



# Different associations of parental involvement with children's learning of Chinese, English, and math: a three-wave longitudinal study

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Received: 15 July 2021 / Revised: 4 February 2022 / Accepted: 8 February 2022 /  
Published online: 25 February 2022  
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## Abstract

Due to the impact of COVID-19, children and their parents are spending more time at home, which increases parent–child interactions. The goals of the present study were to examine the mediating effects of children's learning engagement on the relationships of parental involvement in Chinese, English, and math performance and to investigate whether parent-perceived parental involvement and child-perceived parental involvement consistently affected children's academic performance. Data were collected from 253 Chinese primary school students (117 boys,  $M_{age} = 10.53$ ) during the COVID-19 pandemic. We included parental involvement perceived by the parents and by the children to comprehensively describe parental involvement (in wave 2); we collected children's learning engagement (wave 2); and we compared children's Chinese, English and math academic performances before (wave 1) and after (wave 3) China's first wave of COVID-19 in 2020. The results showed that after controlling for gender, age, and SES, the parental involvement perceived by parents could be directly and positively related to children's learning engagement, and it also indirectly influenced children's learning engagement through the children's perceived parental involvement. Learning engagement was a mediator of the relationship between parental involvement and children's academic performance. Parental involvement significantly predicted children's Chinese and English performances through their learning engagement, while parental involvement failed to predict children's mathematics performances during the COVID-19 pandemic. The current research provides insights into the underlying mechanisms of how parental involvement affects children's academic performances during school closures and hopes to guide parents and schools to consider how to cooperate and continue to use rapidly developing digital education resources amid the long-term impact of COVID-19 to provide children using more effective and suitable guidance in the future.

**Keywords** Parental involvement · Learning engagement · COVID-19 · Chinese · English · Math

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## Introduction

Beginning in early 2020, the outbreak of COVID-19 had a long-term impact on children's learning activities worldwide (Chaturvedi et al., 2021; UNESCO, 2020). Great changes have occurred in children's education because of school lockdowns. Primary school students had no choice but to study online at home; their parents supervised them for much longer periods than before, which increased parent–child interactions. Studies have found that parents themselves have undergone some psychological changes. Many parents are worried that their children will fall behind in **academic performance** (Nyanamba et al., 2021). Thus, parents tend to provide more support for their children than before (Austin-Ohanenye, 2022; Luísa et al., 2021). Although there have been studies on the relationship between parental involvement and children's academic performance across subjects (e.g., numeracy, literacy) in recent years, there is much less evidence showing whether parental involvement affects children's academic performance differently across subjects with a longitudinal design when parents are present and supervising their children much more than before. Therefore, the first purpose of this study is to explore whether parental involvement has a positive impact on children's academic performance in the context of the epidemic.

### Effect of parental involvement on Children's academic performance

Parental involvement has three domains: emotional, cognitive or intellectual, and behavioral (Cheung & Pomerantz, 2011; Grolnick & Slowiaczek, 1994). Previous research has demonstrated strong relations between parental involvement and children's academic engagement and performance (Anthony & Ogg, 2019; Barger et al., 2019; Englund et al., 2004; Hill & Taylor, 2004; Jaynes, 2005). For Chinese primary school students, the main assessment subjects are Chinese, English, and mathematics. However, the influence of parental involvement on students' academic performance in different subjects has not been fully explored (Wilder, 2014).

Some studies have examined the impact of parental involvement on students' academic performance in multiple subjects, and these studies are somewhat controversial. Some show that parental involvement has a positive effect on students' overall performance (Dotterer & Wehrspann, 2016), while others show that the effect of parental involvement on academic performance varies by subject (Fan & Williams, 2010; Ho Sui-Chu & Willms, 1996; Patall et al., 2008). For example, Patall et al. (2008) found that parental involvement in homework had a positive relationship with verbal learning performance but a negative relationship with math performance. The authors explained that the math problem-solving strategies used by parents may differ from those taught by teachers in class; however, for language learning, students need relatively few complicated skills and strategies. Other studies focus on the impact of parental involvement on students' academic performance in specific subjects (Cui et al., 2021; Dearing et al., 2006; Levpušček & Zupančič, 2009; Xia et al., 2020; Xu et al., 2010). For example, Cui et al. (2021) found that parental involvement in emotion and behavior toward education had a positive effect on fourth grade children's math performance. It is not yet known whether parental involvement has an effect on students' academic performance in all subjects or only in specific subjects in Chinese primary school students. Therefore, this study intended to comprehensively analyze and compare the impacts of parental involvement on the main subjects (Chinese, English, and math) of primary school students in China.

In recent years, when collecting data on the variable of parental involvement, some studies have directly investigated the parental involvement perceived by parents (Cui et al., 2021; Daniel et al., 2016), and some studies have collected data on the parental involvement perceived by children (Cheung & Pomerantz, 2012, 2015; Grolnick & Slowiaczek, 1994). Previous studies have found conflicting results on the relationship between parental behaviors perceived by parents and by children (Dinkelmann & Buff, 2016; Gaylord et al., 2003; Niermann et al., 2020; Wilk et al., 2018). Some studies have shown that parental involvement reported by children was positively related to that reported by parents (Dinkelmann & Buff, 2016). When the parenting measure was reported by students, the relation between parental involvement and children's achievement was stronger (Kim, 2020). In contrast, other studies have shown that children's perception of parenting behaviors was negatively related to parents' perception of their involvement (Hou et al., 2020), and only children's perceived parenting behaviors could be associated with children's academic performance (Wilk et al., 2018). To address these gaps, it is necessary to assess parental involvement from both children's and parents' perspectives. Therefore, the third purpose of this research was to explore whether the parental involvement perceived by parents was positively correlated with the parental involvement perceived by children and whether both would contribute to children's academic performance.

### Mediating hypothesis of children's learning engagement

Learning engagement is defined in three ways: behavioral, emotional, and cognitive engagement (Fredricks et al., 2004). Behavioral engagement refers to involvement in academic or extracurricular activities and is considered essential to positive academic achievement. Emotional engagement involves students' feelings about academia and influences their willingness to do the work. Cognitive engagement incorporates willingness to give effort to acquire difficult and more complex skills.

Many theories and studies have demonstrated that children's spontaneous motivation and engagement in learning play an important role between parental involvement and children's academic performance. Grolnick and Slowiaczek (1994) proposed a *multidimensional conceptualization and motivational model*, supporting the view that children are active constructors of their learning experience and that their motivational qualities indirectly link parental involvement and school performance. Pomerantz et al. (2007) proposed a *skill and motivational development model*, indicating that parental involvement enhances children's motivation and skills in learning. In recent years, studies focusing on the role of learning engagement have found that learning engagement links parental involvement and school performance (Wang & Eccles, 2012). Parental involvement is positively associated with learning engagement, which in turn contributes to academic achievement (Dotterer & Wehrspann, 2016). When children are parent-oriented, the involvement of parents in their learning can help them improve their motivation as students, such as learning engagement, thus promoting their academic performance (Cheung & Pomerantz, 2012). Regarding language learning, some researchers found that parents' involvement in children's reading, such as reading to children or providing them with books, is related to children's reading engagement (Loera et al., 2011). Fan and Williams (2010) also found a significant relationship between parental advice at home and children's improved sense of self-efficacy toward English. Under the influence of the epidemic, the current situation of online learning requirements for learning participation is more severe (Kehinde & Olubusayo, 2021). In the case of online learning at home, students are required to have a high degree of

self-awareness and commitment to learning in order to avoid the temptation of the internet and achieve better academic results. The fourth purpose of this study is to retest the mediating role of learning engagement between parental involvement and children's academic achievement.

## Current study

As noted above, none of these studies has compared the mediating effects of parental involvement on children's Chinese, English, and math performance. None of the existing studies suggests whether parent-perceived parental involvement and child-perceived parental involvement consistently affect children's academic performance. This research used a three-wave longitudinal design to examine the relationships among parental involvement, learning engagement, and children's academic performance among Chinese primary school students during COVID-19. We collected children's academic grades in Chinese, English, and math before COVID-19 (wave 1) and obtained parental involvement perceived by the parents and children and children's learning engagement during online learning at home (wave 2). After the children finished online learning and returned to school, we collected their academic grades again (wave 3).

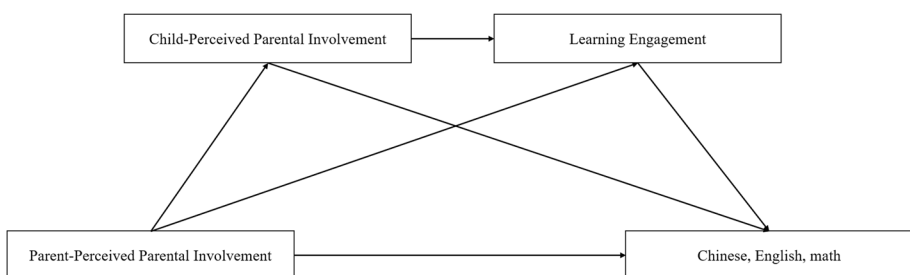
The specific assumptions are as follows (shown in Fig. 1):

- 1) There is a significant relationship between parent-perceived parental involvement and child-perceived parental involvement.
- 2) Parental involvement perceived by both parents and children predicts children's learning engagement and affects academic performance through learning engagement.
- 3) Parental involvement has a positive impact on academic performance across different subjects through learning engagement.

## Methods

### Participants

Participants were randomly recruited from Yantai in Shandong Province in China. In wave 1, the participants were 249 primary school students (116 boys,  $M_{age}=10.53$ ,  $SD=0.98$ ) with 71 third graders, 104 fourth graders, and 74 fifth graders. In wave 2, the participants



**Fig. 1** Hypothesized models of the associations among parental involvement, learning engagement, and children's academic performance in Chinese, English, and math

were 253 primary school students and their parents (117 boys,  $M_{age} = 10.53$ ,  $SD = 0.98$ ). There were 72 third graders, 105 fourth graders, and 76 fifth graders. In wave 3, the participants were 250 primary school students (116 boys,  $M_{age} = 10.54$ ,  $SD = 0.97$ ) with 71 third graders, 104 fourth graders, and 75 fifth graders. Outliers (3 SDs from the mean) were identified and excluded from further analysis. Specifically, for math, there are 4 extreme values in wave 1 and 1 extreme value in wave 3; for Chinese, there are 4 extreme values in wave 1 and 6 extreme values in wave 3; and for English, there are 6 extreme values in wave 1 and 1 extreme value in wave 3. Participants' attrition was caused by students being absent from school due to illness or transferring to other schools, and a logistic regression test showed that participants' attrition was not related to children's obtained scores on any of these variables. We used regression imputation to handle missing data (Little & Rubin, 2002).

Based on information from the statistical yearbook released on the official website of Shandong Provincial Statistics (<http://www.stats.com.cn/tjsj/tjsj.asp>), these children were all from middle-SES families. All the students used Chinese as their first language at home and English as their second language. Regarding parents' level of education, 54.5% of the fathers had graduated from high school and below, 32.4% had graduated from junior college or technical secondary school, 12.3% had a bachelor's degree, and 0.8% had a master's degree. Of the mothers, 59.7% had graduated from high school and below, 28.9% had graduated from junior college or technical secondary school, 10.7% had a bachelor's degree, and 0.8% had a master's degree.

## Measures

### Parental involvement

Parental involvement was assessed in wave 2 during online classes at home, with children and their parents reporting their perceived parental involvement. The scale is the Chinese version of parental involvement (Cheung & Pomerantz, 2011) with 23 items including three aspects: *personal involvement*, *cognitive or intellectual involvement*, and *behavioral involvement*. *Personal involvement* includes 9 items assessing the child (parent) perceiving that their parents (they) care about their (children's) school life and emotional interaction around school life (e.g., for parents, "During the epidemic, I eased my child's emotions from learning difficulties"; and for children, "During the epidemic, my parents eased my emotions from learning difficulties"). *Cognitive or intellectual involvement* includes 8 items assessing the children's exposure to cognitively stimulating activities and materials such as books and current events (e.g., for parents, "During the epidemic, I bought study textbooks or tutorials to help my child study"; and for children, "My parents bought textbooks or tutorials to help me"). *Behavioral involvement* includes 6 items assessing parents' behavioral participation in children's school life (e.g., for parents, "During the epidemic, I controlled my child's time online"; and for children, "My parents controlled my time online"). Children and parents were both asked to assess the frequency of each item on a scale ranging from "1 = never" to "5 = very often." The items for parent-perceived parental involvement and the items for child-perceived parental involvement were calculated, with higher numbers reflecting greater involvement (Cheung & Pomerantz, 2011).

These scales have been used among Chinese students and have shown good reliability and validity in prior research (Cheung & Pomerantz, 2011; Grolnick & Slowiaczek, 1994). We also conducted confirmatory factor analyses (CFA) to examine the three dimensions of

parents' and children's perceived parental involvement. For parents, the CFA supported the model fit indices:  $\chi^2/df=1.96$ , CFI=0.92, TLI=0.90, SRMR=0.06, and RMSEA=0.05. For children, the CFA supported the model fit indices:  $\chi^2/df=1.95$ , CFI=0.92, TLI=0.90, SRMR=0.05, and RMSEA=0.06. Additionally, the three scales demonstrated good reliabilities (Cronbach's alphas ranged from 0.77 to 0.87), and the Cronbach's alpha of the overall measure was 0.92.

## Learning engagement

Learning engagement was also assessed in wave 2 during online learning at home. The scale is the Chinese version on student engagement (Lam et al., 2014). There are 10 items answered on a scale ranging from "1=highly unlikely" to "5=highly likely" (e.g., "When I'm studying, I feel mentally strong" and "I can continue for a very long time when I am studying"). The average of the ten items was calculated to indicate the level of children's learning engagement. The higher the average scores were, the greater the learning engagement was. In this sample, the Cronbach's alpha was 0.93.

## Academic performance

Children's standard Chinese, English, and math school grades were obtained from their mothers twice in December 2019 (before COVID-19) and July 2020 (after the children returned to school). The grade range for each subject is from 0 to 120. Standard Z scores for three-subject grades were obtained. A higher score represents higher academic performance.

## SES

Similar to Cheung et al. (2018), family SES was measured using the sum of parental highest education and family monthly income ranging from 1 to 15, with higher scores indicating higher family SES. Parents provided their level of education, which included both mothers' and fathers' highest education according to the following scale: 1=high school and below, 2=junior college or technical secondary school, 3=bachelor's degree, 4=master's degree, and 5=doctoral degree or above. Parents also provided their "family monthly income," which covered both mothers' and fathers' income, according to the following scale: 1=2000 RMB or less, 2=2000–5000 RMB, 3=5000–10,000 RMB, 4=10,000–30,000 RMB, and 5=over 30,000 RMB.

## Procedures

After obtaining informed consent from the parents, we collected parent-reported parental involvement, child-reported parental involvement, and learning engagement in April 2020 online when students were taking online classes at home every day because of COVID-19. We also obtained the students' Chinese, English, and math grades in December 2019 before the epidemic. After the students returned to school, we collected their grades again in July 2020. This study was approved by the research commission of the university and the school.

## Data analysis

First, the means, standard deviations, and correlations among the main variables were computed. Second, the chain mediation model was examined. Previous studies have found that gender, age, and SES affect the main variables (Benner et al., 2016; Midori, 2020). Therefore, gender, age, and SES were controlled for in all subsequent analyses. The grades in wave 1 were collected to control for the initial effects of academic performance on parental involvement and learning engagement (Englund et al., 2004; Halle et al., 1997; Murphey, 1992). Chinese, English, and math scores were standardized prior to the analysis. SPSS 25.0 was used to perform the preliminary and correlation analyses, and PROCESS (model 6) macro software was used for the chain mediation analysis.

## Results

### Descriptive statistics and correlation analysis

The descriptive statistics and correlations among all the observed variables are shown in Table 1. As shown, parent-perceived parental involvement was positively correlated with child-perceived parental involvement and learning engagement. Child-perceived parental involvement was positively correlated with learning engagement. Learning engagement was positively correlated with children's academic performance.

### Chained mediating analyses

With parent-perceived parental involvement as the independent variable, children's Chinese, English, and math academic performances in wave 3 were used as the outcome variables separately, and child-perceived parental involvement and learning engagement were used as the mediators. All were entered into the mediation model. Gender; age; children's Chinese, English, and math grades in Wave 1; and SES were entered as covariates.

As shown in Table 2, (1) parent-perceived parental involvement accounted for unique variance in child-perceived parental involvement and children's learning engagement. Child-perceived parental involvement could significantly explain the variance in [learning engagement](#). These findings were consistent with the hypothesis. (2) Unexpectedly, parent-perceived parental involvement could only negatively predict Chinese performance, but child-perceived parental involvement could only positively explain the variance in Chinese performance. (3) Learning engagement could not predict math academic performance but could predict children's Chinese and English performances, which was also partly consistent with the hypothesis.

As shown in Table 3, the mediating analyses demonstrated that the direct paths from parent-perceived parental involvement to children's math and English academic performances were not statistically significant, but that of Chinese performance was statistically significant. Moreover, the total indirect effect was not significant in the relationship between parent-perceived parental involvement and children's math and English academic performance, but it was significant in children's Chinese performance.

Specifically, for children's Chinese academic performance, all the indirect effects from parent-perceived parental involvement to children's academic performance were significant.

**Table 1** Correlations, means, and standard deviations for the main variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1 Gender	1											
2 Age	-0.09	1										
3 SES	-0.02	-0.02	1									
4 Math (W1)	0.01	-0.09	0.26**	1								
5 Chinese (W1)	0.14**	-0.10	0.20**	0.68**	1							
6 English (W1)	0.23**	-0.09	0.29**	0.58**	0.62**	1						
7 PPI	-0.03	-0.06	0.20**	0.08	0.14*	0.17**	1					
8 CPI	-0.01	0.04	0.14*	0.04	0.16*	0.13**	0.65**	1				
9 Learning Engagement	0.20**	0.15**	0.05	0.14*	0.26**	0.19**	0.36**	0.36**	1			
10 Math (W3)	0.06	-0.11	0.31**	0.71**	0.53**	0.54**	0.08	0.06	0.13*	1		
11 Chinese (W3)	0.26**	0.05	0.18**	0.49**	0.56**	0.51**	0.07	0.17**	0.28**	0.67**	1	
12 English (W3)	0.22**	-0.08	0.35**	0.49**	0.53**	0.72**	0.17*	0.14*	0.26**	0.69**	0.62**	1
Mean	0.54	10.53	5.80	79.14	76.692	85.68	3.62	3.70	3.80	82.74	84.84	82.54
SD	0.5	0.978	1.81	14.18	12.27	11.94	0.72	0.76	0.87	23.39	13.08	17.30
Min	0	6	3	33	34	50	1.52	1.04	1.00	12.7	39.5	34
Max	1	13	13	116	115	117	5.00	5.00	5.00	39.5	108	110

*N* = 253. Gender: 0 = female and 1 = male. W1 = wave 1, W2 = wave 2, and W3 = Wave 3. *SD* standard deviation, *PPI* parent-perceived parental involvement, and *CPI* child-perceived parental involvement  
 \*\* *p* < 0.01 and \* *p* < 0.05



**Table 2** Path analysis results

	Math		Chinese		English	
	$\beta$	SE	$\beta$	SE	$\beta$	SE
PPI on CPI	0.67***	0.05	0.67***	0.05	0.67***	0.05
PPI on learning engagement	0.31***	0.09	0.31***	0.09	0.31***	0.09
PPI on academic performance	-0.05	0.09	-0.19*	0.09	-0.01	0.08
CPI on learning engagement	0.19*	0.08	0.19*	0.08	0.19*	0.08
CPI on academic performance	0.01	0.08	0.18*	0.09	-0.01	0.07
Learning engagement on academic performance	0.03	0.08	0.12 <sup>+</sup>	0.07	0.13*	0.06

PPI parent-perceived parental involvement and CPI child-perceived parental involvement

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , and <sup>+</sup> $p = 0.06$

**Table 3** Mediating effects of child-perceived parental involvement and learning engagement

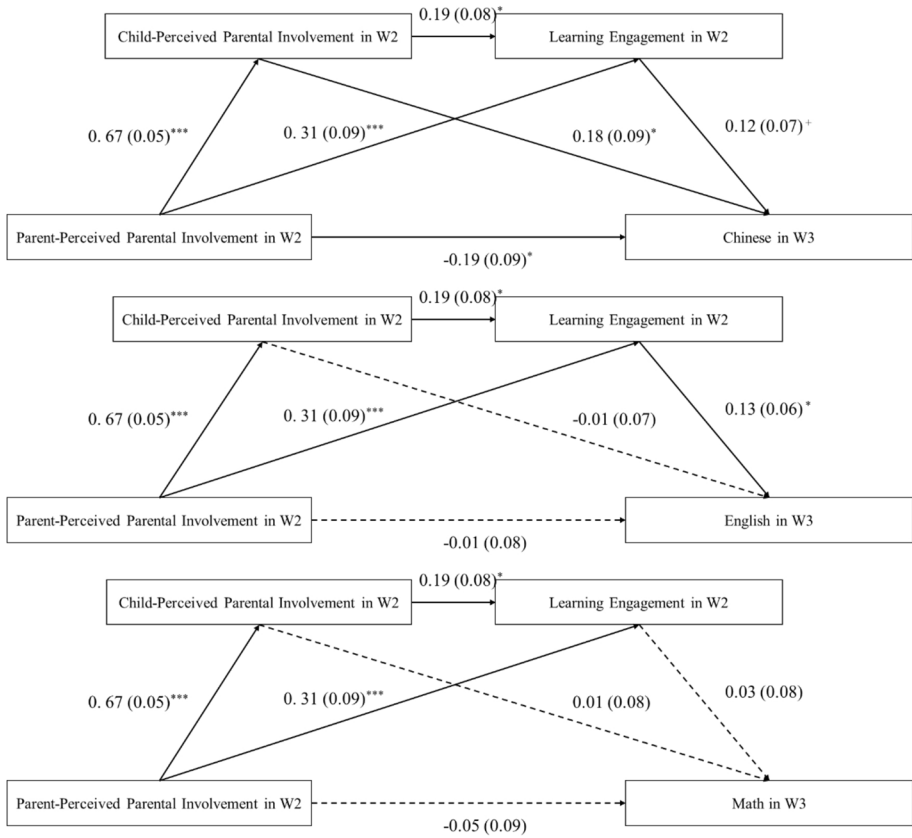
	Math		Chinese		English	
	Effect	95% boot CI	Effect	95% boot CI	Effect	95% boot CI
1. Direct effect	-0.05	[-0.21, 0.12]	-0.19	[-0.38, -0.01]	-0.01	[-0.17, 0.15]
2. Indirect effect 1	0.01	[-0.11, 0.12]	0.12	[0.004, 0.26]	-0.01	[-0.13, 0.09]
3. Indirect effect 2	0.003	[-0.01, 0.03]	0.15	[0.001, 0.05]	0.02	[0.002, 0.05]
4. Indirect effect 3	0.01	[-0.03, 0.05]	0.38	[0.01, 0.11]	0.04	[0.01, 0.11]
5. Total indirect effect	0.02	[-0.08, 0.14]	0.18	[0.06, 0.32]	0.05	[-0.06, 0.18]
6. Total effect	-0.02	[-0.15, 0.10]	-0.02	[-0.16, 0.12]	0.04	[-0.07, 0.16]

Indirect effect 1: parent-perceived parental involvement → child-perceived parental involvement → academic performance

Indirect effect 2: parent-perceived parental involvement → child-perceived parental involvement → learning engagement → academic performance

Indirect effect 3: parent-perceived parental involvement → learning engagement → academic performance

For children’s English academic performance, the indirect effect of PPI → CPI → learning engagement → academic performance was significant. The indirect effect of PPI → learning engagement → academic performance was also significant. However, the indirect effect of PPI → CPI → academic performance was not significant. For children’s math academic performance, all the indirect effects from parent-perceived parental involvement to children’s academic performance were not significant. All these results indicated that parental perceived parental involvement indirectly impacted Chinese and English performance but not math performance through children’s perceived parental involvement and children’s learning engagement. The final models for different subjects are shown in Fig. 2.



**Fig. 2** Mediating analyses showing the direct and indirect paths from parent-perceived parental involvement to children’s academic performance through child-perceived parental involvement and learning engagement. *Note:* Gender, age, SES, Chinese, English, and math at W1 were considered covariates. The solid lines represent significant paths, and the dashed lines represent insignificant paths. \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , and <sup>+</sup> $p = 0.06$

## Discussion

Using a three-wave longitudinal design, we investigated the relationships among parental involvement, children’s learning engagement, and academic performance and tested a model of whether children’s learning engagement is a mediator between parental involvement and children’s academic performance during COVID-19. The findings of this research showed that after controlling for gender, age, and SES, parental involvement perceived by parents can be directly and positively related to children’s learning engagement, and it will also indirectly influence children’s learning engagement through the children’s perceived parental involvement. Learning engagement is a mediator of the relationship between parental involvement and children’s academic performance. Parental involvement significantly predicted children’s Chinese and English performance through their learning engagement, while parental involvement failed to predict children’s mathematics performance during the COVID-19 pandemic. The current research

provides insights into the underlying mechanisms of parental involvement affecting children's academic performance during school closures.

### **Impact of parents' involvement in online learning on students' academic performance**

Consistent with our hypothesis, in the epidemic, parental involvement has a positive effect on children's academic performance through engagement. Although some studies have shown that due to pressures on life and work caused by the epidemic, parents' negative emotions and behaviors have adverse effects on children (Brown et al., 2020); the duration of such negative effects is not yet known. As the students stayed at home for the entire semester, their interaction time with their parents increased significantly compared with the previous period. Although there were conflicts between parents and children in the early stage, both parents and children adjusted their way of interacting over time, adapted to the new learning model, and formed a good balance.

### **Different mediation effects on different subjects**

The current study found that in the online learning of Chinese primary school students at home, the positive impact of parental involvement through learning engagement on academic performance is significant in the two subjects of Chinese and English but not significant in math. The findings can be explained from three aspects. First, they might be due to the influence of personal characteristics. With more learning engagement or a better learning environment (for example, more books or English movies), children are more likely to perform better in language learning. However, for math learning, the influence of personal cognitive factors (such as working memory and spatial visualization) is especially important (Bailey et al., 2014; Raghubar et al., 2010; Sherman, 1979), and these are more difficult to change. For example, meta-analysis results suggest that working memory training is ineffective at enhancing typically developing children's math skills (Sala & Gobet, 2017). Thus, it might be more difficult for parents to improve their children's math performance than their language performance. Second, it is easier for parents to tutor their children in language homework than in math homework. In online learning, parents must take on more homework tutoring. In the subjects of Chinese and English, parents are relatively familiar with the learning content and can quickly correct mistakes in their children's homework (such as checking whether the children's dictated poems are correct and whether English words are spelled correctly). However, in math learning, children need to understand more sophisticated skills and methods. The teaching methods used by parents may differ from those used by children's teachers (Shanley, 2016). Thus, parents may encounter difficulties when trying to assist their children in math learning. Finally, language practice in daily life is more common than math practice. For Chinese learning, it is more convenient for parents to use life scenarios to practice their own knowledge and test their children (e.g., parents and children read a book together), but the content of mathematics learning is more complicated and difficult to apply in real life (e.g., A bathtub with a capacity of 200L is filled with 500 ml of water per minute and 200 ml of water flows out. How long does it take for the bathtub to be filled with water?). Parents may feel unsure about their own understanding of and ability with current math knowledge and concepts (Warren & Young, 2002). In our pilot survey, we found that parents found it difficult to enhance children's logical abilities to solve mathematical problems, and these parents rarely let their children

practice calculations through life scenes. In terms of daily language training, however, parents can buy interesting materials for their children to read, and parents can accompany their children to watch English movies. Studies on left-behind children in rural China also show that parental monitoring and care for children have positive effects on children's educational performance, especially on language learning (Hu, 2013; Hu et al., 2020).

### **Consistency between parent-perceived and children-perceived parental involvement**

This study found that there was a strong consistency between parent-perceived parental involvement and child-perceived parental involvement. The finding was in contrast with that from Western countries, where parent-perceived parental involvement was not always felt similarly by their children (Hou et al., 2020; Kim, 2020). Under the collectivism of China, parent-child relationships are very close and they pay more attention with each other than in western culture, where freedom and openness are more important. Therefore, a high level of parental involvement may be a burden for Western children, while it is an important source of attachment, and can always be perceived by Chinese children. For example, Xie and Goyette (2003) have found that Chinese students are more aware of their parents' hopes than American students; they are more willing to meet their parents' expectations, especially their parents' expectations of their academic achievements. Chao (1994, 2000) found that compared with European American children, Asian students have lower negative responses to high-level parental control and involvement in parenting because they consider such a parenting style as an expression of care and love.

### **Limitations and future directions**

There are some limitations of this study. First, evaluating parental involvement from the perspective of teachers might be necessary (Grolnick & Slowiaczek, 1994). Although most of the students' classes were online classes during the COVID-19 period, teachers' evaluation of parents' participation in education and teaching was still particularly important. Future research can comprehensively compare the impact of parent involvement on students' academic performance from different angles (students, parents, teachers) to better facilitate communication between students and parents, home, and school. Second, it is necessary to comprehensively examine the impact of parental involvement with different dimensions on children's academic performance (Chowa et al., 2013; Sabater, 2018). For example, future research can explore the impact of personal involvement, cognitive or intellectual involvement, and behavioral involvement on students' emotional and behavioral learning engagement (Núñez et al., 2021). Finally, future intervention studies can explore how to promote parental involvement and make use of parental care to promote children's learning engagement and frequent academic activities.

### **Implications**

With the exploration of the reasons for children's achievement, researchers have gradually shifted from focusing on school factors to focusing on family factors. Most studies on parental involvement are concentrated in Western countries. For example, the "No Child Left Behind"

policy in the USA proposes that parental involvement is essential to the success of students in school. Research on the impact of parental involvement on children's academic performance has only gradually increased in East Asian groups in the last nine years (Kim, 2020). In the past, Chinese parents who paid special attention to education did not hesitate to pay high prices for their children to receive after-school tutoring in various subjects, resulting in many students spending most of their time in school and tutoring institutions. The Chinese government has recently promulgated a series of policies restricting students' burden of homework and tutoring (The General Office of CPC Central Committee & the General Office of State Council 2021). In the absence of after-school tutoring agencies, parental involvement, which has been proven to have an important impact on students' academic development in this study, will play a more important role. Meanwhile, parents also need to explore the guidance methods for different disciplines, such as paying attention to daily training for language subjects and consulting special teachers for subjects requiring certain methods and logic, such as mathematics.

In addition, the epidemic has had a great impact on the mental health and academic performance of students of all ages (Chaturvedi et al., 2021). Ecological systems theory (Bronfenbrenner, 1986) states that the growth of individuals occurs at different levels of ecosystems. If the effect of family microsystems on children is positive, the protective effect of parents' involvement will also affect children's behaviors. This study shows that effective guidance from parents to educate children is necessary in this uncertain situation. After COVID-19, we may face a trend of combining online and offline teaching in the future (Beijing Review, 2020) and children growing up in a digital world. Therefore, this research also hopes to guide parents and schools to consider how to cooperate in digital education to provide children with more effective guidance.

**Funding** This study was funded by the National Natural Science Foundation of China (32000757) to Xiujie Yang, the Science Foundation for the Excellent Youth Scholars from Faculty of Psychology, Beijing Normal University (2019004) to Xiujie Yang, COVID-19 Psychological Support Program from Tencent-Mercedes-Benz Foundation, Beijing Normal University Education Foundation (600187) to Xiujie Yang, the National Natural Science Foundation of China (32171061) to Yinghe Chen.

**Data availability** The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

#### Declarations

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us. We further confirm that any aspect of the work covered in this manuscript that has involved either experimental animals or human patients has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

**Informed consent** All subjects gave written informed consent in accordance with the Declaration of Helsinki. Within our ethics statement, the consent obtained from the parents of all research participants was both informed and written by the ethics committee of Faculty of Psychology, Beijing Normal University.

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