

Barriers and benefits of primary caregivers' involvement in children's education during COVID-19 school closures

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ABSTRACT

School closures during the COVID-19 pandemic have forced many children around the world to spend unprecedented amounts of time at home, and the responsibility for educating children, especially young ones, has largely fallen to parents and caregivers. Using a sample of 764 households with preschool children in Wuhan, China, where the pandemic started, this study examined the impact of the pandemic on primary caregivers' involvement in their children's education at home, and the barriers and benefits of such involvement for preschool children's learning and well-being. The results showed that primary caregivers were generally less involved in their children's education at home during the pandemic than they were prior to it. Having younger children, a lower socioeconomic status (i.e., parents' lower levels of education and less prestigious occupations), poorer physical health, and higher levels of household chaos were associated with lower frequencies of home-based involvement exhibited by caregivers. Finally, caregivers' home-based involvement during the pandemic was beneficial to preschool children's learning behavior and emotional health. The findings highlight the importance of understanding the barriers and benefits of caregivers' home-based involvement for designing interventions and policies to mitigate the negative impact of the pandemic on children and their families.

1. Introduction

According to UNESCO [1], over 190 countries have implemented nationwide school closures due to coronavirus disease 2019 (COVID-19), affecting at least 90% (1.57 billion) of students worldwide. Consequently, many children around the world have been spending unprecedented amounts of time at home [2], and many caregivers are facing the challenge of educating their children [3]. There is evidence showing that interruptions in formal schooling, including COVID-19 school closures, can cause adverse consequences on children's learning and well-being [4,5]. Such evidence highlights the importance of finding alternatives to formal education, such as home schooling, in mitigating the negative impact of COVID-19 on children's education. Since the start of the pandemic, a few studies have described the patterns of caregivers' involvement in their children's education during the pandemic [6–8]. Yet little is known about whether such involvement has been beneficial to children's learning and well-being. Based on a sample of 764 households with preschool children in Wuhan, China, where the COVID-19 pandemic started, this study addressed three research questions: (1) Did the pandemic lead primary caregivers to increase or

decrease their involvement in their children's education at home? (2) Which familial characteristics were potential barriers to caregivers' home-based involvement amid the pandemic? (3) Did such involvement enhance the learning behavior and emotional health of preschool children?

1.1. Caregivers' involvement in children's education during the pandemic

Having to stay home during the pandemic has disrupted the learning and education of many children [1]. This has been especially true for preschool children, who typically do not have strong self-care or self-regulatory abilities and whose learning requires frequent support from their caregivers [9]. There has been a growing awareness that caregivers' involvement may be more critical to facilitating children's learning and well-being during the pandemic than it was prior to it [10, 11].

Increased awareness of the importance of caregivers' involvement has raised questions about how they have been engaged in their children's education during the pandemic. One way to conceptualize caregiver involvement is Fantuzzo's multidimensional model of family

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involvement [12,13]. This model understands caregiver involvement to have three distinct dimensions: (1) *school-based involvement* (activities in which caregivers engage at school, such as volunteering in the child's classroom and planning or participating in school trips); (2) *home-based involvement* (the creation of learning opportunities at home and in the community, such as engaging in reading and educational activities and visiting museums and libraries); and (3) *home-school communication* (communication between caregivers and school personnel, such as talking to teachers about the child's behavior or performance at school). These three dimensions generally coincide with other influential multidimensional models of caregiver involvement, such as Epstein's [14].

Although this multidimensional conceptualization has been the basis for much of the research on caregiver involvement [15,16], it should not be treated as a straightforward account of the ways caregivers have been involved with their children during the pandemic. The containment measures implemented by many countries against COVID-19, such as social distancing and school closures, have led to the cancellation or suspension of many school-related activities, such as school trips and parents' volunteer activities [17,18]. School closures have also largely reduced or even eliminated caregivers' opportunities to meet with school staff and have limited their communication with teachers [19,20]. In the city of Wuhan, for example, people endured 76 days of stringent lockdown during which nearly no-one was allowed to leave their home [21]. Consequently, it was almost impossible during this time for caregivers to participate in school-related activities or meet with their children's teachers. In this study, therefore, we focused on caregivers' home-based involvement.

One purpose of this study is to examine how the pandemic affected caregivers' home-based involvement in their children's education. There are at least two competing hypotheses regarding this question. One is that caregivers may have spent more time educating their children during the pandemic than they did prior to it, possibly because home quarantine and work-from-home arrangements gave them more time at home with their children. According to the OECD Rapid Response Report [11], more than 65% of the world's educators believed that the pandemic had strengthened caregiver involvement. Moreover, in a recent survey of 3645 parents and guardians in the United States, 67% of the respondents reported feeling more connected with their child's day-to-day education during the pandemic than ever before [10]. An alternate hypothesis is that the pandemic may have led caregivers to decrease their involvement in children's education, possibly because it disrupted their pre-crisis ways of life [22,23], and may have led to health and economic emergencies within some families [24,25]. For example, work-from-home arrangements might have disrupted caregivers' daily routines, such as rising times and bed times, making it harder to keep a regular routine for their children [26,27]. Moreover, having to address health and economic emergencies may have placed increased competing demands on caregivers' time and energy and constrained the amount of time spent on children's education [28]. We discuss this further in the next section.

1.2. Barriers to caregivers' home-based involvement during the pandemic

Although little is known about whether the COVID-19 pandemic specifically has hindered or strengthened caregivers' involvement, researchers have identified a wide range of barriers to caregiver involvement in normal non-crisis situations. Hornby and Lafaele [29] categorized the various barriers into four: individual caregiver and family factors, child factors, caregiver-teacher factors, and societal factors. Although it is theoretically important to examine whether certain types of barriers relate differentially to caregivers' home-based involvement, in this study, we focused on barriers related to caregivers and families. According to Hornby and Lafaele [29], family circumstances are major barriers to caregiver involvement. A better understanding of family circumstances can inform efforts to make

family-based interventions more effective. In relation to this, the second purpose of this study was to examine potential familial barriers to caregivers' home-based involvement during the pandemic.

In the literature, single parenthood [12,30], a lower family socioeconomic status (lower levels of parental education, occupation, and family income; [13,31], and larger family sizes [13] have been found to hinder caregivers' home-based involvement. These three barriers are often referred to collectively as caregivers' life contexts [29], and may reflect insufficient or diluted family resources (e.g., economic and educational resources) that impede caregivers' adequate levels of involvement [32]. Single parenthood and large family sizes are also characteristics of family structures that can lead caregivers' time and attention to be diverted away from a particular child [33].

As discussed above, the pandemic itself may also have hindered caregivers' involvement in their children's education. We argue here that family members' physical health, economic instability, and household chaos resulting from the pandemic may have counted among the potential family barriers to caregivers' involvement. First, on top of managing jobs and chores, caregivers have needed to look after their own and other family members' physical well-being. The demands on caregivers' time and energy to care for sick family members, such as those infected with the coronavirus, may have resulted in caregivers' having little available time for educating their children. In the literature, Eccles and Harold [34] have found that parents with poor physical health have difficulties engaging in their children's education at home. Second, many people have lost their jobs or experienced diminished income due to the lockdowns. Among families affected in this way, caregivers may not have been able to purchase learning materials for their children. Income instability may also have impeded positive parenting practices and limited the amount of attention, time, and supervision that caregivers could give to their children [35,36]. Third, caregivers working from home may have struggled to balance their multiple responsibilities (e.g., managing their jobs, chores, and child-care; [37]. Having young children at home may have led to more noise or disorder in the home, as caregivers likely would have found it difficult to keep their children independently occupied. Such chaos and confusion in the household may have led to unfinished work, and, in turn, increased employment demands on caregivers' time and energy, thereby leaving them with little available time to educate their children. In the literature, household chaos has been found to predict caregivers' decreased levels of involvement in their young children's learning, such as learning to read [38].

1.3. Benefits of caregivers' home-based involvement

The third purpose of this study was to examine whether caregivers' home-based involvement during the pandemic was beneficial to their preschool-aged children's learning behavior and emotional health. There has been substantial literature on the benefits of caregivers' involvement to the learning and well-being of children in non-crisis situations across developmental phases ranging from preschool to high school (for a recent meta-analysis, see Ref. [39]). Many studies have also shown that home-based involvement is more predictive of child outcomes than school-based involvement and home-school communication [40–44]; for a recent meta-analysis, see Ref. [45]. During the pandemic, school closures have largely restricted children's opportunities for classroom interactions that facilitate positive learning behavior. Moreover, the pandemic has triggered negative emotions such as fear and anxiety in many children. In a cross-sectional survey of households with children in the United States, 46.5% of which had children under 10 years old, 45.6% of caregivers reported observing signs of emotional distress in their children after being quarantined [46]. It is thus vital to find ways to mitigate the negative impact that the pandemic and its containment measures may have on children's learning and well-being.

Caregivers' home-based involvement has been considered to be critically important, because it often facilitates children's learning

through practice, instruction, scaffolding, and the provision of cognitively stimulating environments [39]. Many studies have examined the relation between caregiver involvement and children's learning behavior (e.g., academic motivation [41,47]; and learning outcomes (e.g., academic achievement; [42,48]. Focusing on early childhood and early elementary school years, a meta-analysis by Ma et al. [45] revealed a strong and positive correlation between caregivers' home-based involvement and young children's academic achievement. In a meta-analysis by Barger et al. [39]; learning behavior such as academic motivation had a stronger correlation with caregivers' home-based involvement than did other aspects of child adjustment (e.g., academic achievement). However, studies of caregiver involvement with preschool children have focused mainly on how caregiver involvement benefits academic achievement (see Ref. [45] for a meta-analysis). Recently, evidence has emerged linking caregivers' involvement to preschool children's learning behavior [41]. Using a sample of children attending Early Head Start programs, Jeon et al. [49] found that children living in families with high levels of home-based involvement across ages 2–3 years showed significantly higher levels of engagement and orientation (i.e., positive affect and interest) than their peers living in families with low levels of home-based involvement. Moreover, Hayes et al. [50] showed that caregiver involvement in shared reading and home activities at age 2 years predicted children's positive learning behavior at age 6 years.

Caregiver involvement also provides an important context for children's socioemotional development [39]. Caregivers' involvement often reflects their care for their children, which enhances positive caregiver–child relationships. According to attachment theory [51,52], children who have positive relationships with their caregivers are likely to see themselves as worthy of love, which may protect them from developing emotional problems. The extant research has documented the benefits of caregiver involvement for the emotional adjustment of primary and middle school children [47,53]. Less attention has been devoted to the benefits of caregiver involvement for preschool children's emotional adjustment. Nevertheless, Sheridan et al. [54] found that children of caregivers who became highly involved in their children's education by participating in an intervention program called Getting Ready, exhibited lower levels of anxiety than their counterparts in the control group.

1.4. The present study

The present study was carried out in Wuhan, China. Cross-cultural research showed that parents who lived in China or were of Chinese origin were generally more involved in educating their children at home than their non-Asian American counterparts were [55,56]. The city of Wuhan was chosen as the study site, because it is where the COVID-19 pandemic started, and its residents endured among the strictest quarantine restrictions all over the world. At the start of the pandemic, people knew little about how contagious and dangerous COVID-19 was [57]. The harsh quarantine restrictions in Wuhan, such as the 76 days of strict lockdown, when almost everyone was prohibited from leaving their residences [21], may have pushed many families into health, economic, and social crises. These conditions might have seriously challenged the functioning of individuals and families. By recruiting households in Wuhan with preschool children, we aimed to understand the impact of the pandemic on caregivers' home-based involvement, and the barriers and benefits of such involvement for preschool children's learning and emotional well-being. We did not make specific predictions regarding the impact of the pandemic on home-based involvement due to the lack of conclusive evidence from previous studies regarding this topic. We hypothesized that single parenthood (see Refs. [12,30], a low family socioeconomic status (see Refs. [13,31], a large family size (see Ref. [13], the poor physical health of the family (see Ref. [34], income loss (see Refs. [35,36], and household chaos (see Ref. [38] would be potential barriers to caregivers' home-based involvement. We also

expected higher levels of home-based involvement to be associated with more positive learning behavior (see Refs. [41,49,50] and fewer symptoms of emotional distress in preschool children (see Ref. [54].

This study contributes to theories of family involvement in crisis situations. In previous studies, family involvement has been studied with respect to normal non-crisis situations. Crisis situations such as a pandemic differ from normal ones in that they can be life-altering, due, for example, to the serious illness or hospitalization of a family member, the death of a family member, loss of employment, or financial hardship. As such, crisis situations might involve a breakdown or disruption in the functioning of individuals and families, and may trigger extreme tension and stress. Studying the period of the COVID-19 pandemic extends the work of previous researchers by assessing how family involvement is affected by a public health crisis that imposes multiple challenges on families' physical and economic health.

2. Method

2.1. Participants and procedure

The participants of the study were the primary caregivers of 764 preschool children recruited from nine preschools in the city of Wuhan, China. Using the typical case sampling method, which is a purposive sampling technique, we initially contacted the principals of 22 preschools located across the "Three Towns of Wuhan" (Wuchang, Hanyang, and Hankou), and nine agreed to participate. The typical case sampling method is appropriate for this study, because it is an exploratory sampling strategy that can be used to identify the typical cases of preschool children and their caregivers in Wuhan. One major merit of this method is that it permits easier generalizations about the sample compared to random sampling, which was almost an impossible mission during the pandemic [58]. The typical case sampling method requires researchers' prior knowledge of the sample; to meet this requirement, three researchers in the research team, who were professors of early childhood in three different universities in Wuhan and thus knew local preschools and residents very well, were responsible for recruiting preschools. When recruiting preschools, we considered the major attributes of the preschool programs (i.e., public vs. private, school size) and the city population (i.e., income, education). According to Wuhan Statistical Bureau [59]; the sample was generally representative of the population of Wuhan in terms of household income (see Table 1).

Data were collected in June and July 2020. This was the period during which Wuhan was gradually being opened up after the 76-day strict lockdown, but all schools remained closed and children remained out of school. A total of 1200 consent forms and questionnaires were mailed to the nine principals, who then distributed them to all the children in all three groupings in their schools. In Chinese preschools, children are generally grouped by age. Three groupings are rather prevalent: junior class (3-year-olds; first-year preschoolers), middle class (4-year-olds; second-year preschoolers), and senior class (5-year-olds; third-year preschoolers). The principals temporarily opened their schools to allow caregivers to participate in the study. In two preschools, children's primary caregivers were asked to complete the consent forms and questionnaires at the school within 1 h. In the other seven preschools, primary caregivers were asked to pick up consent forms and questionnaires from the school, fill them out at home, and then return the completed questionnaires to the school. Of the 790 questionnaires returned, 26 were invalid. The Human Research Ethics Committee of the author's university approved the data collection procedures.

Most of the participants were the children's mothers ($n = 517$), followed by fathers ($n = 198$), grandparents ($n = 20$), and other relatives ($n = 5$); the remaining participants ($n = 24$) did not indicate their relationship to the child. Table 1 presents the demographics of the sample.

Table 1
Demographics of the sample participants.

Variable	M (SD) %	
<i>Child characteristics</i>		
Age (months)	59.07 (12.28)	
Year of study in kindergarten		
First year (junior class)	40.6%	
Second year (middle class)	25.8%	
Third year (senior class)	33.6%	
Sex (numeric code)		
Boy (1)	52.7%	
Girl (0)	47.3%	
<i>Family characteristics</i>		
Marital status (numeric code; n = 749)		
Couple (0)	95.2%	
Single (1)	2.9%	
Annual income in 2019 (numeric code; n = 575)		
<10,000 RMB or \$1429 (1)	3.7%	
10,000–19,999 RMB or \$2858 (2)	3.9%	
20,000–29,999 RMB or \$4287 (3)	2.2%	
30,000–39,999 RMB or \$ 5716 (4)	3.3%	
40,000–49,999 RMB or \$7145 (5)	2.7%	
50,000–59,999 RMB or \$8574 (6)	3.8%	
60,000–69,999 RMB or \$10,003 (7)	3.0%	
70,000–79,999 RMB or \$11,432 (8)	3.1%	
80,000–89,999 RMB or \$12,862 (9)	3.4%	
90,000–99,999 RMB or \$ 14,290 (10)	5.6%	
100,000–109,999 RMB or \$15,719 (11)	8.0%	
110,000–119,999 RMB or \$17,148 (12)	2.7%	
120,000–129,999 RMB or \$18,577 (13)	5.2%	
130,000–139,999 RMB or \$20,006 (14)	1.3%	
140,000–149,999 RMB or \$21,435 (15)	1.8%	
150,000–159,999 RMB or \$22,864 (16)	2.5%	
160,000–169,999 RMB or \$24,293 (17)	1.2%	
170,000–179,999 RMB or \$25,722 (18)	0.8%	
180,000–189,999 RMB or \$27,151 (19)	1.2%	
190,000–199,999 RMB or \$ 28,580 (20)	4.2%	
≥200,000 RMB or \$30,009 (21)	11.4%	
Parental education (numeric code)	Mothers (n = 736)	Fathers (n = 705)
Elementary school or below (1)	1.6%	0.8%
Middle school (2)	13.9%	11.4%
High school or vocational school degree (3)	22.6%	21.5%
Associate degree (4)	29.8%	29.1%
Bachelor's degree (5)	26.7%	26.6%
Master's degree (6)	1.7%	3.1%
Doctoral degree (7)	0%	0.1%
Parental occupation (numeric code)	Mothers (n = 721)	Fathers (n = 679)
Unemployed, nontechical worker, farmer (1)	30.0%	6.4%
Semitechnical worker, self-employed small business owner: e.g., construction worker (2)	16.1%	25.3%
Technical worker or semiprofessional: e.g., driver (3)	30.4%	31.9%
Professional or officer: e.g., doctor, teacher, technician (4)	15.8%	15.7%
High-level professional or administrator: e.g., manager (5)	2.1%	9.6%

2.2. Measures

2.2.1. Caregivers' home-based involvement in children's education

Primary caregivers were asked to rate the frequency of their involvement in their children's education from the start of the pandemic (January 20, 2020) using 13 items taken from the home-based involvement subscales of the Family Involvement Questionnaire for Early Childhood (FIQ-EC [12]; and the Family Involvement Questionnaire-Elementary (FIQ-E; [13]). They also retrospectively reported the frequency of their involvement prior to the start of the pandemic using the same 13 items. The original home-based involvement subscale of the FIQ-EC contains 13 items; three of these were determined not to be suitable for use at the time of the study, when containment measures such as social distancing and school and nonessential business closures had been imposed ("I take my child places in the community to learn

special things [i.e., zoo, museum]"; "I praise my child for school work in front of the teacher"; "I talk about my child's learning efforts in front of relatives"). The remaining 10 items were used in this study, but two items were changed slightly (the wording "school work" was changed to "school work or learning tasks," as some schools might not have assigned learning tasks for children during the pandemic, whereas caregivers might have done so). We also took three items from the home-based involvement subscale of the FIQ-E that were determined to be suitable for this study ("I give my child chores at home"; "I read with my child"; "I limit TV and video watching"). All 13 items were rated on a 4-point Likert scale (1 = *rarely*, 2 = *sometimes*, 3 = *often*, and 4 = *always*) for each of the two time frames (i.e., prior to and during the pandemic). Exploratory factor analysis with principal axis factoring showed that all of the items loaded strongly on one factor under each time frame, with all factor loadings greater than 0.37 prior to the pandemic and greater than 0.39 during the pandemic. Composite scores were calculated separately for caregiver involvement prior to the pandemic ($\alpha = 0.90$) and during the pandemic ($\alpha = 0.90$). Higher scores indicated higher frequencies of caregiver involvement.

2.2.2. Children's learning behavior

Primary caregivers rated the learning behavior of their child with respect to the previous month using the Chinese version of the Caregiver-report Young Children's Approaches to Learning Scale—Short Form [60] on a 4-point Likert scale (1 = *almost never*, 2 = *sometimes*, 3 = *often*, and 4 = *very often*). The scale contains six items (e.g., "takes the initiative to approach new things") measuring persistence and attentiveness, curiosity and eagerness to learn, initiative, imagination and creativity, and reflection and explanation. Composite scores were calculated. Cronbach's α was 0.81. Higher scores indicated more positive learning behavior.

2.2.3. Children's emotional distress

Primary caregivers rated the emotional distress of their child with respect to the previous month using the Chinese version of the Pediatric Emotional Distress Scale (PEDS): A Brief Screening Measure for Young Children Exposed to Traumatic Events [61]. The PEDS contains 21 items rated on a 4-point Likert scale (1 = *almost never*, 2 = *sometimes*, 3 = *often*, and 4 = *very often*). It measures four symptoms of emotional distress, namely anxiety/withdrawal (seven items; e.g., "seems sad and withdrawn;" $\alpha = 0.74$), fearfulness (five items; e.g., "seems worried;" $\alpha = 0.65$), acting out (six items; "has temper tantrums;" $\alpha = 0.71$), and trauma (four items; e.g., "creates games, stories or pictures about;" $\alpha = 0.61$). We inserted the phrase "the COVID-19 pandemic" into the blank space originally shown on the trauma subscale. Composite scores were calculated for each subscale. Higher scores indicated more symptoms of emotional distress.

2.2.4. Physical health of the family

Primary caregivers rated their own physical health status and that of their child using two items ("Since January 20, 2020 [the start of the pandemic], how would you rate your overall physical health?" and "Since January 20, 2020, how would you rate your child's overall physical health?") on a 5-point Likert scale (1 = *poor*, 2 = *fair*, 3 = *good*, 4 = *very good*, and 5 = *excellent*). Composite scores were calculated as an indicator of the physical health of the family. Cronbach's α was 0.91. Higher scores indicated better physical health.

2.2.5. Economic stability

Primary caregivers rated their household economic stability using one item ("How has your monthly household income changed since the start of the pandemic [January 20, 2020]?") on a 4-point Likert scale (1 = *decreased a lot*, 2 = *decreased a little*, 3 = *stayed the same*, 4 = *increased a little*, and 5 = *increased a lot*).

2.2.6. Household chaos

Primary caregivers rated the chaos and confusion in their families from the start of the pandemic (January 20, 2020) using the Chinese version of the Confusion, Hubbub, and Order Scale (CHAOS)—Short Form [62]. The Chinese version contained five items (e.g., “It’s a real zoo in our home.”) rated on a five-point Likert scale (1 = *definitely untrue*, 2 = *somewhat untrue*, 3 = *neutral*, 4 = *somewhat true*, and 5 = *definitely true*). It differed from the English version in that one item (“Usually a television is turned on somewhere in our home”) was removed due to its low factor loading. Cronbach’s α was 0.70. Composite scores were calculated. Higher scores indicated higher levels of household chaos.

2.2.7. Demographic variables

Primary caregivers reported their child’s birth date and sex, their own marital status, the number of people living in the household, their annual family income in 2019, and the education level and occupation of the child’s mother and father (see Table 1 for the numeric codes of these variables). Because strong correlations were observed between paternal and maternal education ($r = 0.73$, $p < .001$) and between paternal and maternal occupation ($r = 0.47$, $p < .001$), the highest education level and the most prestigious occupation in the household were

used as the indicators of education and occupation, respectively. This decision also allowed for the use of data on education and occupation for almost all family structures, thereby reducing the amount of missing data.

3. Results

Table 2 presents the descriptive statistics of and inter-correlations among the study variables. As shown in Table 2, caregivers’ home-based involvement during the pandemic correlated positively with children’s learning behavior and negatively with children’s symptoms of anxiety/withdrawal, fearfulness, and acting out. Involvement during the pandemic also correlated positively with parental education, parental occupation, household income in 2019, and family’s physical health, and negatively with household chaos. The pattern of correlations for caregivers’ involvement prior to the pandemic was the same as that for involvement during the pandemic, with only two exceptions: involvement prior to the pandemic had a nonsignificant correlation with children’s symptoms of acting out and a significant correlation with changes in household income during the pandemic.

To examine whether the pandemic made primary caregivers increase or decrease their involvement in their children’s education, we

Table 2
Means and standard deviations of and inter-correlations among the study variables.

Variables	<i>M (SD)</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Caregiver involvement before the pandemic	37.27 (7.60)	–																
2. Caregiver involvement during the pandemic	36.72 (7.82)	.81	–															
3. Child’s anxiety/withdrawal	9.68 (2.52)	–.14	–.19	–														
4. Child’s fearfulness	8.82 (2.33)	–.11	–.17	.55	–													
5. Child’s acting out	11.06 (2.46)	–.07	–.13	.50	.51	–												
6. Child’s COVID-19 related trauma	6.80 (1.72)	.04	.01	.38	.23	.30	–											
7. Child’s learning behavior	14.27 (2.97)	.33	.29	–.02	.01	.10	.20	–										
8. Child’s age in months	59.07 (12.28)	.01	.03	.00	–.13	–.02	.05	–.01	–									
9. Child’s sex	.53 (.50)	–.08	–.07	.04	–.01	.02	.04	–.06	.05	–								
10. Caregiver’s marital status	.03 (.17)	.02	–.02	.06	.03	.08	–.02	.02	.05	–.03	–							
11. Number of people in the home	4.87 (1.75)	–.04	–.05	.06	–.05	–.01	–.03	–.02	.11	.06	–.14	–						
12. Parental education	4.03 (1.09)	.24	.17	–.11	.06	.04	–.02	.13	–.27	–.13	.05	–.16	–					
13. Parental occupation	3.06 (1.09)	.22	.16	–.12	.01	–.05	–.03	.09	–.16	–.06	–.04	–.06	.49	–				
14. Annual household income in 2019	11.36 (6.36)	.12	.16	–.13	–.01	–.03	–.05	.14	–.28	–.06	–.08	–.12	.38	.39	–			
15. Change in monthly household income during the pandemic	2.03 (.94)	.09	.05	–.07	–.08	–.05	–.03	.09	–.01	–.00	–.01	–.05	.22	.18	.09	–		
16. Family’s physical health during the pandemic	8.99 (1.43)	.13	.11	–.11	–.12	–.02	.05	.13	–.00	–.02	–.00	–.04	–.06	–.01	.04	.11	–	
17. Household chaos during the pandemic	12.43 (3.83)	–.19	–.25	.14	.17	.16	–.01	–.23	–.00	.01	.09	.11	–.04	–.07	–.10	–.16	–.13	–

Note. *Ns* = 575–764. *M* = Mean, *SD* = Standard deviation. Sex: 0 = girls, 1 = boys. Marital status: 0 = couple, 1 = single. Correlations equal to or greater than 0.08 were significant at $p < .05$; correlations equal to or greater than 0.11 were significant at $p < .01$; correlations equal to or greater than 0.13 were significant at $p < .001$.

performed a 2 (Time: before vs. during the pandemic) \times 2 (Sex: boys vs. girls) \times 3 (Grade level: junior vs. middle vs. senior class) General Linear Model repeated measures analysis of caregivers' home-based involvement using SPSS 26. The results showed a significant main effect of Time: Wilks' $\lambda = 0.987$, $F(1, 701) = 9.239$, $p = .002$, $\eta^2_p = .013$. None of the other main effects or interaction effects were significant. Primary caregivers had statistically significantly lower frequencies of home-based involvement in their children's education during the pandemic ($M = 36.72$, $SD = 7.82$), as compared with their frequencies of involvement before the pandemic ($M = 37.27$, $SD = 7.60$). The effect size was small, Cohen's $d = 0.116$, indicating that the decrease in overall frequencies of caregiver involvement was small.

To further explore the impact of the pandemic on the frequency of caregiver involvement in individual involvement behaviors, we carried out a series of paired samples t tests on the 13 items of home-based involvement. Table 3 presents the results. The results showed that caregivers significantly decreased the frequencies of 6 of the 13 involvement behaviors. As indicated by the effect size (Cohen's d), the biggest (but moderate) decrease was in keeping a regular morning and bedtime schedule for the child, followed by limiting television and video watching. For the other four items ("reviewing school work or learning tasks," "maintaining clear rules," "having a place for books and school materials," and "having appropriate learning materials for the child"), the decreases were small in magnitude.

To examine whether caregivers' home-based involvement in children's education predicted preschool children's learning behavior and emotional distress, and whether it was predicted by familial variables, we estimated a path model using Mplus Version 7.11 software [63]. In the model, caregivers' home-based involvement during the pandemic

Table 3

Item-level analysis of changes in primary caregivers' home-based involvement before and during the pandemic.

Items	Before the Pandemic		During the Pandemic		t	Cohen's d
	M	SD	M	SD		
1. I limit TV and video watching.	2.97	.89	2.79	.91	5.96***	.22
2. I review my child's school work or learning tasks.	3.20	.85	3.12	.90	3.81***	.14
3. I keep a regular morning and bedtime schedule for my child.	3.03	.89	2.82	.94	7.97***	.30
4. I see that my child has a place for books and school materials.	3.34	.81	3.30	.84	2.38*	.08
5. I read with my child.	2.89	.88	2.86	.90	1.13	.05
6. I have appropriate learning materials for my child.	2.97	.96	2.93	.97	2.24*	.08
7. I maintain clear rules at my home.	2.98	.85	2.92	.88	3.24**	.12
8. I give my child chores at home.	2.71	.91	2.74	.90	-1.65	.05
9. I spend time with my child working on creative activities.	2.47	.88	2.51	.87	-1.46	.07
10. I spend time working with my child on number/math skills.	2.74	.87	2.77	.87	-1.51	.05
11. I spend time working with my child on reading/writing skills.	2.54	.90	2.56	.92	-1.05	.04
12. I talk to my child about how much I love learning new things.	2.45	.90	2.46	.92	-.38	.02
13. I help my child with school work or learning tasks.	3.02	.83	2.99	.86	1.28	.05

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

was regressed on child's age and sex and familial variables including caregivers' marital status, the number of people living in the household, parental education and occupation, household income in 2019, changes in household income, physical health of the family, and household chaos. Also, children's learning behavior and four symptoms of emotional problems were regressed on caregivers' home-based involvement during the pandemic, child's age and sex, and familial variables. Caregivers' home-based involvement prior to the pandemic was not included in the model, because otherwise the high correlation between involvement prior to and during the pandemic ($r = 0.81$) would have caused a serious multicollinearity problem. Missing data were estimated using the full information maximum likelihood estimation method, which has been shown to produce unbiased parameter estimates and standard errors compared to listwise deletion [64]. Fig. 1 and Table 4 present the path model. Although this model is saturated, it enables the interpretation of the path coefficients [63].

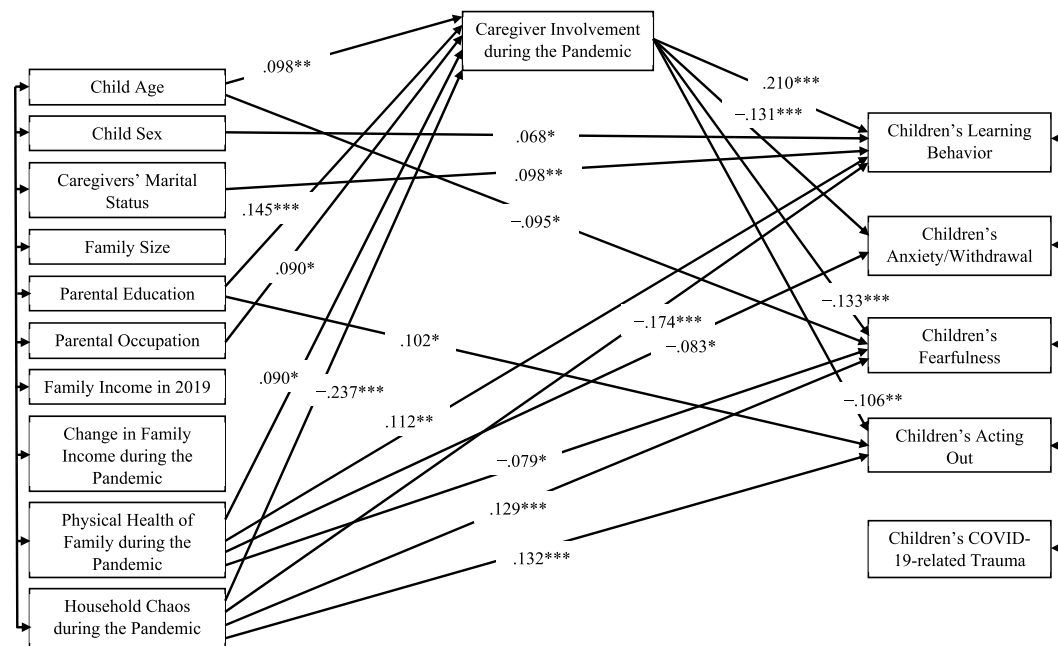
As shown in Fig. 1 and Table 4, primary caregivers' home-based involvement during the pandemic was positively predicted by the child's age, parental education, parental occupation, and the physical health of the family during the pandemic, and negatively predicted by household chaos. That is, primary caregivers were generally less frequently involved in their children's education when their children were younger, the children's parents had lower levels of education and less prestigious occupations, and their families had poorer physical health and were more chaotic during the pandemic. Additionally, primary caregivers' home-based involvement during the pandemic positively predicted children's learning behavior and negatively predicted children's symptoms of anxiety/withdrawal, fearfulness, and acting out. In other words, primary caregivers who were more frequently involved in their children's education during the pandemic had young children with more positive learning behavior and fewer symptoms of anxiety/withdrawal, fearfulness, and acting out. Finally, no relation was found between caregiver involvement and children's COVID-19 related trauma. The model explained 15.6% ($p < .001$), 6.9% ($p < .001$), 7.6% ($p < .001$), 4.8% ($p = .002$), 1.0% ($p = .187$), and 12.3% ($p < .001$) of the variance in the learning behavior, anxiety/withdrawal, fearfulness, acting out, and COVID-19 related trauma of young children and the home-based involvement of caregivers, respectively.

4. Discussion

Using a sample of households with preschool children in Wuhan, China, we examined how the COVID-19 pandemic impacted primary caregivers' involvement in their children's education at home. We further investigated the familial barriers to caregivers' home-based involvement and the benefits of such involvement for preschool children's learning behavior and emotional health during the pandemic. The results showed that the pandemic led primary caregivers to generally decrease their frequencies of home-based involvement. Having a younger child, a lower socioeconomic status (i.e., parents' lower levels of education and less prestigious occupations), poorer physical health, and higher levels of household chaos were associated with lower frequencies of home-based involvement exhibited by caregivers during the pandemic. Finally, caregivers' home-based involvement during the pandemic was beneficial to preschool children's learning behavior and emotional health.

4.1. The impact of the COVID-19 pandemic on caregivers' home-based involvement

Many countries, including China, have implemented a number of containment measures against the spread of COVID-19, including home quarantines, working from home, and school closures. These measures have caused many caregivers around the world to spend unprecedented amounts of time at home with their children. Many educators believe that the pandemic has strengthened caregivers' involvement in their



Note. $N = 764$. For ease of presentation, predictive paths that were not significant at $p < .05$ are not shown. * $p < .05$, ** $p < .01$, *** $p < .001$.

Fig. 1. The Path Model with a Completely Standardized Solution Predicting Child Outcomes and Caregivers' Involvement during the Pandemic. Note. $N = 764$. For ease of presentation, predictive paths that were not significant at $p < .05$ are not shown. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4

Standardized path coefficients in the path model predicting child outcomes and caregivers' involvement during the pandemic.

Predictor	Children's Learning Behavior		Children's Emotional Distress					Caregivers' Involvement during the Pandemic	
			Anxiety/Withdrawal		Fearfulness		Acting Out		COVID-19-related Trauma
	β	S.E.	β	S.E.	β	S.E.	β	S.E.	
Child's age in months	-.038	.036	-.032	.038	-.095*	.038	.008	.038	.039
Child's sex	.068*	.034	.010	.036	-.016	.036	-.004	.037	.051
Primary caregivers' marital status	.098**	.035	.052	.036	.002	.036	.040	.037	-.022
Number of people living in the home	.043	.039	.044	.042	-.048	.042	-.006	.041	-.026
Parental education	.064	.044	-.062	.046	.071	.046	.102*	.046	.008
Parental occupation	.054	.042	-.035	.044	.007	.043	-.080	.044	-.006
Annual household income in 2019	.020	.046	-.051	.046	-.026	.047	.012	.047	-.032
Change in monthly household income during the pandemic	.014	.038	-.020	.040	-.054	.039	-.028	.039	-.031
Physical health of family during the pandemic	.112**	.035	-.083*	.037	-.079*	.036	.016	.037	.058
Household chaos during the pandemic	-.174***	.038	.070	.040	.129***	.039	.132***	.040	-.010
Caregivers' involvement during the pandemic	.210***	.038	-.131***	.041	-.133***	.040	-.106**	.040	.003

Note. $N = 764$. Sex: 0 = girl, 1 = boy. Marital status: 0 = couple, 1 = single. * $p < .05$; ** $p < .01$; *** $p < .001$.

children's education [11]. Surprisingly, however, the results of the present study showed that caregivers from Wuhan were generally less involved in their children's education at home during the pandemic than they had been prior to it. The finding suggests that the time available to caregivers to spend with their children during the pandemic has not necessarily translated into time spent directly engaging with their children. In an analysis of time diaries collected in two surveys of the American population, Moro-Egido [65] studied the effect of mothers' employment status on the time they spent with their children. She found that unemployment did not make mothers increase their active time with their children (i.e., time spent directly engaged in activities with the child, such as teaching, reading, and indoor and outdoor playing), but it did lead mothers to increase their passive time with their children (i.e., remaining time engaged in other activities while children are present). Presumably, for the caregivers in the present study, although staying at home during the pandemic may have increased their time with their children, such an increase was chiefly in passive time. Future

research should include a measure of passive time and test this possibility.

There are several possible reasons why caregivers generally decreased their home-based involvement during the pandemic. First, working at home may have disrupted caregivers' daily routines (e.g., rising time, breakfast time, bedtime) and, in turn, their regulation of their children's daily routines. Indeed, the results of this study showed that caregivers significantly decreased their efforts to keep their child on a regular morning and bedtime schedule during the pandemic. Second, dealing with health, economic, and social emergencies related to the pandemic and its accompanying containment measures may not only have occupied caregivers' time but also caused them stress, thereby reducing their time and energy available for educating their children. Third, as discussed earlier, the increased passive time caregivers spent on activities such as television and Internet use, work, sleep, cleaning, and cooking [66] may have resulted in less available active time for directly engaging with their children. In a study conducted in four

Southeast Asian countries during the pandemic, 73.7% of the respondents reported that they considerably increased their daily television and Internet use (e.g., average increased time of 5+ hours [11.5%] and 3–5 h [17.3%]; [67]. The results of the present study showed that the pandemic made caregivers significantly decrease the frequency of restrictions on their children's television and video watching. Possibly, caregivers' own increased time for television and video watching during the pandemic not only resulted in difficulties limiting their children's television and video watching but also led to their decreased time for engaging in meaningful educational activities with their children. Nevertheless, it should be noted that the observed decreases in caregivers' frequencies of home-based involvement were generally small in magnitude in this study, although the decreases in routine maintenance and screen restrictions were moderate. We also caution readers that the difference in the means of involvement behavior may not necessarily be due to the pandemic itself and, instead, can be attributed to other factors not controlled for. We shall discuss this further in the limitation section.

4.2. Barriers to caregivers' home-based involvement during the pandemic

Consistent with our hypotheses and previous findings (e.g. Refs. [13, 31], poorer education and less prestigious occupations were associated with primary caregivers' lower levels of home-based involvement during the pandemic. This finding is not surprising, because parents with lower levels of educational attainment and less prestigious occupations may have placed a lower value on education, and therefore invested less in their children's education [50]. Contrary to the study's hypotheses, however, annual household income in 2019 and income loss amidst the pandemic were not associated with caregivers' home-based involvement. Together, these findings suggest that the social resource dimension of a family's socioeconomic status matters more for predicting caregivers' involvement than the economic resource dimension. Caregivers with heightened social capital not only are better equipped to support their children's education but also have better social networks from which they can gather useful information about how to do so [39].

The hypothesis that single parenthood and a big family size would be familial barriers to caregivers' home-based involvement was not supported in this study. The findings of prior work on this topic are mixed, with some studies showing less home-based involvement among single-parent [12,30] and larger families [13,31], and other studies not showing the same results [68]. These mixed findings suggest the potential importance of these family structure characteristics for caregiver involvement, but do not allow any conclusions to be drawn.

Consistent with the study's hypotheses, the family's poor physical health and high levels of chaos during the pandemic were among the barriers to caregivers' home-based involvement. Both of these family circumstances may have created competing demands on caregivers' time and energy, such as the demands for healthcare and household organization. This may have left caregivers with little available time and energy for educating their children. Moreover, if a family member, either the caregiver or the child, was infected with the coronavirus or had COVID-19-like symptoms, it would have been natural for the entire family to keep their distance from each other and reduce involvement behavior to avoid infection. In prior studies of non-crisis situations, caregivers' home-based involvement was found to be significantly compromised among families with poor physical health [34] and high levels of chaos [38]. The present study adds to the literature by revealing similar relations in a public health crisis. Our findings are cause for alarm, given that the COVID-19 pandemic has caused poor physical health among many people and pushed many families into chaos and disorganization [69].

4.3. Benefits of caregivers' home-based involvement for the learning behavior and emotional health of preschool children

This study has documented important benefits of caregivers' home-

based involvement for their children's learning and well-being. Specifically, the results showed that primary caregivers' higher levels of home-based involvement were associated with children's higher levels of positive learning behavior and lower levels of emotional distress, including anxiety/withdrawal, fearfulness, and acting out. These findings are consistent with the study's hypotheses, and adds to evidence from decades of research on caregiver involvement [41,49,50,54]; for meta-analytical reviews, see Refs. [39,45].

The result that learning behavior had a stronger relation with caregivers' home-based involvement than did emotional adjustment corroborates the findings of a recent meta-analysis by Barger et al. [39]. Caregiver involvement with children at home provides opportunities for communicative exchanges and interpersonal interactions that facilitate positive learning behavior [50]. During these exchanges and interactions, caregivers may convey their values or expectations regarding children's learning and reward children's positive learning behavior, such as initiative, persistence, and attentiveness. Moreover, from a social-cognitive perspective, children may model their caregivers' positive learning behavior when engaging in home learning activities with caregivers [70].

The observed benefits of home-based involvement for children's emotional health are encouraging, given the documented negative impact of the pandemic and its containment measures on the mental health of children across a wide age range [46]. The findings of the present study suggest that increasing caregivers' home-based involvement might be one way to reduce young children's emotional distress during the pandemic. Caregivers' involvement provides a context for transmitting love, nurturance, and support. Children whose caregivers support them and care about their education are likely to see themselves as worthy of love, thereby reducing their emotional problems [39].

Contrary to the study's hypothesis, caregiver involvement was not associated with COVID-19-related trauma among preschool children. The COVID-19 pandemic and the accompanying containment measures may not have been as traumatic as other events, such as wars and natural disasters. Compared with elderly people, young children are at a much lower risk of serious illness and death from COVID-19 [71]. Most preschool children might not have experienced trauma during the pandemic, and the measure of COVID-19-related trauma may be invalid in this study. This might be why no significant relation was observed between caregiver involvement and trauma.

4.4. Strengths, limitations, and implications

This study adds to the literature in important ways. First, to the best of our knowledge, it represents the first endeavor to examine the impact of the COVID-19 pandemic on caregiver involvement. The findings suggest that caregivers have been less involved in their children's education at home during the pandemic than they were prior to it, despite the increased amount of time they have spent with their children at home due to coronavirus containment measures. Second, the results of this study provide strong evidence for the beneficial role of caregivers' home-based involvement in preschool children's learning behavior and emotional health during the pandemic. They also highlight several familial characteristics that might have hindered caregivers' home-based involvement during this period. The findings have crucial theoretical implications, suggesting that it is essential to understand the antecedents and consequences of caregiver involvement during public health crises.

Although this study has several strengths, it is not without limitations. First, we were not able to recruit a random sample of preschool children and their caregivers in Wuhan. This is unsurprising given the timing of this study and the context of the COVID-19 pandemic. Second, all of the variables were reported by primary caregivers, which might have led to common method variance and biased results. Third, caregiver involvement was measured via self-report methods, which might have had social desirability issues. Fourth, caregivers were asked to

retrospectively report their involvement in their children's education prior to the pandemic, which may have introduced confounding factors such as memory distortion. Consequently, the observed changes from before to during the pandemic on the basis of retrospective reports may not be reliable. It would be valuable for a longitudinal design to be used in the future, together with home observations of caregiver involvement, to better understand the impact of COVID-19. Additionally, the change in caregiver involvement from before to during the pandemic, even when being observed with a longitudinal design, may not necessarily be due to the pandemic and containment measures themselves. Instead, it might be associated with time effects (seasonal, or month specific), such as the natural development of caregiver-child interactions, which occurs as a function of the passage of time, regardless of whether the pandemic is present or not. Thus, one should be cautious when interpreting the results of the present study. Fifth, this study measured only a small number of caregiver- and family-level barriers to caregiver involvement. Other important barriers, such as caregivers' mental health, should be examined in future studies. Last but not least, this study was conducted in the city of Wuhan. In terms of the COVID-19 pandemic, Wuhan differs from other parts of the world, because it is where the pandemic started. At the beginning of the pandemic, people knew little about the contagiousness of and danger posed by COVID-19. Moreover, residents in Wuhan endured quarantine restrictions that were more stringent and extensive than elsewhere [57]. We do not know whether the impact of the pandemic and its accompanying containment measures on children and their caregivers in Wuhan differed from those in other locations. It remains to be seen whether the present results are unique to households in Wuhan or universal to samples around the world.

The findings of this study have important implications for mitigating the negative impacts of the COVID-19 pandemic on children and their families. First, because the findings suggest that a family's low socioeconomic status, poor physical health, and high levels of chaos are potential barriers to caregivers' home-based involvement, it might be important to evaluate families' needs on the basis of these barrier indicators and identify families that need support. Moreover, effective family-based intervention programs could address families' health care concerns, help them reduce chaos and confusion, and support them in establishing an ordered and regular routine. Second, the results showed that the pandemic led caregivers to decrease their involvement in their children's education at home. Because caregivers' home-based involvement predicted children's learning behavior and emotional health above and beyond a large pool of familial characteristics, intervention programs could target increasing caregivers' engagement in their children's education during the pandemic. Nevertheless, because the present study was correlational in nature and did not permit causal inferences, future studies should examine whether improving caregiver involvement could benefit children's learning behavior and emotional adjustment during the pandemic. In summary, in addition to providing health care services, it might be crucial during crisis situations such as the COVID-19 pandemic to enhance caregiver involvement and promote children's learning and well-being.

5. Conclusion

The present study has sought to examine the impact of the COVID-19 pandemic on primary caregivers' involvement in their preschool children's education at home, the familial barriers to the caregivers' involvement, and the benefits of such involvement for children's learning behavior and emotional wellbeing. The finding that primary caregivers were generally less involved in their children's education at home during the pandemic than they were prior to it is a cause for alarm, suggesting the possible negative effects of the pandemic on caregivers' home-based involvement. Given the finding that caregivers' home-based involvement during the pandemic was beneficial to their preschool children's learning and wellbeing, there is an obvious need to

increase caregivers' engagement in their children's education at this critical time. Because our findings suggest that a lower socioeconomic status, poorer physical health, and higher levels of household chaos were associated with lower frequencies of home-based involvement exhibited by caregivers, effective interventions and policies could address socioeconomically disadvantaged families' health care concerns and help them reduce chaos and establish an ordered and regular family routine.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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