



Cross-lagged relationships between home learning environment and academic achievement in Chinese



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ABSTRACT

We examined (a) the cross-lagged relationships between the home learning environment and academic achievement in Chinese, and (b) whether parents' socioeconomic status (SES) and child's gender moderate the relations. One hundred seventy-seven Chinese children were followed from Grade 1 to Grade 2 and were assessed on reading and mathematics. Their parents also responded to a questionnaire assessing the frequency of engaging in different home literacy and numeracy activities. Results showed that reading ability in Grade 1 negatively predicted informal home literacy activities in Grade 2. In turn, mathematics ability in Grade 1 negatively predicted formal home numeracy activities in Grade 2. Neither parents' SES nor child's gender moderated any of the observed cross-lagged relationships. These findings suggest first that different facets of the home learning environment may relate to reading and mathematics in Chinese. Second, once children go to Grade 1, the relationship between home learning environment and academic achievement becomes unidirectional: early reading/mathematics ability predicts future home literacy/numeracy activities and the effect is negative. This suggests that parents engage more frequently in home activities when they notice that their children experience difficulties in reading or mathematics. However, it is also possible that parents change their teaching in order to be in accord with the expectations of the school system.

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There is little doubt that when most children begin Grade 1 they are able to recognize some simple words, print their name, and do some simple calculations (Aunola, Leskinen, Lerkkanen, & Nurmi, 2004; Duncan et al., 2007). Although this can be attributed to their teachers' instruction in Kindergarten, an equal share in the success can be credited to their parents. Several studies have documented that parents engage in different literacy and numeracy activities with their children and that this involvement predicts children's reading and mathematics ability (Manolitsis, Georgiou, & Tziraki, 2013; Melhuish et al., 2008; Niklas & Schneider, 2013; Sénéchal & LeFevre, 2002; Stephenson, Parrila, Georgiou, & Kirby, 2008).

Despite the acknowledged importance of the home learning environment in children's reading and mathematics acquisition (see Dearing & Tang, 2010, for a review), several issues remain

unresolved. First, with few exceptions (Silinskas et al., 2012; Silinskas, Niemi, Lerkkanen, & Nurmi, 2013), most studies have assessed the home learning environment either before or during Kindergarten (Anders et al., 2012; Manolitsis et al., 2013; Melhuish et al., 2008; Rodriguez & Tamis-LeMonda, 2011; Son & Morrison, 2010). Given that parents' involvement in their children's learning does not stop in Kindergarten, it is important to examine if parents' teaching continues to predict academic achievement when assessed in later grades. This is theoretically important because in order to understand how children develop and what factors influence their development we should not only examine the children's abilities, but also the environment in which they are growing. Second, most studies have treated the home learning environment as a predictor of reading and mathematics ability. However, the opposite may be true, namely that academic achievement predicts home learning environment. To our knowledge, only two studies have examined the cross-lagged relationships between the home learning environment and academic achievement (Silinskas, Leppänen, Aunola, Parrila, & Nurmi, 2010; Silinskas et al., 2012) and they have been conducted in Finnish, a consistent orthography (every letter

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corresponds roughly to one sound; see below how orthographic consistency may affect home learning environment). Silinskas and colleagues found that, in Kindergarten, the higher the children's scores in reading/math, the more teaching of reading/math parents reported. However, in Grade 1, it was children's low performance in reading/math that activated more frequent parents' teaching of reading. These findings highlight the need to examine the role of the home learning environment longitudinally and after taking into account earlier levels of academic performance and parents' teaching.

Finally, most studies on the home learning environment have been conducted in Western societies. It would be interesting to examine if the home learning environment exerts the same effects in East Asian societies in which parents engage more frequently in their children's learning (Cheung & Pomerantz, 2011; Miller, Kelly, & Zhou, 2005; Pan, Gauwain, Liu, & Cheng, 2006). Thus, the purpose of this study was to examine the cross-lagged relationships between the home learning environment and academic achievement (reading and mathematics) in a sample of Chinese children followed from Grade 1 to Grade 2.

The examination of the relationship between the home learning environment and academic achievement in Chinese was motivated by three reasons: first, very little is known about the role of the home learning environment in academic achievement in Chinese. To our knowledge, with the exception of two cross-cultural studies (part of which involved assessing Chinese children; Chiu & Zeng, 2008; Huntsinger, Jose, Liaw, & Ching, 1997), no other studies have examined the effects of the home numeracy environment in mathematics ability in Chinese. Importantly, both of these studies reported positive relationships between the home learning environment and mathematics ability. This is in contrast to Silinskas, Leppänen, et al. (2010) findings in which the correlations between the two variables were negative.

In addition, only a handful of studies have examined the role of the home literacy environment in Chinese reading (Li, Corrie, & Wong, 2008; Li & Rao, 2000; Shu, Li, Anderson, Ku, & Yue, 2002; Zhang, Jin, Chen, Zhang, & Hoff, 2008). Given the significant orthographic differences between Chinese and European languages, what we know about the role of the home literacy environment in European languages may not apply to Chinese. Chinese is a morpho-syllabic writing system, where the basic graphic unit, the Chinese character, represents a morpheme as well as a syllable (Shu & Anderson, 1997). Compared to alphabetic orthographies, which use a relatively limited number of symbols (typically 22–30 letters of the alphabet) to produce all of the words in the language, learning to read Chinese presents a much greater challenge, with full literacy in Chinese requiring knowledge of 3,000 to 4,000 different characters (Hanley, 2005). Notably, during the first two years of formal education, Chinese children are expected to learn 1,145 new characters (45% of the body of characters they will be introduced to during the elementary school years; Shu, Chen, Anderson, Wu, & Xuan, 2003). As acquiring reading skills in consistent orthographies is easier than acquiring reading skills in inconsistent orthographies (Ellis et al., 2004; Seymour, Aro, & Erskine, 2003), the cross-lagged associations between parental reading-related activities and children's reading skills could manifest differently in different language environments (LeFevre, Clarke, & Stringer, 2002; LeFevre, Polyzoi, Skwarchuk, Fast, & Sowinski, 2010; Manolitsis, Georgiou, Stephenson, & Parrila, 2009). For example, Manolitsis et al. (2009) reported that Canadian parents (whose children were learning to read English, an inconsistent orthography) were reading to their children and teaching them to identify letters more frequently than Greek parents (whose children were learning to read Greek, a consistent orthography).

Second, because Chinese parents have high expectations from their children (Li, 2003; Ng, Pomerantz, & Lam, 2007), they engage more frequently in their learning (Huntsinger et al., 1997; Ng,

Pomerantz, & Deng, 2014; Pan et al., 2006). For example, Huntsinger et al. (1997) showed that Chinese-American parents spend more time on their children's homework, structure their children's time to a greater degree, and show more encouragement for mathematics-related activities than do their European-American counterparts. In addition, the widely held belief among Chinese families is that a child achieves for his/her family (Ng et al., 2014). A child's performance reflects on the family; therefore, parents have one more reason to help their children learn the subject matter (Huntsinger & Jose, 2009). Despite the evidence showing that Chinese parents are more involved in their children's learning, it remains unknown if their involvement translates into significant gains in their children's academic performance.

Finally, most of the families in major Chinese cities have only one child. As a result of the one-child policy, parents pay substantial attention to their children's academic achievement (Pan et al., 2006; Tam & Chan, 2009). According to a study that took place in several major cities in China, parents spent more than 20% of the family budget in children's books, magazines, musical instruments, sport's equipment, and other children's items (Lu, 1999). Thus, it is important to examine if the undivided attention of parents to their child's educational needs helps the child perform better in reading and mathematics.

Home literacy activities and children's reading ability

Parents' reading-related activities with their children have been grouped into two major categories: formal and informal home literacy activities (Sénéchal, 2006). The formal literacy activities are those directly engaging children in print concepts through the teaching of letters or teaching of reading and writing of words. Several studies have shown that formal literacy activities contribute to reading through the effects of letter knowledge (Evans, Shaw, & Bell, 2000; Sénéchal & LeFevre, 2002; Stephenson et al., 2008). In turn, informal literacy activities are those that expose children to print incidentally through activities, such as joint storybook reading or number of books at home. Several studies have shown that informal literacy activities contribute to word reading through the effects of oral language skills (Frijters, Barron, & Brunello, 2000; Manolitsis et al., 2009; Sénéchal & LeFevre, 2002).

The studies that examined the role of home literacy activities in Chinese children's reading ability have reported a rather positive effect (Li et al., 2008; Li & Rao, 2000; McBride-Chang et al., 2012; Shu et al., 2002). For example, Li et al. (2008) followed 88 five-year-old children from Beijing and Hong Kong for three years and examined if the home literacy environment was related to literacy skills both at the beginning and at the end of the study. They found that formal literacy activities were significantly related to literacy skills in both groups of children and at both measurement points (r s ranged from .36 to .56). However, informal literacy activities correlated significantly with literacy skills only in the Hong Kong cohort (r s ranged from .33 to .34).

Unfortunately, none of these studies assessed the role of the home literacy activities in reading ability after children had gone to Grade 1. This is important in light of recent findings that the direction of the relationship between the home literacy environment and reading changes from being positive in Kindergarten to being negative in Grade 1. In Kindergarten, formal literacy activities, such as teaching of letters (Manolitsis et al., 2009; Silinskas, Parrila, et al., 2010; Stephenson et al., 2008) or teaching of decoding (Hood, Conlon, & Andrews, 2008; Sénéchal & LeFevre, 2002) have been found to have a positive effect on children's reading skills. For example, Silinskas, Parrila, et al. (2010) found that more frequent teaching of letter names at the beginning of Kindergarten was associated with better reading skills at the end of Kindergarten. In

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