Effects of Attending Preschool on Adolescents' Reading Literacy: Evidence from the Ethnic Minority Children in China

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Abstract

This study aims to investigate the long-term effects of attending preschool on Chinese reading literacy in the ethnic minority Zhuang adolescents. Altogether 457 Zhuang students (N_{female} = 250, M_{age} = 13.81, SD = .86) were randomly sampled, surveyed, and tested with the PISA Reading Literacy (Chinese). The OLS, PSM, and regression analyses results jointly indicated that: (1) Chinese reading literacy varied over different levels of extracurricular reading, parental educational expectation (PEE), and preschool attendance; (2) family income, extracurricular reading, parental expectations of academic achievement and educational levels, and self-education expectations were found the significant predictors of reading literacy; and (3) after controlling for the confounding factors, preschool attendance did not predict any variation in Chinese reading literacy. The implications for policymaking and educational development for ethnic children are also discussed.

Keywords: preschool attendance; ethnic minorities; Zhuang children; reading ability; China

Effects of Attending Preschool on Adolescents' Reading Literacy: Evidence from the Zhuang Ethnic Minority Children in China

Longitudinal and experimental studies in North America have confirmed the positive effects of preschool attendance on reducing education-related expenditures and adult crime (Garcia, Heckman, & Ziff, 2019), building human capital for future development (Heckman et al., 2010; Heckman, Pinto & Savelyve, 2013), and achieving better cognitive and academic performance in adolescence (Heckman, 2006; McCoy et al., 2017). Similarly, a recent study in China has provided new evidence to support the long-term effects of attending preschool (Zhang, 2017). However, all these studies have focused on the majority ethnic group in a specific country, leaving those ethnic minority children neglected and understudied. In China, for instance, there are 55 ethnic minority groups in addition to the majority Han (Chinese) group. The largest ethnic minority group Zhuang has 18 million people who have their own heritage language, cultural beliefs, and educational values. Many Zhuang parents are neither willing nor able to send their children to preschools (Kang, 2019). This might have put Zhuang children in a disadvantaged situation, where all the education programs are delivered in Chinese (as L2), and the long-term effects of ECE might be negatively affected. Therefore, this study aims to explore the long-term effects of preschool attendance on Zhuang adolescents' Chinese reading literacy to provide new evidence from ethnic minority children.

The Ethnic Minority Zhuang Children in China

Zhuang is the largest ethnic minority group of the official 55 ones in China, with 18 million people. Most Zhuang people live in southwestern China, and most of the Zhuang parents have lower educational levels, less income, and career opportunities, some are living a hard life as a result (Grey, 2019; Grey, 2017; Cheng, Jin, & Jing, 2016). Accordingly, many Zhuang parents have less willingness and affordability to support their children to attend preschools for early childhood education. First, due to the inequality of economic development, the Zhuang region is facing a lack of educational resources, qualified teachers, and quality school settings (Ou & Liu, 2019). In 2018, for instance, the preschool gross enrollment rate of the Zhuang Autonomous Region reached 85.6%, lower than that of other non-ethnic regions in western China (90%) (Zhuang Autonomous Region Ethnic and Religious Affairs Commission, 2018). And the number of kindergarteners was 2.198 million, whereas the number of kindergarten teachers was 89,500, resulting in an unacceptable teacher-student ratio, which was 1: 33 (Zhuang Autonomous Region Ethnic and Religious Affairs Commission, 2019). Second, researchers have noted that most of the Zhuang children are living in the remote rural area that is far away from the school premises, thus have difficulties in transportation to school and the attached preschools. This has made attending preschools almost impossible for those preschoolers living far away and has also caused a high dropout rate in primary schools (Huang & Su, 2006; Gu, 2016). Third, researchers also noticed that the difficulty in learning Chinese as a second language and as the medium of instruction is one of the main reasons for Zhuang children dropping out of schools (Qian, 2002; Li, 2014). All these

disadvantages have conjointly made Zhuang children more vulnerable to early development and education problems (Charness et al., 2019; Heckman, 2006; Mu & Jia, 2016).

In China, Modern Standard Chinese (with Putonghua as the spoken form and simplified Chinese characters as the written form) is the official language that should be used in all school settings and workplaces (National People 's Congress, 2000). Accordingly, proficiency in Chinese (listening, speaking, reading, and writing) is critical to the academic success for both Chinese (the Han group) and non-Chinese children in China. However, the Zhuang children, as an ethnic minority, are facing much more difficulties than their Chinese peers due to the following reasons. First, the Standard Zhuang language takes Northern Tai as the spoken form and Latin script as the written form, which are thoroughly distinctive from Modern Standard Chinese (Grey, 2019; Grey, 2017; Huang, 2014). Therefore, Zhuang children have to acquire the Standard Zhuang (mother tongue language) as L1 and Modern Standard Chinese as L2, facing a compulsory bilingual education context (Grey, 2019; Grey, 2017). Second, learning Chinese reading is a great challenge to the Zhuang children, but teaching Chinese reading is also a challenge to their Zhuang teachers who have learned Chinese as L2 (Huang, 2014). Third, the Zhuang families in remote and rural areas have less affordability to provide Chinese reading materials and extracurricular activities, and the Zhuang parents also have a relatively lower level of Chinese literacy, which have jointly introduced to less time of parent-child shared reading in Chinese (Zhao, 2018). All these challenges and obstacles have put Zhuang children in

a very disadvantaged situation in learning Chinese reading literacy. This has made their preschool learning experience most critical and decisive to the long-term development of Chinese reading literacy.

The Predictors of Reading Literacy

Reading literacy has been defined as a comprehensive ability for individuals "to understand, use and reflect on written texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate effectively in society" (Becker, Mcelvany, & Kortenbruck, 2010). The predictors or contributors to reading literacy have been widely explored in the past decade. First, family factors such as SES (i.e., household income, parental occupations, and family property) and parental expectation are found significant contributors to literacy development (Kremer et al., 2019; Llorent et al., 2020; Pace, Luo & Hirsh-Pasek, 2017; Vernon-Feagans & Bratsch-Hines, 2019). Second, preschool experience has also been confirmed as a critical contributor to early language development and later reading achievement (Scarborough & Dobrich, 1991; Brook, Kendeou, & Lousberg, 2017). Specifically, Brook, Kendeou, and Lousberg (2017) found that attendance in high-quality ECE contributed significantly to the reading performance of the children after they went to primary or secondary schools. Some studies have found that Chinese reading literacy skills such as character cognition, pronunciation, semantic understanding have a profound impact on those ethnic minorities' reading performance in China (Jin, 2010; Wang & Tang, 2009; Xu, 2006). Third, extracurricular reading is also a critical factor in influencing children's reading ability development (Chacko, Fabiano, & Doctoroff,

2018; Price & Kalil, 2019). Last, children's self-expectation of academic achievement (SEA) was also found a significant predictor of their reading ability (Ozturk, Hill, & Yates, 2016; Ma & Crocker, 2017).

In particular, parental educational expectation (PEE), the realistic beliefs that parents have about their children's future achievement, has proved to be the significant predictor of student academic outcomes (Guo et al., 2018; Liu, Georgiou, & Manolitsis, 2018; Topping & Wolfendale, 2017). In addition, SES, especially parental education, has been identified as a strong predictor of PEE. Therefore, recent studies have tended to study the mediating role of PEE. On the one hand, it has been found that SES, PEE, and children's academic outcomes might be related to each other (Englund, Luckner, Whaley, & Egeland, 2004; Powell, Son, File, & Froiland, 2012). On the other hand, there was always a marked reduction in the associations between parental education/family income and children's academic performance, after controlling for PEE (Zhan, 2006; Froiland et al., 2012). All these findings jointly suggested that PEE might have a significant impact on the academic performance of Chinese adolescents (Li, Hu, Ge, & Auden, 2019). However, whether this finding could apply to Zhuang students is still unknown, thus will be addressed by this study.

The Role of Preschool Attendance Playing in Reading Achievement

Attending preschool or not has long been considered a key factor to influence children's later academic performance, such as reading and science achievement during primary and middle school periods (Barnett, 2001; Curran, 2019; Givens, 1985; Valenti & Tracey, 2009). Many researchers believed that children develop early

literacy skills during their first five years of life, as a result of which the high-quality preschool experience providing essential reading training was considered strongly linked with children's later reading literacy achievement (Pullen & Justice, 2003; Yaden, Rowe & MacGillivray, 2000). Valenti and Tracey (2009) indicated that first-grade children in urban areas significantly outperformed their peers who did not attend preschool in reading achievement. This finding implied that the effect of preschool attendance might have a long-term impact on later reading achievement. Based on previous studies of the relationship between preschool attendance and reading literacy, Valenti and Tracey (2009) further concluded that the positive effects of preschool attendance on later reading literacy were more obvious for children from low-SES families.

The reasons for the link between preschool attendance and later academic achievement, such as reading literacy, have been heatedly discussed. On the one hand, researchers found that attending preschool could be beneficial for children's school readiness by providing multiple activities designed for children's domain-specific development (Isaacs, 2012; Magnuson et al., 2004; Reynolds et al., 2014; Taylor et al., 2000). On the other hand, the effects of preschool attendance in bridging the gap between normal children and the children suffering from disadvantage environment, such as insufficient family educational capital resulted from low SES family or language deficiency due to immigrant background (Isaacs, 2012; Magnuson et al., 2006). Although the benefits of attending preschool for children have been revealed for decades, the preschool attendance rate in rural China and especially of the ethnic

populations are still low (Wong et al., 2013). Given that the children from an ethnic minority, who mainly live in rural China suffering from disadvantage developmental environment, the effects of preschool attendance of them were extremely necessary and urgent to be studied. Besides, the effects of preschool attendance on children's reading literacy achievement were mainly investigated focusing on urban Han children, the situation of the rural and ethnic minorities was rarely explored. Therefore, this study aimed to fill this knowledge gap.

The Context of This Study

In China, Zhuang children are in a disadvantaged situation with great challenges caused by inadequate learning opportunities and poor language environment (Huang, 2014; Grey, 2017, 2019; Zhao, 2018). In particular, they have a relatively lower preschool gross enrollment rate (Zhuang Autonomous Region Ethnic and Religious Affairs Commission, 2018) as well as an unacceptable high teacher-student ratio (Zhuang Autonomous Region Ethnic and Religious Affairs Commission, 2019). Given the fact that preschool attendance has proved to have a long-term impact on Chinese children's reading literacy and that parents' educational expectations might also influence their academic performance, we tended to believe that preschool attendance, as well as parental educational expectation, might also have an impact on Zhuang adolescents' reading literacy. It is thus necessary to explore the real situation of Zhuang children and to understand their learning difficulties and developmental problems. Accordingly, this study is dedicated to investigating the predictors of

Chinese reading literacy in Zhuang children with a focus on the effects of attending preschool. In particular, the following research questions guided this study:

1. Are there any differences in Chinese reading literacy between those Zhuang adolescents with or without preschool attendance?

2. What is the impact of preschool attendance on Zhuang adolescents' Chinese literacy?

3. What are the other contributors to Zhuang adolescents' Chinese reading literacy?

Method

Participants

This research was a part of the quality contract research project for junior high school students and sponsored by the education authorities in the minority regions of B province. The area is located in a rural area of southwestern China and is mainly home to Zhuang residents. This study only included Zhuang students in secondary school who completed all the surveys and tests, while all the students from the Han and other ethnic groups were excluded. Consequently, 457 Zhuang adolescents (N_{female} = 250, M_{age} = 13.81, SD = .86) participated in the study who were randomly sampled from all the 106 schools. Specifically, one class of ninth-grade is randomly selected from each cooperating school, and then Zhuang children are recruited from these 106 classes. All the participants were informed and agreed to take part in the study before completing all the tests and surveys.

Measures

Early Childhood Education Experience Survey. Based on the literature review, we have developed a comprehensive questionnaire to collect information about the potential factors that may affect the Chinese reading ability in Zhuang children. The questionnaire consists of 6 constructs, including individual particulars, family factors, early education experience, after school time, parental expectations, and self-expectations. First, the construct of individual particulars collects the demographic information about gender, age, only-child status, urban/rural household, local / non-local household, and first language. Second, family factors include the information about their local / non-local residence, monthly family income, mother and father's education levels, Mother and father's occupation, and et cetera. Third, early education experience mainly focuses on family's financial investment level in preschool education, parental beliefs and practices regarding early childhood education, preschool attendance (aged 3-6), years of attendance in preschool, type and region of the preschool, and so on. Fourth, the information about after-school time includes extracurricular activities, tutoring classes, and entertainment. Fifth, the parental educational expectation for academic achievement in terms of the target degree level and future career is also included in this survey. Last, the participants' self-expectation of education level and future career, and self-confidence toward future life is also collected.

Chinese reading literacy. The participants' Chinese reading literacy was evaluated using the publicly released Chinese version of the Program for International Student Assessment (PISA) exam. PISA aims to evaluate the academic performance

of 15-year-olds in reading, math, and science, which is an internationally standardized academic achievement test organized by the Organization for Economic Cooperation and Development (OECD). Its Chinese version was first applied to 15-year-old children in Shanghai in 2009 (Sellar & Lingard, 2013), and later released online for public use (http://pisa.nutn.edu.tw/sample_tw.htm). This Chinese version of the PISA exam has also been employed to investigate the academic achievement of other ethnic minorities in China (see Bai, 2019). In this study, the official Chinese version of the Reading test (2015) was used to evaluate the Chinese reading ability of Zhuang children. In the statistical analysis of this study, the raw scores of each student were converted into standardized scores (*z* scores).

Procedure

First, the Department of Education of the research site and the first author's University approved the study in advance. Then, the principals of the participating schools consented to join this study. Therefore, the participating students were invited to participate in this study; and they were allowed to quite it at any time without any penalties. Accordingly, the trained senior researchers came to the class and briefed them about this study and their rights. All the students (including the participants and non-participants of this study) from the same class were gathered in the same room to complete the paper survey. Last, the PISA tests were conducted as the final exams of the semester by the participating schools.

Data analysis method

First, a set of descriptive analyses was conducted to explore the means and trends of the study variables and group differences. Second, the propensity score matching (PSM) was executed to estimate the causal effects of attending preschool on Zhuang adolescents' Chinese reading literacy. PSM provides a good means to estimate the treatment impact on the observed dependent variable and has been used in a recent study to evaluate the effects of early childhood education in Chinese adolescents (Zhang, 2017). Third, Spearman correlation analysis was conducted to explore the possible factors correlated to Chinese reading literacy. Then a set of hierarchical regression analyses was conducted to confirm the predictors of Chinese reading literacy in Zhuang adolescents.

Results

Descriptive and Correlational Statistics

The information about participants' characteristics is presented in Table 1. In particular, altogether 457 participants (M_{age} = 13.81, SD = .86, 43.70% females) were included in this study, about 244 of them (53.4%) had preschool attendance experience whereas 199 (43.5%) of them did not. In addition, 273 (59.7%) children reported Chinese as their first language, whereas 184 (40.3%) had Zhuang as L1.

Insert Table 1 about here

Next, a set of ANOVAs was conducted to explore the significant differences in Chinese reading literacy. As shown in Table 2, the results indicated the significant

effects of monthly family income ($F_{(3, 453)} = 7.24$, $p < .001$)， extracurricular reading ($F_{(3, 453)} = 6.38$, $p < .001$), PE-achievement ($F_{(4, 452)} = 16.18$, $p < .001$), parental educational expectation ($F_{(8, 448)} = 6.33$, $p < .001$), preschool attendance ($F_{(1, 455)} = 14.27$, $p < .001$). No significant effects were found for the factor of first language and parent language ($p > .05$). Post Hoc tests revealed that: (1) monthly family income effect: the mean reading literacy of the poor and the low groups was significantly lower than that of the middle and high groups ($p < .05$); (2) extracurricular reading effect: the mean reading literacy of the group with more than 6 hours was higher than that of less than 2 hours and 2 to 4 hours groups ($p < .001$); (3) PEA effect: the mean reading literacy of the highest PEA receivers was significantly higher than that of the other groups ($p < .001$) ; (4) PEE effect: the reading literacy of the "Get a doctorate" group was significantly higher than that of the other groups ($p < .05$); (5) preschool attendance effect: the mean reading literacy of Zhuang children with preschool attendance experience was significantly higher than that of those without such experience ($p < .001$).

Insert Table 2 about here

Propensity Score Matching and Ordinary least squares (OLS)

Given that the preschool attendance effect in the Chinese reading literacy of Zhuang adolescents might have been moderated and mediated by many confounding

factors, we conducted propensity score matching (PSM) to further confirm this effect. Participants were matched based on this characteristic of attendance and not attendance in preschool. After excluding 14 missing values, the PSM procedure has yielded a total sample size of 118 paired participants matched with the variable of age, gender, and socioeconomic status. Table 3 presents the Ordinary least squares (OLS) and PSM results to indicate the effect of the binary variable for preschool attendance and to supplement the analysis by considering other child and family factors. In Specification (1), only child variables were controlled for OLS and PSM analysis. In Specification (2), child and family income were controlled. In Specification (3), child, family, parental expectation, and self-expectation were controlled. All the PSM results are not significant, indicating that after controlling for child and family factors, the groups with and without preschool attending experience had no significant difference in Chinese reading literacy.

However, as shown in Table 3, the OLS results indicated that (1) after controlling for child and even family income factors, the preschool type was associated with a 0.13 and 0.11 increase in standard deviation for Chinese Reading Literacy Scores, respectively ($p < .05$), whereas the effect of preschool attendance, was not ($p > .05$),; and (2) after controlling for the child, family, parental educational expectation and self-educational expectation factors, none of the ECE attendance variables (time, type, act) had a significant effect on reading literacy ($p > .05$). All these findings jointly indicated that attending preschool might not have a significant impact on Zhuang adolescents' Chinese reading literacy, whereas parental expectations and self-

expectations did. Therefore, a set of hierarchical regression analyses should be done to identify their contributions.

Insert Table 3 about here

Hierarchical regression analyses predicting Chinese Reading Literacy

Spearman correlation analysis was conducted to explore the possible relationships between reading literacy and the other variables (Table 4). The results indicated that the following variables significantly correlated with Chinese reading literacy: Age (r = -.10, p < .05), Income (r = .20, p < .01), Reading (r = .19, p < .01), Entertainment (r = .13, p < .01), PEA (r = .34, p < .01), PEE (r = .13, p < .01), PEC (r = .10, p < .05), PE Stress (r = .11, p < .05), SE-Edu (r = .29, p < .01), Preschool Attendance (r = .18, p < .01), Years of Attendance (r = .15, p < .01) , and Preschool Type (r = .18, p < .01). Accordingly, they were entered into the following hierarchical regression analysis.

Insert Table 4 about here

Next, a set of hierarchical regression analyses with reading literacy as the dependent variable was conducted. In Step 1, we entered Age as the representative child factor. In Step 2, we entered Income as the representative family factor. In Step 3, Reading (at home) and Entertainment were entered. In Step 4, we entered PEA,

PEE, PEC, and PE stress. In Step 5, we entered SEE to understand its contribution to the variation in the Zhuang Children's reading literacy. In Step 6, we entered the preschool attendance, the years of attendance, and the preschool type to control for the effects of preschool experience.

As shown in Table 5, the changes in R^2 between the six steps indicated that: (1) Age was found a significant predictor of Chinese reading literacy (β = -.11, p < .05) and could explain 1% of the variation; (2) Income was found the positive predictor (β = .19, p < .001) and could explain 4% of the variations; (3) Reading was also found the positive predictor (β = .16, p < .001) and could explain 3% of the variations in conjunction with Entertainment; (4) PEA, PEE, PEC and PE-stress could jointly explain 12% of the variations in CRL, and PEA and PEE were found the significant predictor (β = .27, p < .001; β = .15, p < .01); (5) SE-Edu was identified as the significant predictor (β =.15, p < .01) and could explain 1% of the variation; (6) Preschool Attendance, Years of Attendance, and Preschool Type could jointly explain 1% but were found non-significant (p_s >.05).

To further understand the predictive power of these correlated variables, we conducted two sets of hierarchical regression analyses for the participants with and without preschool attendance. As shown in Table 5, the results indicated that: (1) Age had no significant predictive power in both groups (p >.05)； (2) Income could significantly predict the reading literacy of the preschool-attending group (p < .05) but could not predict that of the no-attending group (p > .05) ; (3) Reading and Entertainment had no significant prediction in the preschool-attending group (p > .05)

but significant effect the no-attending group ($p < .05$); (4) PEA and PEC were found the significant predictors in both groups ($p < .05$); and (5) SE-Edu could predict reading literacy significantly in the preschool-attending group ($p < .05$) but not in the no-attending group ($p > .05$).

Insert Table 5 about here

Discussion

As the first exploration of the longitudinal effects of preschool attending Zhuang adolescents, this study has found a significant difference in Chinese reading literacy between those with and without preschool experience. This difference, however, could not be simply attributed to the experience of preschool attending, as there are many confounding factors at the child, family, and community levels, which have been confirmed by the PSM, OLS, and regression analyses in this study. This section will discuss these findings and their implications for improving education for ethnic minorities in China and other countries.

Reading Literacy Differences Associated with Preschool Experience

This study found significant differences in Chinese reading literacy between those Zhuang adolescents with and without preschool attendance. In particular, there were significant effects of monthly family income, extracurricular reading time, the parental expectation for academic achievement and education, preschool attendance. These findings are consistent with that of the existing studies (Chacko, Fabiano, &

Doctoroff, 2018; Price & Kalil, 2019; Topping & Wolfendale, 2017; Liu, Georgiou, & Manolitsis, 2018; Scarborough & Dobrich, 1991; Brook, Kendeou, & Lousberg, 2017).

In particular, this study has provided additional evidence to support the findings by Rao and her team who had confirmed the effects of preschool attending on academic achievements through a series of longitudinal studies on both Chinese and non-Chinese children (Rao, Sun, Zhou, & Zhang, 2012; Rao et al., 2012; Rao et al., 2019). In 2012, for instance, Rao, Sun, Zhou, and Zhang (2012) found that the young children with developmentally appropriate preschool experiences (kindergartens or separate preschool classes) had higher school readiness than the others, and the preschool type was associated with Grade 1 numeracy and literacy scores. In 2019, they (Rao et al., 2019) further explored the associations between preschool attendance (intensity, duration, and total dosage) and children's cognitive, language, and socio-emotional development in Cambodia, China, Mongolia, and Vanuatu. They sampled 4712 ethnic majority children and controlled for age, gender, parental education and occupation, household wealth, and urbanicity. The results indicated that the ethnic children who received ECE had significantly better cognitive, language, and socio-emotional development than those who did not, even though many were not able to receive preschool education because of accessibility and affordability problems (Rao et al., 2012). In addition, the existing longitudinal reading studies have confirmed the significant effect of preschool attending on children’s cognitive and language development (Raikes et al., 2006; Phillipson & Garvis, 2019).

Therefore, we tend to conclude that the reading literacy differences found in Zhuang adolescents are associated with the preschool attending experience. However, this association might not be a kind of cause-effect relationship, which should be addressed in the next subsection.

Reading Literacy Differences Not Caused by Preschool Experience

The OLS, PSM, and regression analyses in this study found that after controlling for child and family factors, the preschool attending experience had no impact on Chinese reading literacy in Zhuang adolescents. This finding is conflicting with that of the existing studies (Rao, Sun, Zhou, & Zhang, 2012; Rao et al., 2012; Rao et al., 2019; Zhang, 2017). However, most of the existing studies did not employ the PSM and OLS methods to control for those confounding factors; thus, their findings could not rule out the confounding effects. This means that even though there were significant differences between those attending and no-attending preschool children, the differences in later school performance might not necessarily be caused by preschool experience; instead, it could be caused by the confounding factors associated with the factor of preschool attendance. Therefore, Zhang (2017) employed the PSM and OLS methods to control the confounding effects of child, family, and school characteristics and found that preschool attendance did have a positive impact on Grade 7-9 Chinese students' cognition, especially those from economically disadvantaged families. However, Zhang's study was based on the China Education Panel Survey (CEPS) data collected from a large-scale, nationally representative, and 2-year longitudinal survey of 19,487 Chinese students. They were not ethnic minority

students, thus had very different family backgrounds, education resources, language environments, and cultural values. Therefore, it is safe to conclude that attending preschool has no significant impact on Chinese reading literacy in Zhuang adolescents.

In addition, this study found that family monthly income, extracurricular reading, parental expectation of academic achievement (PEA), and educational level (PEE) and self-education expectation (SEE) could significantly predict Chinese reading literacy in Zhuang adolescents. This finding has provided cross-cultural and cross-ethnical evidence to support the existing studies (Pace, Luo, Hirsh-Pasek, 2017; Vernon-Feagans, Bratsch-Hines, 2019). High-income parents are capable of creating a comfortable and convenient reading environment for their children, such as purchasing a variety of books for their children or sending them to tutors (Benner, Boyle, & Sadler, 2016; Park & Holloway, 2018; Kong, Yu, & Zhao, 2017; Seo, 2018). And they tend to have more extracurricular reading activities, and accordingly, their efforts and practices could be converted into the reading skills and literacy attainment in their children (Bergen & Snowling, 2018; Baškarada & Koronios, 2018). In addition, parental expectations (of academic achievement and educational level) have proved to impact Chinese children's academic performance longitudinally, which has been influenced by the traditional Chinese culture of '*expecting their child to have a brilliant future*' (Ren & Edwards, 2017). This parental expectation reflects the parental realization of their child's developmental potential and could become the power to drive their efforts and support to their child (Dizon-Ross, 2019). And the

existing studies have found that those parents with high expectations would usually pay more attention and investment to the development of their children's learning ability (Liu, Georgiou, & Manolitsis, 2018; Aytekin, & Baltaci, Yildiz, 2018). Last but not least, the self-education expectation (SEE) also reflects the child's self-recognition and self-motivation; thus, those with higher SEE tend to be strongly willing to devote more efforts to their study to obtain excellent academic performance. Therefore, we could conclude that it might be family monthly income, extracurricular reading, PEA, PEE, and SEE that contributing to Zhuang adolescents' reading literacy. As all these predictors are highly correlated with preschool attendance leading to a high level of collinearity, further studies with more rigorous controlling for the confounding factors are needed.

Conclusions, limitations, and implications

This study dedicated to exploring the effects of attending preschool on adolescents' reading literacy in the ethnic minority Zhuang children. First, Chinese reading literacy was found varying over different levels of extracurricular reading, parental educational expectation, and preschool attendance. In addition, family income, extracurricular reading, parental expectation of academic achievement and educational level, and self-education expectation were found the significant predictors of Chinese reading literacy. Last but not least, after controlling all those confounding factors, we found that preschool attendance did not predict any variation in reading literacy in Zhuang adolescents. This finding indicates that at least in Zhuang children, preschool attendance does not have any significant impact on adolescents' literacy.

This study has two major limitations, at least. First, this study only collected self-reported data using the retrospective method. The possible socially desirable bias and recall problems should be considered when interpreting the results. Future studies should establish a triangulation of data sources such as reports from parents, teachers, and peers. Second, this study has simply adopted the retrospective approach, thus did not follow up with those Zhuang children longitudinally. Large-scale, longitudinal studies would be more desirable to confirm the cause-effect relationship between preschool attendance and adolescent's literacy attainment. In addition, in future research, it is particularly important to develop a Chinese reading literacy scale exclusively for ethnic minorities such as Zhuang adolescents.

Nevertheless, this study has some important practical implications for protecting the educational rights and achieving educational equity and equality in China and other countries. First, the finding that preschool attendance does not make any differences in adolescents' literacy implies that the situation of Zhuang children's learning and development might be more complicated and difficult than those majority Chinese children. For instance, the poor quality, accessibility, and affordability of early childhood education in Zhuang regions might have compromised the longitudinal effects of preschool attendance. In addition, those Zhuang children are in a disadvantaged situation of early bilingual education with Chinese as the dominant language. As language proficiency lays the solid foundation for academic success and future development, more efforts and resources should be injected into those rural areas with ethnic children to promote early reading and

parent-child shared reading. Second, the confirmed effects of parental expectation and extracurricular reading imply that parent education should be improved to help those ethnic minority parents and grandparents to deliver better education at home. This will help to bridge the literacy gap between rural and urban children and between ethnic majority and minority children. Third, the finding that some children did not attend preschool implies that the Chinese government should provide more accessible and affordable preschool services to those ethnic children living in remote and rural areas. Although we could not confirm the long-term effects of preschool attendance in this study, we believe that it is the right of these Zhuang children to take quality early childhood education as they need. In the same vein, other countries with a significant number of immigrants and ethnic children should also make more efforts to provide accessible and affordable preschool services to those new arrivals or easy-to-neglect children. Only in this way could we achieve the ultimate goal of 'education for all and children who are excluded' (UNESCO, 2001).

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Table 1

Participants Characteristics (*N*=457)

Variables	*M*	*SD*	Variables		*n*	*%*
Age	13.81	.86	Gender	Female	250	54.7
Monthly Family Income	2.43	1.04		Male	207	45.3
Mother Education	2.69	.98	Only child	Only child	43	9.4
Father Education	3.02	.92		Non-Only child	414	90.6
SFS	1.84	1.07	First Language	Chinese	273	59.7
Family Invest in ECE	3.24	.90		Non-Chinese	184	40.3
Parents Value in ECE	3.66	1.02	3-6 ECE Attendance	Attendance	244	53.4
Parental Involvement	2.84	1.19		Non-attendance	199	43.5
ECE quality review	2.97	.97		Missing data	14	3.1
ECE Teacher review	3.19	1.01	Years of ECE	Less than 1 year	63	13.8
ECE Satisfaction	3.25	1.03		1 year	195	42.7
ECE academic significance	3.03	1.09		2 years	91	19.9
Doing homework	2.39	1.15		3 years	75	16.4
Attending tutoring classes	1.18	.51		4 years or more	30	6.6
Attending interest classes	1.11	.38		Missing data	3	.7
Extracurricular Reading	1.62	.92	KG type	Public KG	102	22.3
Entertainment	2.43	1.19		Private KG	49	10.7
PE-Achievement	2.87	1.28		Preschool	214	46.8
PEE	5.32	1.56		International KG	19	4.2
PE-Career	5.47	1.34		Unclear	73	16.0
Stress toward PE	3.25	1.12	KG Region	City	63	13.8
Attitude-achievement	3.20	.79		County town	38	8.3
Self-Confidence	2.93	.77		Town	141	30.9
SEE	5.32	1.77		Countryside	213	46.6
SE-Career	4.90	1.81		Missing data	2	.4
Reading achievement	527.00	69.90				

Notes. PEE = Parental Expectation for Education; SEE = Self-Expectation for Education; SFS = Social Financial Support; KG type = Preschool type.

Table 2

One-way ANOVA Analyses of Reading Literacy

Variables(*n*)	*M*	*SD*	*F*
Monthly Family Income			7.24***
1. Poor (106)	514.34	68.33	
2. Low (129)	512.35	64.44	
3. Middle (140)	536.35	72.01	
4. High (82)	550.41	68.81	
Extracurricular Reading			6.38***
1. Less than 2 hours (277)	520.10	67.72	
2. 2 to 4 hours (115)	526.55	74.28	
3. 4 to 6 hours (28)	538.08	64.01	
4. More than 6 hours (37)	571.63	60.59	
Parent Expectation for Achievement			16.18***
1. No special requirements (89)	501.04	67.90	
2. Average level (87)	498.50	68.25	
3. Middle or upper level (126)	533.36	56.48	
4. Excellent (103)	542.91	62.54	
5. Top-notch (51)	574.85	82.08	
Parent Expectation for Education			6.33***
1. Stop going to school (5)	481.42	108.72	
2. Graduate from junior high school (10)	480.69	44.19	
3. Graduate from senior high school (55)	486.32	55.35	
4. Graduate from technical secondary school (62)	521.50	62.35	
5. Graduate from junior college (58)	532.24	65.58	
6. Obtain an bachelor's degree(174)	502.38	73.36	
7. Get a master's degree (16)	535.68	71.59	
8. Get a doctorate (52)	577.71	74.43	
9. Don’t care (25)	502.38	73.36	
First Language			.45
1. Chinese (273)	528.81	69.21	
2. Zhuang or dialect languages (184)	524.31	71.01	
Parent Language			3.86
1. Putonghua (54)	544.49	94.68	
2. Zhuang or dialect languages (403)	524.65	65.68	
Preschool Attendance			14.27***
1. Attendance (244)	539.04	71.42	
2. Non-attendance (199)	514.50	63.58	

Notes. $^{*}p<.05$; $^{**}p<.01$; $^{***}p<.001$.

Table 3

Effects of Preschool Attending on Zhuang Adolescents' Chinese Reading Literacy

	Specification (1)		Specification (2)		Specification (3)	
	OLS	PSM	OLS	PSM	OLS	PSM
KG Attd	.08	-.00	.07	-.00	.07	.01
KG years	.06	-.02	.05	-.02	.04	-.01
KG type	.13*	.03	.11*	.02	.06	.03
Students controls						
Age	Yes		Yes		Yes	
Reading	Yes		Yes		Yes	
ETN	Yes		Yes		Yes	
Families control						
Income	No		Yes		Yes	
Parental expectation						
PEA	No		No		Yes	
PEE	No		No		Yes	
PEC	No		No		Yes	
PE stress	No		No		Yes	
Self-expectation						
SE-Edu	No		No		Yes	

Notes. $^{*}p<.05$; $^{**}p<.01$; $^{***}p<.001$.

Table 4

Correlation Matrix

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*
1. Age	1																
2. Gender	-.05	1															
3. Income	-.13**	-.11*	1														
4. Reading	-.01	.05	.07	1													
5. ETN	-.06	-.10*	.14**	.24**	1												
6.PEA	-.13**	.09	.110*	.08	-.05	1											
7. PEE	-.05	.05	.15**	.05	.04	.40**	1										
8. PEC	.03	.04	.01	.11*	-.03	.17**	.12*	1									
9. PE Stress	-.04	.09	-.01	.04	-.04	.22**	.13**	.07	1								
10.Self-Con	-.02	-.07	.03	-.03	-.10*	.16**	.23**	.06	-.02								
11. SE-Edu	-.06	.06	.13**	.07	.01	.36**	.62**	.08	.08	.16**	1						
12.SE-Career	-.02	.01	-.02	.02	-.07	.12**	.10*	.36**	.11*	.05	.19**	1					
13. First Lan	-.02	.12**	.09	.05	-.03	.02	-.02	-.02	-.05	-.09	.01	.00	1				
14. KG Attd	-.05	-.05	.16**	.07	.03	.05	.15**	-.02	-.02	.04	.16**	.12*	.12**	1			
15.KG years	-.11*	-.01	.17**	.05	.07	.07	.08	-.06	-.05	.06	.07	.02	.07	.39**	1		
16. KG type	-.07	-.05	.19**	.02	-.01	.17**	.13**	.01	-.08	.11*	.15**	.07	.17**	.41**	.30**	1	
17. CRL	-.10*	.09	.20**	.19**	.13**	.34**	.28**	.10*	.11*	-.06	.29**	.07	.03	.18**	.15**	.18**	1

Notes. Income=Monthly Family Income; Reading= Extracurricular Reading; ETN = Entertainment; PEA = Parent Expectation for Achievement; PEE = Parent Expectation for Education; PEC = Parent Expectation for Career; PE Stress = Stressful feelings toward Parent Expectation; Self-Con = Self-confidence; SE-Edu = Self-expectation for education; SE-Career = Self-expectation for career; First Lan = First language; KG Attd = Preschool Attendance; KG years = Years of attending preschool; KG type = preschool type; CRL = Chinese Reading Literacy.

Table 5

Predicting Zhuang Adolescents' Chinese Reading Literacy with the Whole Sample (N =457), the Preschool-Attending Sample (n1 = 244), and No-Attending Sample (n2 = 199)

	Total				Attendance in ECE				Non-Attendance in ECE			
	β	R^2	ΔR^2	F	β	R^2	ΔR^2	F	β	R^2	ΔR^2	F
Step 1		.01				.01				.01		
Age	-.11*				-.11				-.07			
Step 2		.05	.04	16.40***		.06	.05	12.15***		.02	.01	3.02
Income	.19***				.22**				.12			
Step 3		.08	.03	7.58**		.07	.01	0.70		.13	.11	12.38***
Reading	.16**				.07				.28***			
ETN	.06				.01				.14*			
Step 4		.20	.12	16.66***		.20	.13	9.66***		.28	.15	10.17***
PEA	.27***				.28***				.25**			
PEE	.15**				.11				.19**			
PE Career	.03				.14*				-.15*			
PE stress	.02				-.03				.11			
Step 5		.22	.01	7.12**		.21	.01	4.73*		.29	.01	2.12
SE-Edu	.15**				.17*				.11			
Step 6		.23	.01	2.55								
KG Attd	.09											
KG years	.05											
KG type	.02											

Notes. Income=Monthly Family Income; Reading= Extracurricular Reading; ETN = Entertainment; PEA = Parent Expectation for Achievement; PEE = Parent Expectation for Education; PEC = Parent Expectation for Career; PE Stress = Stressful feelings toward Parent Expectation; Self-Con = Self-confidence; SE-Edu = Self-expectation for education; SE-Career = Self-expectation for career; First Lan = First language; KG Attd = Preschool Attendance; KG years = Years of attending preschool; KG type = preschool type.