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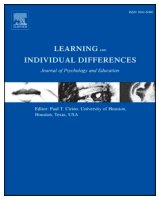

Maternal warmth moderates the longitudinal associations of family economic pressure with early reading and writing skills among Chinese children☆

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ABSTRACT

Little is known about the joint role of family poverty and parent-child relationships in the development of early literacy skills—a strong predictor of later cognitive and academic outcomes—among Chinese children. This study examined the longitudinal associations of family economic pressure with early Chinese reading and writing skills and tested maternal warmth as a moderator. Participants were 330 kindergarten children (mean age at Time 1 = 4.81 years; 56 % were girls) and their mothers from Hong Kong, China. Children completed tests on Chinese word reading and writing at Times 1 and 2; mothers completed questionnaires on family economic pressure and parental warmth at Time 1. Multilevel models indicated that family economic pressure was linked to declines in child Chinese word reading and writing skills for children with low but not high maternal warmth, highlighting the possibility of targeting maternal warmth to promote child development in financially disadvantaged Chinese families.

1. Introduction

Millions of families in the world are affected by economic pressure—defined as psychological distress resulting from financial difficulties (Diemer et al., 2013). This may not be surprising: Although wealth inequality has been declining among countries in the past few decades, it has been deepening within almost every single one of them (Alvaredo et al., 2018). In fact, not having enough money to deal with everyday expenses has been listed as one of the top three major causes of stress in surveys conducted in 22 regions in the world, including Australia, China, Germany, Japan, the U.K., the U.S., and Turkey (Growth from Knowledge, 2015). Of particular concern for parents, practitioners, and policy makers is that family economic pressure may place children at a greater risk for academic problems. Research based on European and North American communities, for example, has indicated that children from financially disadvantaged families tend to have poorer cognitive and academic outcomes (Conger et al., 2010; Cooper & Pugh, 2020).

As China is home to about 20 % of the world's population and the Chinese diaspora encompasses about 43 million people (Song, 2019), it is important to understand the role of family economic pressure in the development of early Chinese reading and writing skills—a strong predictor of later literacy skills and overall academic achievement—among Chinese children (Pan et al., 2017; Su et al., 2017). It is also important to identify modifiable factors that may protect children from the negative impact of family poverty. Using multi-informant, multi-method data from 330 families from Hong Kong, China, we tested the longitudinal associations of family economic pressure with child Chinese word reading and writing skills in the kindergarten years. We also tested maternal warmth—the love and affection expressed when mothers hug, kiss, and hold their children, praise their children, and show sympathy when their children are upset (Robinson et al., 2001)—as a moderator.

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1.1. Family economic pressure and child Chinese word reading and writing

Decades of research have demonstrated that children living in financially more disadvantaged families, such as children whose parents are less educated and less wealthy or experience more economic pressure, have poorer cognitive development and lower academic achievement (Conger et al., 2010; Cooper & Pugh, 2020). Why? According to the parental investment model, family economic pressure may limit parents' abilities to invest in the future of their children, as parents have to attend to more immediate family needs (Haveman & Wolfe, 1995; Li et al., 2021). Parental investment in children may include parental provision of stimulation through purchased goods (e.g., books, toys) and hired services (e.g., tutoring and extracurricular activities). Parental investment may also include parental provision of adequate clothing, food, housing, transportation, entertainment, and medical care and family relocation to a more advantaged neighborhood that better promotes child development. Indeed, longitudinal studies have shown that lower parental education and family income (Crampton & Hall, 2017; Votruba-Drzal et al., 2020) and higher family economic pressure (Dotterer et al., 2012; Iruka et al., 2012) predict less stimulating home environments, less secure food sources, and less resourceful neighborhoods, which in turn predict lower levels of school readiness and English reading skills among European and North American children.

On the other hand, according to a family stress model, family economic pressure may increase parents' psychological distress, which may contribute to other negative family processes (Conger & Conger, 2002; Masarik & Conger, 2017). Psychologically more distressed parents, for example, have more frequent and more intense marital conflict and are less involved and less patient with their children—family processes that may trigger negative emotions among children and disrupt their academic learning, at home and in school. For example, longitudinal studies have indicated that lower parental education and family income (Baker et al., 2018; Nievar et al., 2014) and higher family economic pressure (Dotterer et al., 2012; Palermo et al., 2018) predict more parental psychological distress, more marital conflict, and more parent-child conflict, which in turn predict lower levels of math and English reading achievements among European and North American children.

Little is known about the role of family economic pressure per se in the development of reading and writing skills among Chinese children, but there has been extensive research on the role of family socioeconomic status (SES; typically indicated by parental education and family income). For example, one meta-analysis based on 148 independent effect sizes found that family SES was concurrently correlated, at $r = 0.27$, with child language-related, educational outcomes across studies conducted in China, though the correlation strength declined with the publication year of the studies (Liu et al., 2020). Moreover, some longitudinal studies showed that family SES predicted child and adolescent Chinese reading skills, even after controlling for prior levels of child skills (Ren et al., 2020; Zhang et al., 2020). Inconsistent findings have also been reported, however, with some longitudinal studies showing that family SES no longer predicted the reading and writing skills of Chinese kindergarten and primary school children, when children's oral fluency and phonological and morphological awareness (Pan et al., 2017; Su et al., 2017) or prior levels of skills (Dulay et al., 2017; Yang et al., 2019) were controlled.

There are several possible explanations for these mixed findings. First, family SES is only a proxy variable of family economic pressure; parental education focuses on parents' potential rather than actual abilities to gather family resources, whereas parental income and job prestige focus on family resources rather than family needs (Conger et al., 2010; Diemer et al., 2013). Therefore, a direct measure of whether parents perceive themselves to have enough money to cover their family expenses, such as the one used in the study by Conger et al. (1994), may be more able to tap onto parents' abilities to invest in their children and parents' experience of psychological distress. Second, Chinese culture places a strong emphasis on education (Liu et al., 2020). Regardless of their backgrounds, Chinese parents are often willing to put in whatever they have to help their children succeed in school, sometimes even at the expense of the larger family needs. Therefore, the association between family economic pressure and child academic outcomes may be less pronounced in Chinese than in other cultures. Finally, child academic development is often shaped by multiple factors, operating in both additive and interactive ways (Rouse et al., 2020). Indicators of positive parent-child relationships, such as maternal warmth, may modulate the negative impact of family financial hardship on child academic outcomes.

1.2. Maternal warmth as a moderator

A risk and resilience perspective directs attention to why some children are protected from the negative impact of risk factors, such as having low birth weight, experiencing family poverty, studying in an underfunded school, and living in a dangerous neighborhood (Masten et al., 1990; Zolkoski & Bullock, 2012). By definition, a resilience factor is identified when it proves to interact with a risk factor and moderate the association of the risk factor with an adjustment outcome. Like risk factors, resilience factors can be found within the child, the family, the school, or the community. One line of resilience research focuses on the interplay between positive parent-child relationships and poverty-related risk factors in understanding child academic development, although the findings are inconclusive.

For example, in a cross-sectional study with African American families, parental discipline consistency mitigated the negative association of cumulative family risk—a composite index based on such risk factors as family poverty, maternal depression, and stressful life events—with adolescent grade point averages (Gutman et al., 2002). Moreover, in a longitudinal study with U.S. families, parental scaffolding mitigated the negative association of cumulative family risk in the preschool years with child school readiness in the primary school years (Ruberry et al., 2018). Furthermore, in a longitudinal study with African American families, parental warmth mitigated the negative association of cumulative family risk in early childhood with child mathematics skills in middle childhood, even after controlling for child mathematics skills in early childhood (Burchinal et al., 2008). The moderating effect of parental warmth was not evident for child English reading skills, however, possibly due to the small sample size ($N = 74$), which might have limited the power to detect moderation effects. Interestingly, in a longitudinal study based on a nationally representative sample in the U.S. ($N = 2352$), Ogg and Anthony (2020) detected few interactions between family SES and parental warmth or involvement for children's growth in mathematics or English reading skills from early to middle childhood. However, parental warmth (but not involvement) interacted with family SES in explaining children's growth of science achievement, possibly because science was less emphasized than mathematics and reading in primary school curriculums and thus more susceptible to non-school influences.

Relevant research based on Chinese families is rare. But, in one cross-sectional study with families living in Shanghai, China, authoritative parenting interacted with family SES to predict kindergarten children's language and cognitive development: In families with low but not high SES, children with more authoritative parents scored significantly higher on communication and general knowledge and marginally higher on language and cognitive skills (Xia, 2020). In another cross-sectional study with families living in six Asia-Pacific countries, a marginally significant interaction of maternal engagement in child learning activities with family SES was also documented in Chinese families (Sun et al., 2018): Maternal engagement in child learning activities appeared to be able to protect kindergarten children from the negative impact of family poverty on language development and emergent literacy.

To date, no studies have examined the moderating role of any

indicators of positive parent-child relationships in the longitudinal association between family economic pressure and child Chinese reading and writing skills—an important developmental outcome and a strong predictor of overall academic achievement in Chinese communities (Pan et al., 2017; Su et al., 2017). We focused on parental warmth as a generic indicator of positive parent-child relationships, given that parental warmth is linked to many other indicators of positive parent-child relationships, including scaffolding, discipline consistency, authoritativeness, and engagement in child learning activities (Olivari et al., 2013) and that praising children, expressing positive affection to children, and showing empathy when children are upset do not have to cost any money (Robinson et al., 2001). In fact, parental warmth may be particularly important in financially disadvantaged families, as the emotional support derived from it may antagonize the impact of negative family processes resulting from living in poverty and the cognitive stimulation associated with it may compensate for the reduced learning opportunities that could have been mediated by purchased goods or hired services in wealthier households (Burchinal et al., 2008; Ogg & Anthony, 2020). We further focused on maternal warmth as mothers continue to be more involved in childrearing than do fathers (Lam & McHale, 2015).

1.3. The present study

To recap, this study used multi-informant, multi-method data from 330 Chinese families to examine the longitudinal associations of family economic pressure with child Chinese word reading and writing skills. Guided by prior theory and research, we expected that family economic pressure would be negatively associated with child reading and writing skills, especially for children with low maternal warmth. We controlled for child gender and age, as these demographic factors have been linked to parent-child relationships and child development (Burchinal et al., 2008; Zhang et al., 2020). We also controlled for child oral fluency (typically indicated by the time required for a child to quickly and accurately name an array of well-known visual stimuli), as oral fluency can be a proxy of more fundamental cognitive processes that are related to both reading and writing, including attention to stimuli, visual discrimination, orthographic and phonological representation, and articulatory ordination (Araújo et al., 2015; Song et al., 2016). Moreover, we controlled for maternal education in order to isolate the effects of financial hardship experienced by the family as opposed to mothers' potential to gather family resources (Conger et al., 2010; Diemer et al., 2013). Finally, we controlled for prior levels of child reading and writing skills, so that we could capture changes in these child outcomes over time (Cole & Maxwell, 2003).

2. Methods

2.1. Participants and procedures

Participants were 330 children and their mothers from 10 kindergartens in Hong Kong, China. To ensure that we were able to recruit families with a wider range of SES backgrounds, we first stratified the 18 districts of Hong Kong into high, medium, and low SES strata based on their median household incomes (Census and Statistics Department, 2016). We then randomly called kindergartens in these strata, until three kindergartens in each stratum agreed to help recruit families for us. As two kindergartens from the high SES stratum had small student bodies, we included one additional kindergarten from that stratum to balance the numbers of families from different strata. Through these 10 participating kindergartens, we sent invitation letters to all families with second-year kindergarten children. In Hong Kong, children typically attend 3 years of kindergarten, beginning at the age of 3–4 years. Therefore, the second year of kindergarten is about 2 years before the entry to primary school. Three hundred and thirty families provided informed consent for us to collect data from the children and the mothers on two occasions about 12 months apart. Of these families, 35 %, 44 %, and 21 % were from kindergartens located in high, medium, and low SES districts, respectively. In the Spring semester (from March through June), children completed tests on Chinese word reading and writing at Times 1 and 2 and tests on oral fluency at Time 1. Meanwhile, mothers completed self-administered questionnaires on living conditions and family relationships and provided demographic information at Time 1. As compensation, at each time point, each child received a stationery gift set, and each mother received a supermarket coupon of HK$50 (about US$6). The retention rate was 91 %. We removed three families whose data on living conditions and family relationships were provided by non-mothers (e.g., aunts, grandmothers) and based our analyses on the remaining 330 families. The procedures were approved by the Human Research Ethics Review Committee of The Education University of Hong Kong.

At Time 1, children averaged 4.81 years ($SD = 0.38$) in age, and 56 % of them were girls. Most mothers aged between 31 and 40 years (65 %). In terms of education, 3 %, 39 %, 17 %, and 42 % of mothers had completed primary school only, secondary school only, higher diploma or associate degree programs only, and college degree programs or above, respectively, suggesting that mothers might be better educated than their same-age peers in Hong Kong, where only 29 % of all women aged 30–39 years had completed college degree programs or above (Census and Statistics Department, 2016).

2.2. Measures

Two research assistants independently forward and backward translated all questionnaire measures from English to Chinese. A third research assistant then joined in, resolving the discrepancies and finalizing the items.

Family economic pressure was assessed with an 8-item measure (Conger et al., 1994). At Time 1, mothers used a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) to rate whether their families had enough money for "clothing," "food," "housing," "household items," "transportation," "medical care," "recreation," and "child education and extracurricular activities." Ratings were reverse-coded and then averaged, such that higher scores indicated higher family economic pressure. The Cronbach's alpha was 0.95.

Maternal warmth was assessed with a 7-item measure (Robinson et al., 2001). At Time 1, mothers used a 5-point scale ranging from 1 (*Never*) to 5 (*Always*) to rate how often they were supportive and affectionate with their children (e.g., "I give praises when this child is good," "I show sympathy when this child is hurt or frustrated"). Though originally developed in the U.S., the measure had been formally validated among parents of kindergarten children from China (Wu et al., 2002). Its validity and reliability were further evidenced in other studies with Chinese samples (Chen et al., 2017; Lam et al., 2018; Xia et al., 2019). Ratings were averaged, such that higher scores indicated higher maternal warmth. The Cronbach's alpha in this study was 0.85.

Child Chinese word reading was assessed with a 60-item measure (Chung et al., 2018). At Times 1 and 2, children were asked to read aloud 30 Chinese single-character words (e.g., "耳" meaning ear, "月" meaning moon) and 30 Chinese two-character words (e.g., "早上" meaning morning, "小心" meaning careful). One point was given when children pronounced the word correctly. The points for all words were summed, such that higher scores indicated better Chinese word reading skills. The Cronbach's alphas were 0.97 at both Times 1 and 2.

Child Chinese word writing was assessed with a 7-item measure (Chung et al., 2018). At Times 1 and 2, children were asked to write down seven Chinese single-character words (e.g., "天" meaning day, "火" meaning fire). The writing of children was evaluated based on its stroke-form correctness and overall shape correctness (Guan et al., 2015)—for each word, one point was given when all correct strokes were present, and another point was given when the word was recognizable as a whole. The points for all words were summed, such that

higher scores indicated better Chinese word writing. The Cronbach's alphas were 0.69 at Time 1 and 0.64 at Time 2.

Oral fluency was assessed with a measure developed by Shu et al. (2006). At Time 1, children were asked to read aloud twice five rows of digits as quickly and accurately as possible. The amounts of time children took to finish reading the digits were averaged across the two trials, such that higher scores indicated lower oral fluency. The test–retest correlation was 0.83.

Demographic information, including child gender, child age, maternal age, and maternal education, was provided by mothers at Time 1.

2.3. Data analytic plan

As children studying in the same kindergarten tended to have similar learning experience, their academic abilities might be more alike than those studying in different kindergartens. Therefore, using Proc Mixed in SAS 9.4, we ran unconditional multilevel models to test whether multilevel modeling was needed to take into account the potential nestedness of our data (Singer, 1998). The results indicated that significant variance existed across children ($\sigma^2 = 125.45$, $SE = 10.41$, $p < .01$ and $\sigma^2 = 6.42$, $SE = 0.54$, $p < .01$, respectively) and across schools ($\sigma^2 = 36.26$, $SE = 18.27$, $p < .05$ and $\sigma^2 = 2.46$, $SE = 1.22$, $p < .05$, respectively), in Chinese word reading and writing skills. Therefore, we used two-level, multilevel models to analyze our data (Level 1 = child level; Level 2 = school level). Following the recommendations of Bell et al. (2013) and Stroup (2012), we further tested if adding the random slopes (allowing the slopes associated with the predictor variables to vary across schools) would better fit our data and specify a better error structure. However, adding these slopes either did not improve the model fit, based on the difference in the −2 log likelihood values (Δ-2LL = 2.8, $df = 2$, *n.s.*, as in the model of writing), or led to substantively identical results (as in the model of reading). Therefore, all random slopes were removed from the final models. Across times, informants, and variables, <5 % of our data were missing. The Full Information Maximum Likelihood procedures were used to accommodate these missing data and reduce possible estimation bias (Larsen, 2011).

To examine the longitudinal associations of family economic pressure and child Chinese word reading and writing skills and test the potential moderating role of maternal warmth, we estimated the main effects of family economic pressure and maternal warmth at Time 1 and their interaction effects on child Chinese word reading and writing skills at Time 2, controlling for child gender, age, and oral fluency, maternal education, and child skills at Time 1. To reduce multicollinearity, we centered family economic pressure and maternal warmth at the sample means before creating their interaction term. Following the recommendations of Frazier et al. (2004) and Preacher et al. (2016), we followed up on significant interactions by computing the predicted values of the outcome variables separately for children with high (1 *SD* above the mean) versus low (1 *SD* below the mean) family economic pressure and maternal warmth, that is, by multiplying the respective unstandardized regression coefficients for each variable by the appropriate value (i.e., 1 *SD* above and below the mean) in the equation.

3. Results

Table 1 presents the means and standard deviations of and correlations between variables. Families in this sample were generally well-functioning, with scores on the low end of the family economic pressure measure and the high end of the maternal warmth. Moreover, family economic pressure (*r*s ranging from −0.32 to −0.19, *p*s < 0.01) was negatively and maternal warmth (*r*s ranging from 0.15 to 0.23, *p*s < 0.01) was positively correlated with child Chinese word reading and writing skills, concurrently and longitudinally. The cross-time correlations of child literacy skills were strong (*r*s ranging from 0.67 to 0.82, *p*s < 0.01), indicating substantial stability over time. The cross-time differences in child average reading (paired $t = 29.25$, $p < .01$) and writing (paired $t = 31.86$, $p < .01$) scores were salient, however, reflecting that children showed significant improvement in both skills within 1 year.

It is worth noting that, although mothers from schools located in the high SES stratum ($M = 1.82$; $SD = 0.62$) and the middle SES stratum ($M = 1.93$; $SD = 0.62$) reported significantly lower economic pressure (*p*s < 0.01) than did those from schools located in the low SES stratum ($M = 2.42$; $SD = 0.79$), there was comparable variability in economic pressure among families from schools located within each stratum. In fact, an unconditional multilevel model examining the variance in family economic pressure indicated that significant variance existed across children ($\sigma^2 = 0.39$, $SE = 0.03$, $p < .01$) and across schools ($\sigma^2 = 0.12$, $SE = 0.06$, $p < .05$) in this variable. Therefore, although we did not oversample financially disadvantaged families in this study, there was substantial variability in family economic pressure to capitalize on in our moderation analyses.

Table 2 presents the unstandardized coefficients and standard errors of the multilevel models. With the interaction term not included in the models, family economic pressure was predictive of child writing skills ($\gamma = -0.74$, $SE = 0.20$, $p < .01$) but not child reading skills ($\gamma = -1.10$, $SE = 0.72$, *n.s.*). Moreover, maternal warmth was not predictive of Chinese word reading or writing skills (γs = −0.12-1.70, *SE*s = 0.28–0.98, *n.s.*). The addition of the interaction term indicated that family economic pressure interacted with maternal warmth to predict child reading as well as writing skills, however. As shown in Figs. 1 and 2, for children with low maternal warmth, family economic pressure was

Table 1
Means and standard deviations of and correlations between variables.

Variables	1	2	3	4	5	6	7	8	9	10
1. Child gender[a]	–									
2. Child age T1	0.11	–								
3. Child oral fluency T1[b]	−0.14*	−0.13*	–							
4. Mother education T1	0.19**	0.05	−0.27**	–						
5. Family economic pressure T1	−0.03	−0.03	0.08	−0.35**	–					
6. Mother warmth T1	0.14*	0.00	−0.15**	0.32**	−0.32**	–				
7. Child Chinese word reading T1	0.16**	0.22**	−0.57**	0.33**	−0.20**	0.15**	–			
8. Child Chinese word reading T2	0.20**	0.15*	−0.57**	0.35**	−0.22**	0.22**	0.82**	–		
9. Child Chinese word writing T1	0.17**	0.32**	−0.48**	0.35**	−0.19**	0.19**	0.68**	0.62**	–	
10. Child Chinese word writing T2	0.22**	0.21**	−0.40**	0.39**	−0.32**	0.23**	0.62**	0.72**	0.67**	–
M	–	4.81	24.14	3.12	2.00	4.19	32.44	48.57	5.89	10.60
SD	–	0.38	8.53	1.14	0.69	0.49	15.52	12.72	3.20	2.96

T1 = Time 1. T2 = Time 2.
* $p < .05$.
** $p < .01$.
[a] Boy was coded as 0, and girl was coded as 1.
[b] Higher scores indicated lower oral fluency.

Table 2
Multilevel models linking family economic pressure and mother warmth at Time 1 to child Chinese word reading and writing skills at Time 2.

	Chinese reading T2				Chinese writing T2			
	Without interaction		With interaction		Without interaction		With interaction	
Variables	*γ*	*SE*	*γ*	*SE*	*γ*	*SE*	*γ*	*SE*
Fixed effects								
Child gender	1.30	0.94	1.26	0.92	0.54*	0.27	0.54*	0.27
Child age T1	−0.15	0.10	−0.15	0.10	0.02	0.03	0.02	0.03
Child oral fluency T1	−0.24**	0.06	−0.24**	0.06	−0.02	0.02	−0.02	0.02
Maternal education T1	0.29	0.47	0.29	0.46	0.17	0.13	0.17	0.13
Child Chinese word reading T1	0.53**	0.04	0.53**	0.03	–	–	–	–
Child Chinese word writing T1	–	–	–	–	0.48**	0.05	0.48**	0.05
Economic pressure T1	−1.10	0.72	−1.10	0.70	−0.74**	0.20	−0.75**	0.20
Maternal warmth T1	1.70	0.98	1.27	0.98	0.12	0.28	0.03	0.28
Economic pressure × Maternal warmth	–	–	3.44**	1.20	–	–	0.68*	0.34
Random effects								
Between-school	3.06		2.36		0.15		0.11	
Within-school	53.50**		52.22**		4.34**		4.30**	

T1 = Time 1. T2 = Time 2.
* $p < .05$.
** $p < .01$.

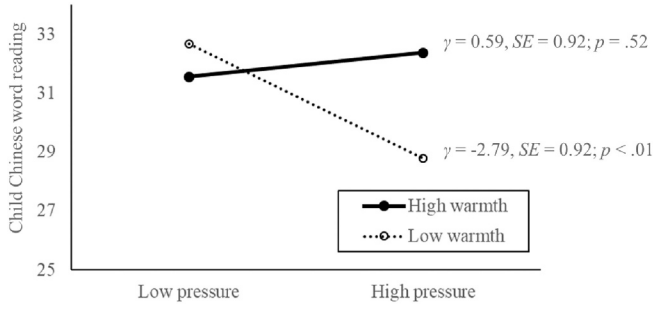

Fig. 1. Association of family economic pressure with child Chinese word reading skills by mother warmth.

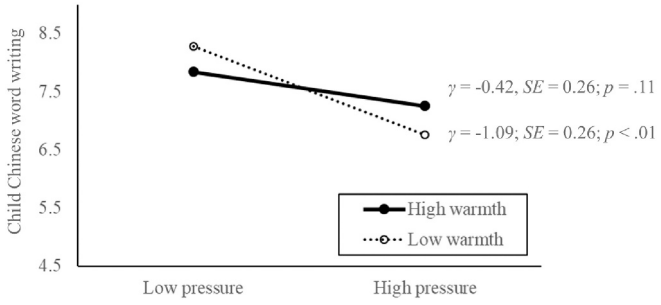

Fig. 2. Association of family economic pressure with child Chinese word writing skills by mother warmth.

linked to decreases in child reading skills ($\gamma = -2.79$, $SE = 0.92$, $p < .01$) and child writing skills ($\gamma = -1.09$; $SE = 0.26$, $p < .01$), although such links were not significant for children with high maternal warmth (γs = −0.42-0.59, *SE*s = 0.26–0.92, *n.s.*). To examine the local effect sizes of these interactions, we computed the partial correlations of the interaction terms with the outcome variables, which controlled for the effects of all other predictor variables (McCartney & Rosenthal, 2000). The partial correlations of the interaction term with child reading and writing skills were 0.18 and 0.16, respectively, indicating small to moderate effect sizes. Overall, with all predictor variables included, the models explained 66 % and 50 % of variance in child reading and writing skills, respectively.

4. Discussion

This study examined the longitudinal associations of family economic pressure with Chinese word reading and writing skills among kindergarten children and tested maternal warmth as a moderator. Although family economic pressure was negatively and maternal warmth was positively correlated with Chinese word reading and writing skills in the bivariate analyses, only family economic pressure (but not maternal warmth) was predictive of Chinese word writing (but not reading) skills in the multivariate models. However, the addition of the interaction term revealed that the associations of family economic pressure with Chinese word reading and writing skills varied as a function of maternal warmth. Consistent with a parental investment model (Haveman & Wolfe, 1995; Li et al., 2021), a family stress model (Conger & Conger, 2002; Masarik & Conger, 2017), and the risk and resilience perspective (Masten et al., 1990), family economic pressure was linked to declines in Chinese word reading and writing skills for children experiencing low but not high maternal warmth. In other words, the potential implications of family economic pressure for child cognitive development might not be fully understood without taking into account such resilience factors as positive parent-child relationships. As we collected data on our predictor and outcome variables using different methods from different informants, our findings could not be explained by common method variance. Neither could our findings be explained by child demographic characteristics (Burchinal et al., 2008; Zhang et al., 2020), more fundamental cognitive abilities of children (Araújo et al., 2015; Song et al., 2016), mothers' potential to gather family resources (Conger et al., 2010; Diemer et al., 2013), or prior levels of child skills (Cole & Maxwell, 2003), as we controlled for child age, child gender, child oral fluency, mother education, and respective outcome measures at Time 1. In addition to these methodological strengths, our study was unique in that it examined early reading and writing in a Chinese community—the largest ethnic group in the East and in the world (Song, 2019).

Theoretically, our findings highlighted the role of family economic pressure in understanding Chinese children's academic development, such as in early reading and writing. Even in a culture that places high emphasis on education (Liu et al., 2020) and in a sample of relatively well-functioning families, family economic pressure was linked to decreases in early reading and writing skills—skills that are predictive of children's literacy skills and overall academic achievement in middle childhood and beyond (Pan et al., 2017; Su et al., 2017). Importantly, the impact of family economic pressure was *not* deterministic. When mothers displayed affection to their children, praised their children, and

gave their children a sympathetic ear as needed, their children seemed to be more resilient in the face of a less resourceful and a more conflictual home environment. Practically, our findings pointed to the utility of targeting maternal warmth to enhance children's academic adjustment, especially in financially disadvantaged families. It is worth noting that maternal education was controlled in our analyses, meaning that—contrary to common stereotypes—mothers do not have to be highly educated in order to support their children's literacy development against family poverty, at least in early childhood. If wealth inequality continues to worsen globally (Alvaredo et al., 2018), family economic pressure may become even more prevalent in different regions and countries in the world (Growth from Knowledge, 2015). Therefore, practitioners and policy makers may consider promoting maternal warmth—using tailor-made, family intervention as well as community-wide, parent education—to improve the well-being of financially disadvantaged children.

4.1. The joint roles of family economic pressure and maternal warmth

Ample research has linked family SES and family economic pressure to child cognitive and academic outcomes in Western communities (Conger et al., 2010; Cooper & Pugh, 2020). There is also keen research interest in the link between family SES and child reading and writing skills in Chinese communities, but the findings have been mixed: Cross-sectional studies documented positive associations between family SES and child language-related educational outcomes, although the strength of the associations declined with the year of publication of the studies (Liu et al., 2020). Moreover, some longitudinal studies linked family SES to increases in Chinese literacy skills over time (Ren et al., 2020; Zhang et al., 2020), whereas others reported null findings (Dulay et al., 2017; Pan et al., 2017; Su et al., 2017; Yang et al., 2019). Our study added to this literature by using a direct measure of family economic pressure and testing maternal warmth as a moderator. Indeed, consistent with prior studies showing that parental scaffolding, discipline consistency, authoritativeness, and engagement in child learning activities mitigated the negative association of cumulative family risk with child cognitive and language development and school functioning (Gutman et al., 2002; Ruberry et al., 2018; Sun et al., 2018; Xia, 2020), our findings indicated that the longitudinal associations of family economic pressure with child Chinese word reading and writing skills were evident for children experiencing low but not high maternal warmth.

Our findings were nevertheless inconsistent with other studies showing that parental warmth moderated the association of cumulative family risk with child growth in only mathematics and science achievements, but not in English reading skills (Burchinal et al., 2008; Ogg & Anthony, 2020). As our and these studies were conducted with different cultural groups and based on different methodologies, direct comparisons are difficult. One possible reason for the differences in our versus their findings, however, was that our study had focused solely on family economic pressure, whereas these studies had focused on multiple risk factors, including family poverty, maternal depression, and stressful life events. When children are faced with multiple risk factors at the same time, their academic development may be disproportionately affected and the impact of a single resilience factor may wane (Zolkoski & Bullock, 2012). Future researchers should differentiate the role of family economic pressure versus other risk factors in shaping child cognitive and academic development. Another possible reason was that our study examined changes in child academic outcomes over 1 year in early childhood only, whereas these studies examined changes over several years, from early to middle childhood. As observed by Ogg and Anthony (2020), with an increasing emphasis of reading in primary school curriculums, non-school influences may become *less* prominent in middle than in early childhood. An important direction for future research is to use annually collected data from early through middle childhood to test if the interaction effect between family economic pressure and parent-child relationships on child literacy skills may decrease with age. Finally, the learning of Chinese, a logographic language, may be different from that of English, an alphabetical language. As it often takes more time and efforts for children to learn the relatively arbitrary sounds and forms of Chinese words, the development of Chinese may be particularly dependent on concerted socialization (Pan et al., 2017; Su et al., 2017). Cultural comparative designs that collect data from, for example, both English and Chinese speaking families are needed to examine whether maternal warmth may moderate the associations of family economic pressure with child learning of Chinese as well as English.

4.2. Limitations and future directions

This study had several limitations. First, despite our use of a longitudinal design and our elimination of several alternative explanations, conclusive claims about causation cannot be made based on correlational data (Cole & Maxwell, 2003). Intervention studies that use experimental designs to improve family relationships in financially disadvantaged families are needed to truly understand whether maternal warmth may protect children from the potential negative impact of family economic pressure. Second, although we used a stratified sampling method to try to recruit families with different SES backgrounds, families that eventually participated in our study were of higher SES (as reflected by the average level of maternal education) and experienced relatively low family economic pressure (as reflected by the self-reports of mothers). Moreover, Hong Kong is only one of the many cities in China—it remains unknown whether our findings are generalizable to Chinese families from other parts of China and the Chinese diaspora, which may have different political and educational systems (Song, 2019). Replications of our findings are needed with additional Chinese samples, especially samples that are more diverse in terms of family SES, financial hardship, and political economy. Third, our measure of family economic pressure focused on parents' subjective perceptions of poverty, which might not fully represent the real situation of the family (Conger et al., 2010). As an objective indicator of poverty, such as the federal poverty threshold or the income-to-needs ratio, is often used to determine if a family is eligible for public assistance benefits, families deemed to be poor based on such a criterion often face more "absolute" disadvantages and are thus more at-risk (Diemer et al., 2013). Whether maternal warmth may moderate the association of an objective indicator of poverty with child reading and writing skills awaits investigations.

Fourth, we assessed maternal warmth using only mothers' self-reports, which are susceptible to social desirability bias, especially among Chinese parents (Bornstein et al., 2014). Future researchers should triangulate this construct using multiple assessment methods, including maternal reports, child reports, and direct observation. Relatedly, we focused on maternal warmth as it is ubiquitous and encompassing (Olivari et al., 2013; Robinson et al., 2001). Given that other indicators of positive parent-child relationships, such as scaffolding, discipline consistency, authoritativeness, and engagement in child learning activities have also been identified as resilience factors against family poverty (Gutman et al., 2002; Ruberry et al., 2018; Sun et al., 2018; Xia, 2020) and that father-child relationships also play a crucial role in child development (Lam et al., 2012, 2018), additional work is needed to test different indicators of positive mother- and father-child relationships as potential moderators, especially in the longitudinal association between family economic pressure and child Chinese reading and writing skills. Finally, the interactions between family economic pressure and maternal warmth documented in this study were only modest to moderate in strength, indicating that family conditions and parent-child relationships are only part of the story. As child academic development is simultaneously affected by child, family, school, and community factors (Rouse et al., 2020), future studies should take a more comprehensive approach and study how these different categories of influences may affect early reading and writing skills in additive as

well as interactive ways.

5. Conclusions

Despite these limitations, our study was the first to use a longitudinal design to test the joint impact of family economic pressure and maternal warmth on child Chinese word reading and writing skills. Theoretically, our findings highlighted the importance of identifying resilience factors that may help children adapt in the face of challenging or threatening circumstances. Practically, our findings pointed to the potential utility of targeting maternal warmth to promote positive child development in financially disadvantaged Chinese families.

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