children—who constitute the majority of the resident population—Mandarin is typically learned as a school subject with comparatively fewer opportunities for use outside instructional contexts. This linguistic asymmetry creates conditions for subtractive bilingualism (Li et al., 2022)—a gradual decrease in mother tongue proficiency as English dominates children's linguistic repertoires.

Despite this shift toward English dominance, Singaporean Chinese parents remain strongly committed to bilingual education. Sun et al. (2025a) found that parents express positive attitudes toward maintaining Chinese and recognize its cultural and cognitive benefits. However, they face substantial practical challenges in creating rich mother tongue environments at home, often constrained by their own limited Mandarin proficiency (Sun et al., 2023). Many parents—particularly those educated primarily in English—report feeling inadequate to provide quality Mandarin input, creating a gap between their bilingual aspirations and daily language practices.

Language-specific EA may serve as a response to this dilemma. For many families, Mandarin EA represents a pragmatic solution: outsourcing mother tongue exposure to trained instructors when parents themselves lack the proficiency or confidence to provide it. This contrasts with motivations for English EA, which typically reflect competitive academic pressures—what Singaporeans call "kiasu" (fear of losing out) parenting, rather than parents' linguistic limitations (Göransson, 2015). In other words, English EA supplements already provide abundant input to gain a competitive advantage, whereas Mandarin EA often compensates for genuine input scarcity at home. These distinct motivations raise

questions about whether language-specific EAs might differentially support development in input-rich versus input-scarce languages—a question this study addresses.

### 1.2. EA Participation and Related Factors

Under these circumstances, exploring what factors motivated families in language-specific EA becomes important. Socioeconomic status (SES) has been consistently found to predict EA participation across societies. Lareau's (2011) influential ethnography distinguished two class-based parenting approaches: middle-class concerted cultivation, which emphasizes developing children's skills through structured activities, versus working-class accomplishment of natural growth, which prioritizes autonomous development with minimal parental intervention. This framework has received robust empirical support across diverse societies. For instance, using the nationally representative U.S. Early Childhood Longitudinal Study–Kindergarten cohort ($n$ = 21,260), Covay and Carbonaro (2010) found that by third grade, over 95% of children in the highest SES quartile participated in at least one EA, compared with approximately 60% in the lowest quartile. Logistic regression models revealed that family income, parental education, and occupational prestige each independently predicted EA participation even after controlling for race and school characteristics.

Similar patterns emerge across Asia. In Hong Kong, Lau and Cheng (2016) surveyed 1260 parents of kindergarten-aged children and found that higher parental education and family income predicted both higher ideal and actual numbers of EAs. Subsequent studies in Hong Kong (Chiu & Lau, 2018) and China (Ren et al., 2020) confirmed these associations. Inoue et al.'s (2025) multi-site study in China revealed that SES shapes parental attitudes toward home education and expectations for children's abilities, which in turn influence EA participation decisions.

In Singapore, qualitative research confirms that Lareau's class-based parenting logics operate here as well. Through in-depth interviews with 18 young parents, I. Y. H. Ng et al. (2023) found that higher-SES parents consciously enacted concerted cultivation by investing heavily in EAs, whereas lower-SES parents emphasized meeting basic needs while granting children autonomy in daily activities—consistent with the accomplishment of natural growth. This class stratification is reflected in spending patterns: the top 20% of Singaporean households spend an average of S$162.60 monthly on private tuition, over four times the S$36.30 spent by the bottom 20% (Singapore Department of Statistics, 2024). While Singapore's "kiasu" (fear of losing out) parenting culture pervades all ethnic groups (Göransson, 2015), its intensive practice—requiring substantial investments of time, money, and energy—remains concentrated among middle-class families.

Beyond SES, home language environment, especially parental language proficiency, may also shape demand for language-specific EAs. Parents with lower proficiency in a target language tend to enroll children in EAs for that language—a pattern documented in Hong Kong for English (Lau & Cheng, 2016) and in Singapore for Mandarin (Sun et al., 2025b). Mothers with lower Mandarin proficiency report anxiety about language errors, which may motivate EA enrollment as a compensatory strategy.

### 1.3. EA and Child Development: Three Theoretical Models of EA Effects

Although it is crucial to understand the factors that influence EA participation, an equally or even more important question concerns whether and how EA benefits children's development. As the specific EA studies on early language are limited, we review theories and models on EA and child development in general. Three main theoretical models have been proposed to explain how EA affects child development. The zero-sum model (Coleman, 1961; Otto & Alwin, 1977) posits that students' time and energy are limited.

When they devote many hours to EAs, especially those in social or athletic domains, participation may reduce time for traditional academic pursuits such as homework, exam preparation, and thereby harm academic achievement.

In contrast, the developmental model (Holland & Andre, 1987; Larson & Verma, 1999) views EAs as a positive context for growth. High-quality activities provide additional opportunities for practicing skills, building peer relationships, and receiving adult guidance, which can foster cognitive, social–emotional, and academic development and help students become more well-rounded and socially competent.

The threshold model (Marsh & Kleitman, 2002) integrates these perspectives, proposing that EA effects are nonlinear. While additional participation may benefit development at low to moderate levels, excessive involvement can yield diminishing or even negative returns and displace other developmental opportunities. Marsh and Kleitman (2002) analyzed data from 4757 American high-school students in the National Educational Longitudinal Study and found inverted U relationships between overall EA participation and multiple academic and psychosocial outcomes. In their study, benefits typically began to level off at about 1.4 standard deviations above the mean EA participation score, indicating that extremely high levels of involvement are associated with diminishing returns.

Taken together, these models suggest that EA effects depend on students' existing resources and opportunities effects may be negative when extensive EA participation displaces other valuable experiences (zero-sum model), positive when EAs provide additional opportunities for skill-building, social interaction, and adult guidance (developmental model), or show diminishing or even negative returns once participation exceeds an optimal range (threshold model). However, a critical limitation is that these models were developed and tested in monolingual contexts, where EAs encompass a broad range of activities (e.g., sports, arts, student government) that may or may not have explicit academic goals. Their applicability to language-specific EA in bilingual contexts—where input quantity and quality vary dramatically across languages—remains unclear.

### *1.4. EA and Bilingual Language Learning: The Role of Input Asymmetry*

When we shift focus to language EAs—extra-curricular activities primarily intended to enhance students' language skills, such as English or Mandarin tuition and language enrichment classes—a key moderating factor emerges: the quantity and quality of language input students already receive in each language.

Research on bilingual acquisition emphasizes the importance of adequate language exposure (Place & Hoff, 2011; Unsworth, 2013) and sufficient usage (Tomasello, 2003). Recent studies show that the language input environment moderates how various factors influence children's language learning. Sun et al. (2018, 2020) found among Singaporean bilingual children that in mother tongue language environments with relatively sparse input, external factors (such as family and school resources) exerted stronger effects on vocabulary acquisition than internal factors (such as children's nonverbal intelligence); in English environments with abundant input, internal factors demonstrated stronger predictive power for individual differences in learning outcomes. The authors suggest that learners need sufficient input quantity and quality before internal learning mechanisms can function effectively.

These findings raise a critical question: Do language EAs have similar effects in languages where children already receive abundant input (e.g., societal dominant languages) and in languages where input is relatively limited (e.g., heritage or minority languages)? Based on Sun et al.'s (2021) relative weight hypothesis, we would expect language EA to benefit input-scarce languages more than input-rich languages. Empirical evidence supports this prediction. In input-rich language contexts, language EAs tend to show weak

or non-significant associations with language proficiency. Allen et al. (2022) examined 401 American kindergarteners and found no significant association between EA and expressive vocabulary in multilevel models controlling for socioeconomic status and other covariates (b = 0.78, $p$ = 0.09). They noted that their finding is consistent with Carolan's (2018) analysis of 10,422 children, parents, and teachers in a national database, which reported only very small direct effects of EA participation on reading achievement (β = 0.04). Allen et al. argued that such findings likely reflect both genuinely small effects and the use of coarse, dichotomous measures of EA intensity. Ren and colleagues reported similar patterns in Mandarin-speaking contexts. In a three-wave longitudinal study of 343 preschoolers in Shanghai, Ren et al. (2021) found that neither the breadth nor the intensity of EA participation predicted children's later Chinese character reading or receptive vocabulary after controlling for baseline development and family background. In a separate study in Guangdong, Ren et al. (2022) showed that among children who attended EAs ($n$ = 193), the total number of EAs, EA breadth, and EA intensity were not significantly associated with later academic readiness, including Chinese reading and receptive vocabulary. Critically, all these null or small effects emerged in contexts where the target language was societally dominant: English for American children and Chinese for children in China (Shanghai and Guangdong)—contexts where children receive ample exposure through schools, families, and media.

In contrast, in input-scarce language contexts, additional language-focused activities tend to show stronger effects. Zheng et al. (2020) analyzed 9225 junior-high students in China and found that private tutoring was significantly and positively associated with test scores after extensive controls, with the largest gains observed in English: tutored students scored 5.82 points higher in English than non-tutored peers. The significant effect for English, which is learned as a foreign language with limited daily exposure, is consistent with the idea that language EAs are especially helpful for input-poor languages. Experimental evidence from heritage-language settings further supports this pattern. In Luxembourg, Engel de Abreu et al. (2025) conducted a 30-week controlled trial with preschoolers from Portuguese-speaking immigrant families, comparing a small-group Portuguese oral-language program with an active early-math control. Children in the heritage-language program showed significantly larger gains in Portuguese vocabulary, phonological awareness, and early literacy skills than children in the control group, with some advantages maintained at follow-up. Together, these findings suggest that when daily input in a language is sparse, structured language-focused activities such as private tutoring or additional heritage-language classes can make a meaningful contribution to children's proficiency in that language.

### *1.5. The Present Study*

As revealed in the literature review above, despite important findings in recent years, crucial gaps remain in existing research on EA. First, most EA research has focused on monolingual contexts, and systematic research in bilingual societies with asymmetric language exposure remains limited. Second, existing studies typically operationalize EA outcomes using broad categories (e.g., academic versus non-academic) or simple participation counts and rarely distinguish language-specific EA or examine differential impacts across languages. Third, it remains unclear whether EA conducted in different languages yields differential effects on corresponding language proficiency. Addressing these gaps is both theoretically and practically important, as it would clarify how bilingual children's language development relates to parents' educational investment.

Singapore's bilingual policy, asymmetric language exposure patterns, and highly developed EA culture provide a compelling context for examining language-specific EA

and addressing these gaps. This study investigates how English EA and Mandarin EA differentially relate to preschool children's language learning. Specifically, we address the following research questions:

RQ1. Do familial SES and parental language proficiency predict children's EA intensity?
RQ2. Is EA intensity in English and Mandarin related to children's vocabulary and word-reading skills in the corresponding languages?

## 2. Methods

### 2.1. Participants

The dataset employed for this study is a part of a longitudinal project on bilingual children's book reading at home. The project is approved by the university's institutional review board. Informed consent was obtained on the survey platform before the start of the questionnaires. The children had to be English–Mandarin bilingual language learners and have no history of developmental or learning impairment. There were 127 children recruited for the study for the assessment, 4 participants' data were excluded from the analyses due to the diagnoses of learning/development issues, and one due to invalid data (e.g., keeping silent during productive tasks). The final dataset used for analyses consisted of data collected from 123 Mandarin–English bilingual children (60 boys and 63 girls). Although 123 may appear modest in absolute terms, this sample size is appropriate and meaningful given the specificity of the target population: preschool-aged English–Mandarin bilingual children representing a well-defined subpopulation assessed during the critical developmental window immediately preceding formal schooling.

### 2.2. Data Collection

**Parental Questionnaires.** Parents completed a questionnaire adapted from previous research (Sun et al., 2022) assessing the home bilingual language environment and demographic information. The questions relevant to the current study measured the following aspects. First, parents indicated the dominant language at home (English, Mandarin, other languages, or any combination). Second, to quantify home language input, parents reported how many hours each family member spoke to the child in English, Mandarin, or other languages during the child's waking hours on a typical weekday and weekend, respectively. A weekly average was calculated based on input from nuclear family members (i.e., parents and siblings), the dominant family structure in Singapore. Third, parents reported the weekly duration of language-related extra-curricular activities (e.g., phonics, reading programs). Fourth, maternal and paternal proficiency in English and Mandarin were self-rated on a 5-point scale (1 = No understanding or speaking ability to 5 = Understand almost everything, very comfortable expressing myself in all situations). Finally, socioeconomic status was assessed via household monthly income on a 30-point scale increasing in $500 increments (1 = Below $1000 to 30 = $15,000 and above) and parental education levels on an 8-point scale (1 = No qualification; 2 = Primary school; 3 = Secondary school; 4 = Junior college; 5 = Polytechnic diploma or equivalent; 6 = Bachelor's degree; 7 = Master's degree; 8 = Doctorate).

**English and Mandarin Receptive Vocabulary.** The Bilingual Language Assessment Battery (BLAB; Rickard Liow et al., 2013), a standardized vocabulary measure developed in Singapore, was used to assess receptive vocabulary in English and Mandarin. Like the Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 2007), the receptive understanding section consists of 80 trials per language, with 2 practice trials. In each trial, participants were shown 4 images while an audio played a word. They selected the image that best matches the word. The BLAB has demonstrated good validity (Cronbach's Alpha: 0.75–0.77; Rickard Liow et al., 2013) and was well-suited for this study's participants.

**Word Reading.** We used the Word Reading Subtest (Blue version) of the Wide Range Achievement Test (WRAT; Wilkinson & Robertson, 2006) to assess children's English word-reading skills. The task consists of letter reading (15 items) and word reading (55 items), with word items increasing in complexity. Children were required to recognize and read out loud the measured words. If children read a letter or a word correctly, the items were scored as "1". The word reading part followed a discontinuous rule, and administration was terminated after children committed ten consecutive incorrect responses. The split-half reliability of the WRAT word reading subset is 0.98, and the validity (median correlation with other measures of WR) is 0.71, according to the WRAT manual. Child Mandarin reading skills were assessed with a custom Mandarin word reading task. The Mandarin word reading task comprises 125 trials and 4 practice trials across 3 parts. Parts 1 and 2 consist of single-character Mandarin words in increasing difficulty. Part 3 consists of double-character Mandarin words, including some utilizing characters tested in the previous parts.

**Nonverbal Intelligence.** Nonverbal Intelligence was assessed through Raven's Colored Matrices (Raven et al., 1998). This assesses children's analytical reasoning, a component of language aptitude (Paradis, 2011; Sun et al., 2026). Children were shown a pattern with a missing part and chose from 6 options which one correctly completed the pattern. Sets A, AB, and B were used for a total of 36 trials. The assessment for each set was terminated after the child made 4 consecutive errors. The Raven's test demonstrated good internal reliability in the current sample ($\alpha = 0.82$).

### 2.3. Data Analysis

Path models were estimated using AMOS 29 with maximum likelihood estimation. Socioeconomic status (SES) was modeled as a latent factor with three indicators: maternal education, paternal education, and household income. Model fit was evaluated using four indices (Klem, 2000): chi-square ($\chi^2$), Tucker–Lewis index (TLI), Comparative Fit index (CFI), and root mean square error of approximation (RMSEA). Although a non-significant $\chi^2$ indicates good fit, $\chi^2$ is sensitive to sample size (Kline, 2016). Therefore, we prioritized TLI and CFI values, which are less affected by sample size. Acceptable fit was deemed to be TLI and CFI values $\geq 0.90$ and RMSEA values $\leq 0.06$ (Hu & Bentler, 1999).

## 3. Results

### 3.1. Descriptives and Correlations

The descriptive statistics of the 123 children are summarized in Table 1. Children's and parental variables in English and Mandarin Chinese were further compared using pairwise *t*-tests. Participants ranged from 48 to 67 months old (M = 59.37, SD = 4.74). Families' socioeconomic status was estimated via parental education levels and monthly household income. Most participants were from middle-class families, with mothers and fathers holding, on average, a Polytechnic diploma or Bachelor's degree as their highest educational qualification (ranging from no qualification to a Doctorate degree). The average household income was approximately $11,000–$11,499 per month (with a range from below $1000 to $15,000 and above, increasing in $500 increments). Children participated in an average of half an hour per week of extra classes in English (M = 0.53, SD = 0.97) and Mandarin Chinese (M = 0.46, SD = 0.82). Approximately 30.3% of the sample participated in English EA and 30.1% in Mandarin EA. Children's weekly home English input (M = 33.49 h, SD = 26.14) was significantly higher than Mandarin input (M = 15.32 h, SD = 17.56) ($t(122) = 5.46$, $p < 0.001$). Parents rated themselves as having a good command of both English and Mandarin speaking skills and could understand and use both languages adequately for work and most other situations (M = 4.40, SD = 0.88 for English; M = 4.18, SD = 0.81 for Chinese, on a 5-point scale). Children demonstrated significantly

larger receptive vocabulary in English (M = 44.07, SD = 8.40) than in Mandarin Chinese (M = 38.30, SD = 9.63) (t(121) = 5.54, $p < 0.001$). For word-reading, children recognized an average of 20 words in English (M = 19.79, SD = 6.72) and approximately 31 words in Mandarin Chinese (M = 30.54, SD = 25.44). Notably, there was a stopping rule for the English word-reading task, whereas no such rule applied to the Mandarin word-reading task.

**Table 1.** *Descriptives and correlations between the variables.*

| | English | | | Chinese | | |
|---|---|---|---|---|---|---|
| | **N** | **M (SD)** | **Range** | **N** | **M (SD)** | **Range** |
| Age(Month) | 123 | 59.37 (4.74) | 48–67 | | | |
| Nonverbal Intelligence | 123 | 19.58 (6.21) | 2–33 | | | |
| Maternal Education | 123 | 6.02 (0.84) | 2–8 | | | |
| Paternal Education | 123 | 5.76 (1.21) | 2–8 | | | |
| Household Income | 123 | 22.18 (7.85) | 2–30 | | | |
| Home Language | 123 | 59 English-dominant, 25 Mandarin-dominant, 39 both | | | | |
| EA Intensity | 121 | 0.53 (0.97) | 0–5 | 122 | 0.46 (0.82) | 0–4.5 |
| EA Participation Rate | 122 | 30.3% | | 123 | 30.1% | |
| Weekly Home Input.ave | 123 | 33.49 (26.14) | 0–107 | 123 | 15.32 (17.56) | 0–80.5 |
| Maternal Proficiency | 123 | 4.41 (0.91) | 1–5 | 123 | 4.25 (0.87) | 1–5 |
| Paternal Proficiency | 121 | 4.38 (1.02) | 1–5 | 120 | 4.13 (1.09) | 1–5 |
| Receptive Vocabulary | 122 | 44.07 (8.40) | 21–62 | 122 | 38.3 (9.63) | 17–65 |
| Word Reading | 122 | 19.79 (6.72) | 3–43 | 122 | 30.54 (25.44) | 0–103 |

Pearson correlations were conducted to examine the correlations between the predictors. The magnitudes of correlations were acceptable (<0.60), except for the correlation between maternal and paternal English proficiency (r = 0.66). In addition, maternal and paternal Mandarin proficiency were also significantly correlated (r = 0.35). To maintain parsimony given the number of predictors relative to sample size, we averaged maternal and paternal proficiency scores in English and Mandarin separately before conducting the path analyses for RQ1 and RQ2. In addition, the three-category home language variable (English-dominant, Mandarin-dominant, bilingual) was recoded into a binary variable—English-dominant ($n$ = 59) versus non-English-dominant ($n$ = 64)—to simplify the model while maintaining adequate group sizes.

Two distinct measures of home language environment were used across the path models, reflecting the different analytical objectives of each research question. In the model examining predictors of children's EA participation (RQ1), home language dominance (English-dominant vs. Mandarin-dominant) was used as a single composite indicator of the overall home language environment. This choice was motivated by two considerations. First, as both English and Mandarin EAs were modeled simultaneously as outcomes, a single relational index capturing the relative dominance of each language in the home was conceptually more appropriate than separate language-specific input measures. Second, to maintain adequate statistical power relative to the number of predictors, parsimony in model specification was warranted. In the models examining bilingual language outcomes (RQ2), weekly hours of English and Mandarin home language input were used separately as predictors, as these language-specific measures were better suited to examining the differential impact of each language's exposure on children's corresponding outcomes in that language.

### *3.2. SES and Parental Proficiency in Children's EA Participation*

Table 2 presents the results addressing the first research question regarding the predictors of children's extra-curricular participation. Parental education levels and household

income were used to create a latent "SES" factor. In the path model, SES, home language (i.e., English-dominant vs. non-English-dominant), and parental English and Mandarin proficiency were modeled as independent variables, while children's English and Mandarin extra-curricular hours per week were modeled as dependent variables. The results show that parental English proficiency was significantly negatively associated with the duration of children's English extra-curricular activities, while home English dominance and SES were significantly positively associated with children's Mandarin extra-curricular participation. In other words, children from families that use predominantly English at home and that have higher SES tended to participate in more Mandarin Chinese extra classes. It is worth noting that home language dominance was not included as a predictor of English EA in the final model. Unlike for Mandarin EA—where home English dominance directly indexes Mandarin input scarcity and thus motivates compensatory enrollment—the compensatory logic for English EA operates primarily through parental proficiency: parents with lower English proficiency seek external supplementation to address their own limitations in supporting English development at home. Home language dominance was tested but found to be non-significant for English EA and collinear with parental English proficiency, such that its inclusion degraded model fit without theoretical benefit. The final model demonstrated good fit: $\chi^2(15) = 20.937$, $p = 0.139$, CFI = 0.961, TLI = 0.906, RMSEA = 0.057.

**Table 2.** *The results of the path model on children's English and Mandarin extra-curricular activities.*

| Outcome | Predictor | β | B | S.E. | *p* |
|---|---|---|---|---|---|
| English EA Intensity | English Parental Proficiency | −0.23 | −0.26 | 0.12 | 0.03 |
| | SES | 0.13 | 0.02 | 0.02 | 0.27 |
| Mandarin EA Intensity | Mandarin Parental Proficiency | −0.01 | −0.01 | 0.1 | 0.9 |
| | SES | 0.24 | 0.04 | 0.02 | 0.02 |
| | Home Eng Dominance | 0.21 | 0.35 | 0.15 | 0.02 |

### 3.3. EA Participation in Predicting Bilingual Children's Vocabulary and Word Reading

Tables 3 and 4 present the results for the second research question regarding the predictors of children's English and Mandarin skills, respectively. In both path models, children's weekly language extra-curricular activities, weekly language input at home, age, nonverbal intelligence, and SES were modeled as independent variables, while receptive vocabulary size and word reading were modeled as dependent variables.

**Table 3.** *The results of the path model on children's English receptive vocabulary and word-reading skills.*

| Outcome | Predictor | β | B | S.E. | *p* |
|---|---|---|---|---|---|
| English Receptive Vocabulary | English EA Intensity | −0.02 | −0.21 | 0.69 | 0.76 |
| | English Weekly Home Input | 0.29 | 0.09 | 0.03 | *** |
| | Nonverbal Intelligence | 0.28 | 0.38 | 0.11 | *** |
| | Child Age | 0.06 | 0.11 | 0.15 | 0.45 |
| | SES | 0.22 | 0.35 | 0.15 | 0.02 |
| English Word Reading | English EA Intensity | −0.05 | −0.33 | 0.56 | 0.56 |
| | English Weekly Home Input | 0.05 | 0.01 | 0.02 | 0.51 |
| | Nonverbal Intelligence | 0.11 | 0.12 | 0.09 | 0.2 |
| | Child Age | 0.28 | 0.4 | 0.12 | *** |
| | SES | 0.39 | 0.49 | 0.13 | *** |

Note. *** refers to $p < 0.001$.

**Table 4.** *The results of the path model on children's Mandarin receptive vocabulary and word-reading skills.*

| Outcome | Predictor | β | B | S.E. | *p* |
|---|---|---|---|---|---|
| Mandarin Receptive Vocabulary | Mandarin EA Intensity | −0.06 | −0.73 | 0.94 | 0.44 |
| | Mandarin Weekly Home Input | 0.5 | 0.27 | 0.05 | *** |
| | Nonverbal Intelligence | 0.29 | 0.45 | 0.13 | *** |
| | Child Age | 0.01 | 0.02 | 0.16 | 0.91 |
| | SES | 0.23 | 0.39 | 0.18 | 0.03 |
| Mandarin Word Reading | Mandarin EA Intensity | 0.17 | 5.38 | 2.51 | 0.03 |
| | Mandarin Weekly Home Input | 0.36 | 0.52 | 0.13 | *** |
| | Nonverbal Intelligence | 0.22 | 0.9 | 0.33 | 0.01 |
| | Child Age | 0.18 | 0.96 | 0.43 | 0.02 |
| | SES | 0.4 | 1.78 | 0.5 | *** |

Note. *** refers to $p < 0.001$.

Results showed that English extra-curricular activities were not significantly associated with either of the children's English outcomes (Table 3). In contrast, weekly home English input, children's nonverbal intelligence, and SES were significantly associated with children's English vocabulary size. The more English children were exposed to at home, the higher their nonverbal intelligence, the higher their SES, and the larger their English receptive vocabulary sizes were. For English word-reading, child age and SES were significant positive predictors. Older children from higher-SES families recognized more English words. The model explained 28% of the variance in children's English receptive vocabulary size and 29% of the variance in English word reading skills. Model fit indices were excellent: $\chi^2(17) = 18.599$, $p = 0.352$; CFI = 0.989; TLI = 0.972; RMSEA = 0.028.

In contrast to the English results, Mandarin extra-curricular activities appeared to matter for children's Mandarin learning. Results showed that Mandarin extra-curricular activities were significantly associated with children's Mandarin word-reading skills ($\beta = 0.17$, $p = 0.03$) but not with receptive vocabulary size. Regarding established predictors of language outcomes, home Mandarin input, children's nonverbal intelligence, and SES were significantly associated with both children's Mandarin receptive vocabulary and Mandarin word-reading skills. Paralleling the English model, children with more home Mandarin exposure, higher nonverbal intelligence, and higher SES demonstrated better Mandarin skills. As with English, older children also recognized more Mandarin words. The model explained 33% of the variance in children's Mandarin receptive vocabulary size and 34% of the variance in Mandarin word-reading skills. Model fit indices were good: $\chi^2(17) = 23.212$, $p = 0.142$; CFI = 0.971; TLI = 0.924; RMSEA = 0.055.

## 4. Discussion

This study examined whether (1) family SES and parental language proficiency predict language-specific EA participation, and (2) whether EA intensity in each language predicts corresponding vocabulary and word-reading outcomes, among English–Mandarin bilingual preschoolers in Singapore. The results revealed that (1) higher parental English proficiency predicted lower English EA participation, while higher SES and English-dominant home language predicted greater Mandarin EA participation; (2) English EA was not significantly associated with English vocabulary or word-reading outcomes, whereas Mandarin EA was significantly associated with Mandarin word reading but not receptive vocabulary. Home language input, nonverbal intelligence, and SES consistently predicted outcomes across both languages. These findings suggest EA participation is more beneficial in the input-scarce language (Mandarin), particularly for literacy, than in the input-rich language (English), where children already receive substantial exposure from home, school, and media.

### 4.1. Predictors of EA Participation: A Compensatory Pattern

The results for the first research question indicate that parents treat EA enrollment as a potential compensatory strategy. For English, parental English proficiency was the sole significant predictor of children's English EA participation, with lower parental proficiency associated with greater English EA enrollment. This reflects a compensatory logic: parents with lower English proficiency—less able to support their children's English development through daily home interactions—seek external supplementation to address this gap. For Mandarin, higher SES and an English-dominant home language were both significantly associated with greater Mandarin EA participation, reflecting a parallel compensatory pattern: families that predominantly use English at home—and thus provide limited Mandarin input—turn to external resources to address this gap. That higher-SES families are more likely to pursue this compensatory strategy aligns with Lareau's (2011) concerted cultivation framework, in which middle-class parents actively invest in structured activities to develop their children's skills. In Singapore, I. Y. H. Ng et al. (2023) documented the same class-based logic, with higher-SES parents investing heavily in EAs while lower-SES parents prioritized meeting basic needs.

This compensatory enrollment pattern for Mandarin EA is further consistent with Sun et al.'s (2025b) findings on Singaporean parents' bilingual aspirations. While Chinese parents generally express strong positive attitudes toward maintaining Mandarin, many—particularly those educated primarily in English—report feeling inadequate to provide quality Mandarin input at home. For these families, Mandarin EA represents a pragmatic solution: outsourcing language exposure to trained instructors when parents lack the proficiency or confidence to do so themselves.

### 4.2. Differential EA Effects Across Languages: Input Context Matters

In terms of the second research question, a differential effect of EA has been identified across languages. The null effect of English EA on both receptive vocabulary and word reading replicates a consistent pattern documented in input-rich language contexts (Allen et al., 2022; Ren et al., 2021, 2022), and the present findings help explain the reason. Children in this sample received an average of 33.49 h of English input at home per week, in addition to substantial school and media exposure. Against this backdrop, an additional 0.53 h per week of English EA represents a marginal increase of approximately 1.5% in total English input—a contribution too small to produce detectable effects on language outcomes. This interpretation aligns with Sun et al.'s (2018) finding that in input-rich environments, internal factors carry greater predictive weight than additional external input sources—a pattern confirmed in the present English model, where nonverbal intelligence and age were the significant predictors of English skills rather than EA participation.

In contrast, Mandarin EA was significantly associated with Mandarin word-reading skills, though not with receptive vocabulary. This selective effect warrants explanation on two dimensions: why Mandarin EA shows effects when English EA does not, and why the effect is specific to word reading rather than vocabulary. First, the key difference lies in the input context. Children's weekly home Mandarin input (M = 15.32 h) was less than half of their English input (M = 33.49 h), a substantial difference. In this input-scarce environment, additional structured Mandarin exposure through EA constitutes a proportionally larger contribution to children's total Mandarin input. This finding is consistent with Sun et al.'s (2018) observation that external factors exert stronger effects on language outcomes in input-poor environments. It also converges with Zheng et al.'s (2020) finding that private tutoring was most strongly associated with test scores in English—a foreign language with limited daily exposure for Chinese students—and with Engel de Abreu et al.'s (2025) demonstration that a heritage-language intervention significantly enhanced Portuguese language skills

among preschoolers from immigrant families in Luxembourg, where Portuguese was the input-scarce heritage language.

The selective effect on word reading but not vocabulary likely reflects the nature of skills targeted by EA instruction. Chinese character reading draws on cognitive processes that are distinct from those involved in alphabetic reading (McBride & Wang, 2015). Unlike English, where grapheme–phoneme correspondences enable children to decode unfamiliar words, Chinese characters are logographic units that do not transparently map onto pronunciation; children therefore benefit substantially from explicit instruction in orthographic structure and morphology when learning to read characters (Packard et al., 2006). Indeed, leading Mandarin tuition providers in Singapore design their preschool curricula around character recognition, stroke order, and structured reading practice (e.g., Berries, Tien Hsia Language School.)—precisely the skills that require systematic, teacher-guided instruction beyond what most home environments can provide. Parents who use Mandarin at home may provide adequate oral input for vocabulary acquisition but may lack the pedagogical expertise to teach character reading. EA thus fills a specific instructional gap that the home environment cannot easily address, resulting in effects on literacy skills but not oral vocabulary.

### 4.3. Control Variables and Their Effects

Across both language models, home language input, nonverbal intelligence, and SES consistently predicted children's vocabulary and word-reading outcomes. Home input was significantly associated with receptive vocabulary in both English and Mandarin, underscoring the fundamental role of quantity of language exposure in early vocabulary development (Place & Hoff, 2011; Unsworth, 2013). SES predicted outcomes across both languages and both skill domains, with higher-SES children demonstrating larger vocabularies and stronger word-reading skills. This broad SES effect is consistent with the extensive literature documenting socioeconomic disparities in children's language and literacy development (Covay & Carbonaro, 2010; Inoue et al., 2025).

Notably, SES predicted both EA participation (RQ1) and language outcomes (RQ2), pointing to a potential compounding advantage for higher-SES children. Higher-SES families not only provide richer home language environments but also have greater access to compensatory EA resources—particularly for Mandarin, where EA appears to benefit word reading. This pattern is consistent with a Matthew effect in which initial resource advantages accumulate over time, potentially widening socioeconomic gaps in language and literacy development. Whether SES operates through EA participation as a mediating pathway is an empirical question that future studies with larger samples could address using formal mediation models. Importantly, however, the present findings also indicate that EA cannot substitute for the home language environment: home input remained a significant predictor of language outcomes even after accounting for EA participation, and the variance explained by EA was modest relative to that of home input and SES.

### 4.4. Theoretical Contributions

This study makes several theoretical contributions. First, it extends both the threshold model (Marsh & Kleitman, 2002) and the relative weight hypothesis (Sun et al., 2021) to the context of language-specific EA in bilingual children. The threshold model proposed that EA effects follow an inverted U-shaped function, with diminishing returns beyond an optimal level of participation. The relative weight hypothesis, drawing on bilingual acquisition research, proposed that the input environment moderates the relative influence of internal versus external factors on language learning, with external factors carrying greater weight when input is scarce. Although these two frameworks were developed

independently, our findings suggest they converge on a shared insight when applied to bilingual EA: the returns of discretionary structured input vary systematically as a function of how much input a child already receives in that language. When a child already receives abundant input in a language—as Singaporean preschoolers do in English—the marginal return of additional EA exposure is negligible, because the input threshold has effectively already been met through home, school, and media. When input is relatively scarce—as in Mandarin—the same EA investment yields meaningful returns, because children are operating well below that threshold. Together, these findings reconceptualize the threshold not as a fixed quantity tied to participation hours, but as a function of the broader input ecology surrounding each language.

Second, this study challenges the prevailing assumption in EA research that participation effects are uniform across activity types and domains. Most prior research has treated EA as a monolithic construct, collapsing across diverse activity types into a single participation measure (Bohnert et al., 2010). By contrast, this study distinguishes language-specific EA and demonstrates that the same structural type of activity—language tuition—yields markedly different developmental returns depending on the language in which it is conducted. This finding suggests that domain specificity is not sufficient: the linguistic context of an activity is an equally important moderator of its effectiveness. Future EA research in multilingual settings should therefore move beyond aggregate participation measures and examine language-specific engagement to avoid masking differential effects.

## 5. Limitations and Implications

Several limitations should be acknowledged. First, the cross-sectional design precludes causal inference; longitudinal and experimental studies are needed to establish directionality. Second, EA is a multidimensional construct, yet only intensity was measured. Future work should capture breadth, content, pedagogy, and instructor quality, given the importance of input quality to language development (Rowe & Snow, 2020). Third, EA participation was assessed via parental recall, which may be subject to over- or underestimation; more objective measures, such as attendance records from EA platforms, would improve reliability. Fourth, the sample was predominantly middle-class, ethnically Chinese, and limited to 4–5-year-olds. Future studies should include other mother tongue languages (Malay, Tamil), broader SES backgrounds, and wider age ranges. Fifth, EA participation was limited in both intensity (M = 0.5 h/week) and breadth (36% participation), potentially attenuating effects. The heavy zero-inflation of the EA intensity variable may also not fully conform to the assumptions of maximum likelihood estimation; future studies with larger samples could employ two-part (hurdle) models to separately examine participation decisions and intensity effects, providing a more nuanced picture of their independent contributions to language outcomes. Finally, outcomes were limited to receptive vocabulary and word reading; future studies should assess a broader range of skills directly targeted by EA, including productive vocabulary, reading comprehension, and writing.

Despite these limitations, our findings have important implications for bilingual families, educators, and policymakers. For families, these findings suggest that when a language dominates the societal context, and children receive sufficient input from school, home, and media (as with English in this study), additional EA may provide minimal benefit. In contrast, EA may be more beneficial for languages where children have limited exposure (as with Mandarin), particularly from a cost-effectiveness perspective. However, not all language domains benefit equally: literacy skills appear more responsive to EA than oral vocabulary. Most importantly, the home environment plays a crucial role in children's language learning that appears irreplaceable by EA during early childhood. Parents should prioritize creating rich language environments at home through speaking

and reading activities. For parents with limited proficiency in the heritage language, digital technologies (e.g., eBooks; Sun et al., 2025a) may support children's language learning. For policymakers, our findings reveal that EA participation is stratified by SES, with higher-SES families accessing more mother tongue EA. This pattern risks exacerbating educational inequality, particularly given that EA appears effective for mother tongue literacy development. To ensure equitable access to language development opportunities, governments may consider: (1) subsidizing mother tongue EA through programs similar to the SG active initiative; (2) increasing mother tongue instruction hours in preschools to reduce reliance on private EA; and (3) providing resources to support home language development. Such interventions could help level the playing field, particularly for lower-SES families.

## 6. Conclusions

This study examined the predictors and language outcomes of English and Mandarin EA participation among bilingual preschoolers in Singapore. The findings reveal a compensatory pattern in EA enrollment: families with limited Mandarin input at home and greater economic resources are more likely to enroll children in Mandarin EA. Crucially, EA effects on language development are not uniform across languages: English EA showed no significant association with English outcomes in this input-rich context, whereas Mandarin EA was significantly associated with Mandarin word reading in an input-scarce context. These findings extend theoretical models of EA effects to bilingual settings and highlight the role of input asymmetry in moderating the effectiveness of supplementary language education. For bilingual families navigating decisions about language enrichment, and for policymakers aiming to support equitable bilingual development, these results underscore the importance of considering language-specific input contexts when evaluating the potential benefits of EA investment.

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