

Maternal COVID-19 Distress and Chinese Preschool Children's Problematic Media Use: A Moderated Serial Mediation Model

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Introduction: Maternal distress increased during the COVID-19 pandemic, significantly impacting children's media use. The purpose of this study was to explore the influence mechanism of maternal COVID-19 distress on preschoolers' problematic media use through a moderated mediation model; specifically, we examined the possible mediating roles of parenting stress and negative instrumental use of media in parenting and the moderating role of supportive co-parenting.

Methods: An online survey was conducted in a sample of 1357 children ($M_{age} = 4.01$, $SD = 1.06$; 47.4% boys) and their parents from six public kindergartens in Shanghai, China. The mothers provided information by completing measures on their levels of distress related to COVID-19, parenting stress levels, digital parenting practices, and perception of supportive co-parenting from their partners. Additionally, both parents rated their children's problematic media use.

Results: (1) maternal COVID-19 distress was significantly and positively related to children's problematic media use; (2) this relationship was sequentially mediated by parenting stress and parents' negative instrumental use of media in parenting; and (3) supportive co-parenting moderated the serial mediation path by reducing the effect of maternal COVID-19 distress on parenting stress.

Conclusion: The findings provide some support and guidance for preventing children's problematic media use and enhancing parental adaptation during the COVID-19 pandemic or in potentially adverse situations.

Keywords: maternal COVID-19 distress, children's problematic media use, parenting stress, negative instrumental use of media in parenting, supportive co-parenting

Introduction

During the spread of the COVID-19 pandemic over the past few years, the daily lives of children have been disrupted, including school closures and loss of opportunities for outdoor exercise.¹ Studies have shown that the proportion of Chinese children over-exposed to screen media/digital media (such as smartphones, tablets, and gaming consoles) increased significantly during the COVID-19 pandemic than before this period.^{2,3} Excessive exposure to and reliance on the media disrupt, to some extent, young children's daily life and psychosocial function, which is essentially problematic media use;⁴ however, the problem was rarely understood among preschoolers. Moreover, the COVID-19 pandemic induced and exacerbated various stressors affecting families and members' psychological health, such as rising unemployment, declining income, fear of infection, and terrible disinformation and rumors.^{5,6} Parents' well-being was greatly influenced, including increases in perceived anxiety and distress;⁷ particularly, women with young children experienced much more psychological distress.⁸ Research has indicated that parents' perceived distress or depression caused children to spend excessive time on screen media.^{9,10} However, no empirical studies have been conducted on the relationship and mechanisms between parental COVID-19 distress and preschoolers' problematic media use.

Furthermore, parents experienced tremendous parenting stress during the COVID-19 pandemic, influenced by their psychological stress.^{7,11} Digital media offers an essential outlet for parents to relieve parenting stress or mental distress.¹² Indeed, stressed or distressed parents are more likely to use media devices as a behavior modifier, babysitter, or distractor for their children,^{4,13} which is the negative instrumental use of media in parenting, a negative digital parenting practice. Research has suggested that parenting stress and negative instrumental media use were positively related to children's increased screen time.^{14–16} In addition, when families experience crisis events, collaborative support from family members, especially parenting support between partners, could effectively reduce the negative impact of adverse events on parental adjustment.^{17,18} Thus, parent-related factors, including parenting stress, digital parenting practice, and co-parenting, may serve complex roles in the influence of maternal distress on problematic media use in children. The present study explored the relations between maternal COVID-19 distress and children's problematic media use and its underlying mechanisms in Chinese culture.

Impacts of Maternal COVID-19 Distress on Children's Problematic Media Use

The COVID-19 pandemic-related events, such as COVID-19 infection, social disinformation, school closures, and reduced personal income, placed a great deal of fear, burden, and distress on families and members,^{19,20} particularly mothers who are the primary caregivers in the family and take on most of the childcare responsibilities.²¹ Studies have indicated that during the COVID-19 pandemic, Chinese mothers reported more severe symptoms of psychological distress than before.^{22,23} Kazak et al proposed that parental COVID-19 distress consisted of two aspects: parents' perceived general distress of their own related to COVID-19 and parents' perceived distress of their children during home quarantine.²⁴ Specifically, the two aspects are related to two stressful experiences that parents had during the COVID-19 lockdown: the general psychological distress caused by the adverse events (eg, being laid off from work, home isolation) and the distress associated with taking on special parenting responsibilities (eg, children at home all day, online learning).²⁵ Previous research has shown that parents' distress caused by the COVID-19 pandemic harmed children's well-being and may lead to too much screen time.^{9,26}

Nowadays, children spend more time on digital media and become more reliant on them,^{27,28} which has negative impacts on children's physical, cognitive, and social development and reflects problematic media use in children.^{29,30} Domoff et al hold that problematic media use in childhood is an excessive reliance on and overuse of screen media with developmental dysfunction, a model of maladaptive behavior.^{4,31} Meanwhile, Domoff and her team developed the "Problematic Media Use Measure" to measure children's media use problems, which has been validated in other countries such as China and Arabia.^{32–34} However, existing studies have focused on children's increased screen time,^{27,35} with less in-depth attention given to problematic media use. Moreover, the interactional theory of childhood problematic media use (IT-CPU) indicates that the following factors influence problematic media use in children: proximal factors (eg, parents' distress or stress), maintenance factors (eg, soothing children by using digital media), and distal factors (eg, social crisis events); proximal factors can directly affect children's problematic media use.⁴ Research has suggested that maternal distress or depression was positively associated with children's increased screen time.^{36,37} For example, Sahithya et al found a positive correlation between parents' perceived general psychological stress during the COVID-19 pandemic and children's excessive screen time.⁹ Similarly, Park et al discovered that maternal depression was linked to excessive use of television in children aged 2–5.¹⁰ Accordingly, we hypothesized (H1) that maternal COVID-19 distress was positively associated with children's problematic media use.

The Mediating Role of Parenting Stress

General stressors related to COVID-19 events were closely associated with parenting stress.³⁸ Parenting stress was the feeling of suffering or discomfort caused by the responsibilities of the parental role and perceived environmental stresses.³⁹ During the COVID-19 pandemic, mothers usually take on more responsibilities, such as taking care of families and raising children, and thus suffer from more psychological stress and parenting stress.^{8,11} Studies have suggested that poor psychological well-being and higher mental distress were significantly related to higher parenting stress.^{7,11,40}

According to the IT-CPU, parenting stress is a risk factor for problematic media use in early childhood.⁴ Indeed, there was a positive link between parenting stress and children's screen time.¹⁴ Seguin et al found that parenting stress was significantly associated with children's increased screen time during the COVID-19 pandemic.⁴¹ Researchers further revealed that parenting stress mediated the relationship between parental psychological distress and children's

developmental problems.^{42,43} Moreover, the stress process model holds that stress and its effects should be understood from a process perspective; specifically, primary stressors (eg, crisis events, general distress) created secondary stressors (eg, financial pressures, parenting stress) that, in turn, affect individual development.⁴⁴ This model implied that COVID-19 distress could create parenting stress, thus causing media use problems in children. As a result, we assumed (H2) that the relationship between maternal COVID-19 distress and children's problematic media use was mediated by parenting stress.

The Mediating Role of Negative Instrumental Use of Media in Parenting

For people in the digital age, electronic media has become an indispensable aspect of their daily lives.²⁷ The uses and gratifications theory indicates that people choose phones, computers, and other media to meet their specific needs.¹² Media are also gradually becoming a tool/instrument to help parents in child-rearing, including easing their negative feelings (such as anxiety and distress) and fulfilling parenting goals (such as babysitters and education).¹⁵ The phenomenon is conceptualized as the instrumental use of media in parenting (IUMP),⁴⁵ a digital parenting practice. Researchers have not yet thought deeply about the concept and properties of IUMP, and there is a lack of validated tools to measure parents' IUMP in China. We considered the attributes and connotations of the IUMP from the perspective of its impact on children. Distractors, modifiers, babysitters, and backgrounds are harmful to children and result in increased screen time,⁴⁶ poorer executive function,⁴⁷ and distractibility;⁴⁸ these behaviors were defined in this study as negative instrumental use of media in parenting (NIUMP), and were more about relieving parents' parenting burdens or distress. In contrast, we considered education, family time, and enrichment as positive instrumental use of media in parenting (PIUMP); these practices contribute to children's cognitive, physical, and mental development,^{49,50} and are more inclined to improve the quality of parenting.

In contemporary life, especially during home isolation, digital media may be an accessible and effective tool for parents and children to relieve their distress.⁵¹ Domoff et al argued that when mothers are distressed, they are more likely to leave their children with electronic babysitters.⁴ Similarly, Coyne et al believed that depressed parents tend to use media to keep their children occupied during the daytime or settle them down at bedtime.¹³ Nikken found that poorer parenting efficacy was positively associated with parents' use of media as a distraction and babysitter.⁴⁵ Therefore, maternal COVID-19 distress may be positively associated with parents' NIUMP, a maladaptive media parenting practice, and the focus of current research.

Research findings have consistently demonstrated a significant positive correlation between parents' utilization of digital media as a "babysitter", "distractor", and "modifier" (NIUMP) and increased screen time observed in children.^{15,45,46} For example, Benedetto and Ingrassia believed that parents who viewed digital media as a tool to keep their children occupied tended to have children addicted to media.⁵² Similarly, Domoff et al suggested that giving children electronic devices to soothe or keep them occupied while parents are busy could reinforce children's problematic media use.⁴ Also, Hails et al discovered that parental COVID-19 distress impacted children's behavioral problems through negative parenting practices.⁵³ Waller et al found that parental psychological distress was positively associated with dysfunctional parenting (eg, laxness, over-reactivity), which in turn was associated with more screen time for children.⁵⁴ Furthermore, according to the IT-CPU, maintaining factors (eg, parents' NIUMP) were the mechanisms connecting proximal factors (eg, family distress) to problematic media use in children.⁴ Thus, we proposed (H3) that NIUMP mediated the link between maternal COVID-19 distress and children's problematic media use.

The Serial Mediating Roles of Parenting Stress and Negative Instrumental Use of Media in Parenting

Family routines and everyday life were disrupted during the home isolation, posing many challenges for parents.⁵⁵ Mothers' psychological distress increased significantly,²¹ which would cause and exacerbate parenting stress.⁴³ According to the uses and gratifications theory, parents under higher parenting stress are more likely to choose digital media as a parenting tool to relieve their pressure and meet parenting needs.¹² Studies have indicated that parents experiencing high parenting stress frequently provide children with screen media.^{46,56} For example, Radesky et al discovered that mothers with higher parenting stress and lower parenting efficacy are more likely to use electronic media to keep their children quiet or calm, particularly for children with behavioral and social-emotional difficulties.^{57,58}

Similarly, Elias and Sulkin found that digital media helped stressed parents carry out parenting duties or complete complex tasks, such as providing relatively safe activities for children during mealtimes.⁴⁶ Furthermore, research has consistently suggested that media use as parenting tools, especially NIUMP, was positively and significantly related to excessive screen time in children.^{45,46} Consequently, we speculated (H4) that parenting stress and parents' NIUMP acted as serial mediating roles in the relationship between maternal COVID-19 distress and children's problematic media use.

The Moderating Role of Supportive Co-Parenting

The COVID-19 pandemic heightened the level of distress for parents, who experienced more significant psychological distress, especially when they lacked adequate resources to deal with it.⁵⁹ Co-parenting, as a unique family system,⁶⁰ has a vital protective function for parental adaptation and child social adjustment when families experience risks.⁶¹ McHale et al argued that co-parenting was the quality of cooperation and coordination between fathers and mothers in rearing children.⁶² Feinberg held that a supportive parental role as an essential part of co-parenting is a family characteristic where parents recognize each other's parenting abilities and appreciate and value each other's devotion.⁶³ The ecological model of co-parenting indicates that supportive co-parenting is a protective factor that may moderate the relationship between risk factors (eg, unemployment, psychological distress) and family outcomes (eg, family functioning, child adjustment).⁶⁴ Besides, according to the stress process model, although individuals were exposed to similar stressful conditions, they may suffer different outcomes since social support or supportive relationships played significant roles.⁴⁴

Empirical research has demonstrated the protective role of supportive co-parenting in the influence of risk factors on individuals.¹⁸ For example, Jam et al found that supportive co-parenting acted as a buffer in the impact of stressful events (such as divorce) on parenting stress.¹⁷ Similarly, Bastiaansen et al discovered that supportive co-parenting significantly mitigated the effects of COVID-19 lockdown measures on paternal burnout.¹⁸ As a result, we speculated that the higher level of supportive co-parenting perceived by mothers, the more it could alleviate the impact of maternal COVID-19 distress on parenting stress. We further presumed that there might be a range of effects on parenting practices and children's media use when mothers' parenting stress was reduced. Specifically, on the one hand, the effects of parenting stress on children's problematic media use may be weakened since less stressed mothers would be more likely to mediate and regulate their children's media use behavior,^{35,56} on the other hand, mothers' positive parenting practices would increase,⁶⁵ while they may have less negative digital parenting practices and value interaction and companionship with children,⁶⁶ thereby the likelihood of problematic media use in children would be reduced. Based on the above, we expected (H5) that supportive co-parenting moderated the relationship between maternal COVID-19 distress and parenting stress; (H6) supportive co-parenting moderated the mediating role of parenting stress in the relationship between maternal COVID-19 distress and children's problematic media use; and (H7) supportive co-parenting moderated the serial mediating role of parenting stress and NIUMP.

The Present Study

While researchers have explored parental distress and children's screen time, no attention has been given to the relationship between parental COVID-19 distress and children's problematic media use and the involvement of parent-related factors in it. The study deeply investigated the relationship between maternal COVID-19 distress and preschoolers' problematic media use and the underlying mechanisms. The conceptual model of the current study is shown in Figure 1. The aims of the study were as follows: (1) examining the relationship between maternal COVID-19 distress and children's problematic media use; (2) exploring the mediating role of parenting stress and NIUMP in the association between maternal COVID-19 distress and children's problematic media use; and (3) investigating the moderating role of supportive co-parenting in the link between maternal COVID-19 distress and parenting stress, and the moderating role in mediating paths. This study helps us to fully understand the relationship between maternal distress and children's media use. Moreover, the study supports efforts to prevent children's problematic media use, promote mothers' mental health, and advance adaptive parenting practices.

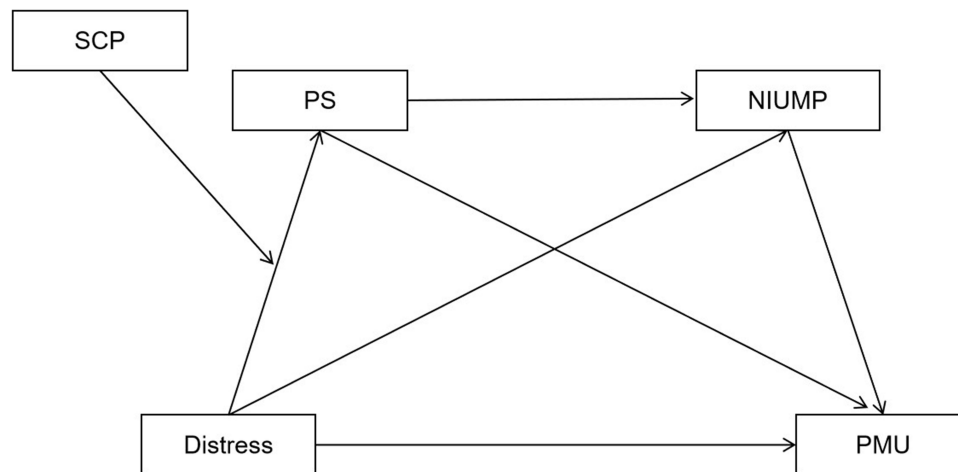


Figure 1 Theoretical Hypothesis Model.

Note: Distress: maternal COVID-19 distress.

Abbreviations: PS, parenting stress; NIUMP, negative instrumental use of media in parenting; SCP, supportive co-parenting; PMU, problematic media use.

Method

Procedure

The survey data was collected through the online website “Wenjuanxing”, China’s largest online survey platform. The study was approved by the institutional review board of Shanghai Normal University prior to data collection; meanwhile, we obtained written informed consent from all parents through kindergartens. Data were collected from May 1 to June 10, 2022. Mothers reported their distress related to COVID-19, parenting stress, digital parenting practices, and perceived parenting support from their partners. Also, mothers and fathers completed the problematic media use questionnaire, and the average of both was used in our analysis to more accurately reflect children’s media use problems.

Public kindergartens in China are classified as “model”, “first-level”, “second-level”, and “third-level”; “model” kindergartens are the highest level and quality, followed by “first and second-level” kindergartens, and “third-level” kindergartens are at the lowest. The sampling method for this study was convenience sampling, and the study included participants from a total of six kindergartens, comprising one “model” kindergarten, two “first-level” kindergartens, and three “second-level” kindergartens. Our sample is basically representative of the overall situation of kindergartens in Shanghai.

Participants

Participants were $N = 1357$ ($M_{age} = 4.01$ years, $SD = 1.06$; 47.4% boys) preschool children (ages 3 to 6) and their parents from Shanghai, China. The mothers’ ages ranged from 26 to 52 ($M_{age} = 34.99$ years, $SD = 3.97$); for educational levels, 19.8% had a college degree or below, 61.7% had a bachelor’s degree, and 18.5% had a master’s degree or above. The fathers’ ages ranged from 26 to 60 ($M_{age} = 36.67$ years, $SD = 4.82$); in terms of education levels, 20.9% had a college degree or below, 54.1% had a bachelor’s degree, and 25.0% had a master’s degree or above. All children and their parents were of Han nationality, a dominant ethnic group (over 90% of the population) in China. The specific demographic information is presented in Table 1.

Measures

Maternal COVID-19 Distress

Maternal COVID-19 distress was assessed with the COVID-19 Distress Scale, a subscale of the COVID-19 Exposure and Family Impact Survey (CEFIS), and used in Western families.²⁴ The COVID-19 Distress Scale included 2 items (“Caregiver distress levels during COVID-19” and “Child distress levels during COVID-19”) based on a 10-point Likert scale (1 = “none” to 10 = “very high”). Higher scores implied higher distress in the mother. The two items were translated into Chinese using the translation and back-translation procedure, with differences between the versions addressed by bilingual teachers and graduate students from the psychology department at Shanghai Normal University.

Table 1 Demographic Information of Participants

Variables	Groups	N	%
Age of child	Age 3	610	45
	Age 4	281	20.7
	Age 5	314	23.1
	Age 6	152	11.2
Gender of child	Girl	714	52.6
	Boy	643	47.4
Age of mother	≤ 30 years	157	11.6
	31–35 years	665	49
	36–40 years	410	30.2
	≥ 41 years	125	9.2
Age of father	≤ 30 years	86	6.3
	31–35 years	555	40.9
	36–40 years	446	32.9
	≥ 41 years	270	19.9
Mother education level	High school degree or below	57	4.2
	College degree	212	15.6
	Bachelor degree	837	61.7
	Master degree or above	251	18.5
Father education level	High school degree or below	64	4.7
	College degree	220	16.2
	Bachelor degree	734	54.1
	Master degree or above	339	25

Eisinga et al suggested that for the two-item scale, the Spearman-Brown coefficient and the standardized alpha coefficient were the best suitable statistics for reliability.⁶⁷ In this study, Cronbach's α for maternal COVID-19 distress was 0.77, and the Spearman-Brown coefficient was 0.64 ($p < 0.001$).

Children's Problematic Media Use

Children's problematic media use was measured using the Chinese version of the Problematic Media Use Measure (PMUM).^{32,33} The scale consists of 23 items and two subscales: tolerance and withdrawal (12 items; eg, "It is hard for my child to stop using screen media") and psychosocial problems (11 items; eg, "My child's screen media use interferes with family activities"). Each item was rated on a 5-point Likert scale (1 = "never" to 5 = "always"). Higher scores indicated more severe problems with media use among children. Both fathers and mothers completed the scale in this study, and their scores were averaged to reflect children's media use problems. The scale in China has good reliability and validity.³³ The Cronbach's α for this scale reported by the mothers was 0.97, consistent with that of the fathers.

Parenting Stress

Parenting stress was measured by the Parenting Stress Index-Short Form (PSI-SF).⁶⁸ The scale comprised 36 items and three subscales: parenting distress (eg, "I often feel I cannot deal with things very well"), parent-child dysfunctional interaction (eg, "My child rarely does anything that makes me feel good"), and difficult child (eg, "My child seems to be more of a crybaby than most children"). Each item was rated on a 5-point Likert scale (1 = "strongly disagree" to 5 = "strongly agree"). Three items were reverse-scored and addressed in the analysis. Higher scores meant that the mother perceived higher levels of parenting stress. Studies showed that the scale is reliable and valid in China.^{69,70} The Cronbach's α of the scale was 0.96.

Co-Parenting

The Chinese version of the Parents' Perceptions of the Co-parenting Relationship (PPCR) was utilized to assess the mother's perception of co-parenting from her partner.^{71,72} The scale consisted of 14 items and two subscales: supportive co-parenting (7 items; eg, "My partner backs me up when I discipline the child") and unsupportive co-parenting (7 items; eg, "My partner criticizes my parenting behavior in front of the child"). Each item was rated on a 5-point Likert scale (1

= “never” to 5 = “always”). The supportive co-parenting subscale was used in the current study. Higher scores meant that the mother perceived more parenting support from her partner. The Chinese version of the scale was revised and shown to be reliable and valid.⁷¹ The Cronbach’s α of the supportive co-parenting subscale was 0.90.

Instrumental Use of Media in Parenting

Referring to and integrating the measurement tools of Nikken,⁴⁵ Elias and Sulkin,⁴⁶ and Wartella et al,⁷³ this study established the Instrumental Use of Media in Parenting Scale (IUMPS) to measure parents’ IUMP. The original scale included seven aspects/items: distractors, modifiers, babysitters, backgrounds, family time, enrichment, and education, which captured the most common uses of media in parenting. We used principal axis factoring extract factors ($N = 1357$), and the results of EFA indicated that one item (“I would use digital media as a background for my child’s activities”) did not meet the criteria of commonality and factor loading and was deleted.⁷⁴ The possible reason is that “media as background” is more applicable to infants and their parents,^{75,76} whereas parents of preschoolers are less frequently using this approach. The detailed results of the EFA are shown in Table 2. Our analysis confirmed that the IUMPS consisted of 6 items and two subscales: negative instrumental use of media in parenting (NIUMP, 3 items), and positive instrumental use of media in parenting (PIUMP, 3 items), which also supported two properties of the IUMP. Each item was rated on a 5-point Likert scale (1 = “strongly disagree” to 5 = “strongly agree”). Higher scores implied that mothers use media as a parenting tool more frequently. The Cronbach’s α of the whole scale was 0.77. The NIUMP subscale was used in the present study, and Cronbach’s α was 0.73.

Statistical Analysis

All statistical analyses were performed using SPSS 22.0. First, exploratory factor analysis, descriptive statistics, and correlation analysis were performed. Second, the SPSS PROCESS macro,⁷⁷ a computational tool for testing moderation and mediation effects and their combinations, was used to test all hypotheses. The hypothesized model was tested using SPSS PROCESS macro model 6 and model 83. All the independent variables used were mean scores and standardized in statistical analysis. Third, the indirect effects and moderated mediation effects were tested using the bootstrapping method. The approach produced 95% bias-corrected confidence intervals of the estimates from 5000 resamples of the data.⁷⁸ A confidence interval did not contain 0, showing a significant effect. In addition, children’s age and gender and parents’ age and education level may influence parental distress, parenting stress, digital parenting practices, co-parenting, and children’s media use,^{38,45,79,80} which were included as control variables in our analyses.

Self-report questionnaires may cause the issue of common method bias. We adopted the Harman single-factor method to examine the common method bias.⁸¹ The results indicated that there were nine factors with characteristic roots of more than 1 in principal component analysis, and the variation explained by the first factor was 35.07%, which was lower than the critical value of 40%, demonstrating that there was no serious common method bias in this study.

Results

Descriptive Statistics and Correlation Analysis

Descriptive statistics and Pearson correlation analysis were performed for all study variables, and the results are shown in Table 3. Children’s problematic media use was significantly and positively correlated with parents’ NIUMP, parenting

Table 2 The Results of EFA for the Instrumental Use of Media in Parenting Scale (IUMPS)

Item	Factor Load Coefficient		Common Degree	KMO	% of Variance Explained
	Factor 1	Factor 2			
Q4	0.61		0.47	0.74***	40.09
Q5	0.85		0.73		
Q6	0.91		0.77		
Q1		0.75	0.56		17.86
Q2		0.56	0.41		
Q3		0.77	0.55		

Note: *** $p < 0.001$.

Table 3 Descriptive Analysis and Correlations Among Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Child age	1										
2. Child gender	0.01	1									
3. Mother age	0.23***	0.01	1								
4. Mothers' education	0.08**	-0.01	0.08**	1							
5. Father age	0.22***	-0.01	0.83***	0.04	1						
6. Fathers' education	0.09**	0.001	0.10***	0.57***	0.10***	1					
7. PMU	0.002	0.07**	0.04	-0.04	0.01	-0.05	1				
8. NIUMP	-0.09**	-0.01	-0.08**	0.001	-0.11***	-0.06*	0.38***	1			
9. SCP	0.01	-0.04	-0.02	0.10***	-0.02	0.09**	-0.34***	-0.20***	1		
10. PS	-0.12***	0.07*	-0.08**	-0.08**	-0.09**	-0.13***	0.46***	0.36***	-0.43***	1	
11. Distress	-0.002	0.01	0.01	-0.05	0.03	-0.02	0.25***	0.18***	-0.23***	0.38***	1
M	4.01	1.47	34.99	2.94	36.67	2.99	1.96	2.41	3.86	1.89	3.88
SD	1.06	0.50	3.97	0.71	4.82	0.78	0.60	0.95	0.71	0.61	2.11

Notes: Child gender was coded as 1 = girl and 2 = boy. Distress: maternal COVID-19 distress. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Abbreviations: PMU, problematic media use; NIUMP, negative instrumental use of media in parenting; SCP, supportive co-parenting; PS, parenting stress.

stress, and maternal COVID-19 distress but negatively correlated with supportive co-parenting. Moreover, NIUMP was significantly and negatively correlated with supportive co-parenting but positively correlated with parenting stress and maternal COVID-19 distress. Furthermore, supportive co-parenting was significantly and negatively correlated to parenting stress and maternal COVID-19 distress. In addition, parenting stress and maternal COVID-19 distress had a significant positive association.

Testing for the Main Effect and Mediation Effects

The results of the hypothesis testing are displayed in Table 4 and Figure 2. First, maternal COVID-19 distress was positively associated with children's problematic media use, supporting Hypothesis 1. The total effect of maternal COVID-19 distress on children's problematic media use (effect = 0.24, 95% CI [0.19, 0.30]) was positive and significant. The direct effect of maternal COVID-19 distress on problematic media use in children (effect = 0.06, 95% CI [0.02,

Table 4 Results of Model Testing

Predictors	Model 1 (Outcome: PS)			Model 2 (Outcome: NIUMP)			Model 3 (Outcome: PMU)		
	β	SE	t	β	SE	t	β	SE	t
Child age	-0.09***	0.02	-4.15	-0.04	0.02	-1.47	0.05*	0.02	2.12
Child gender	0.09*	0.05	2.05	-0.07	0.05	-1.29	0.10*	0.05	2.26
Mother age	0.002	0.01	0.2	0.01	0.01	0.75	0.02*	0.01	2.24
Mothers' education	0.04	0.04	0.92	0.08	0.04	1.78	-0.04	0.04	-1.06
Father age	-0.02	0.01	-1.83	-0.02*	0.01	-2.23	-0.004	0.01	-0.42
Fathers' education	-0.11**	0.04	-3.08	-0.04	0.04	-1.1	0.02	0.04	0.54
Distress	0.30***	0.02	12.68	0.06*	0.03	2.35	0.06*	0.03	2.57
PS				0.32***	0.03	11.55	0.35***	0.03	13.08
NIUMP							0.26***	0.02	10.28
SCP	-0.36***	0.02	-15.01						
Distress $\times$ SCP	-0.06*	0.02	-2.53						
R^2	0.30			0.14			0.28		
F	63.09***			27.38***			58.50***		

Notes: Child gender was coded as 1 = girl and 2 = boy. Distress: maternal COVID-19 distress. Distress $\times$ SCP = maternal COVID-19 distress $\times$ supportive co-parenting. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Abbreviations: PS, parenting stress; NIUMP, negative instrumental use of media in parenting; SCP, supportive co-parenting; PMU, problematic media use.

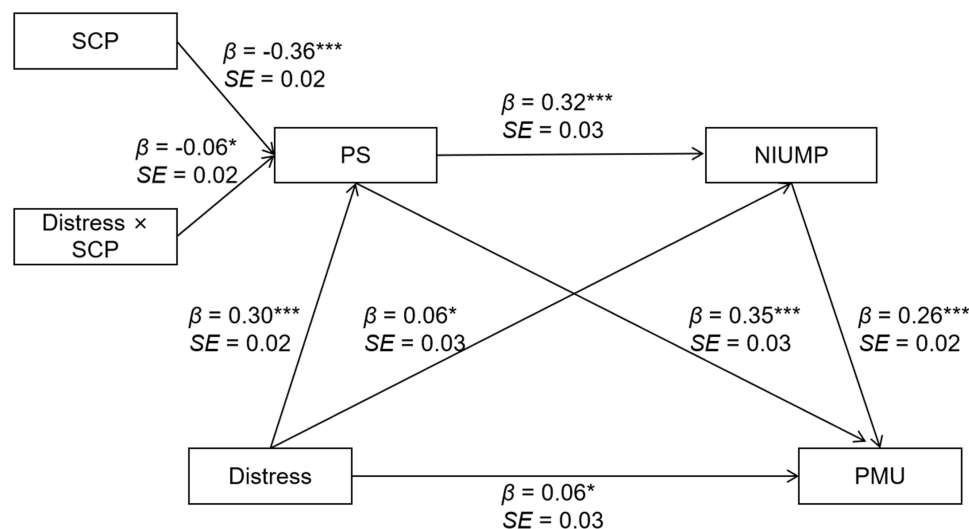


Figure 2 Regression Results of the Moderated Serial Mediation Model.

Note: Distress: maternal COVID-19 distress. Distress × SCP = maternal COVID-19 distress × supportive co-parenting. * $p < 0.05$. *** $p < 0.001$.

Abbreviations: PS, parenting stress; NIUMP, negative instrumental use of media in parenting; SCP, supportive co-parenting; PMU, problematic media use.

0.11]) was also positive and significant. Second, Table 4 (Model 1 and Model 3) showed that maternal COVID-19 distress was positively related to parenting stress, and parenting stress was positively related to children's problematic media use. Third, Table 4 (Model 2 and Model 3) indicated maternal COVID-19 distress was positively correlated with NIUMP, and NIUMP was positively correlated with children's problematic media use. Moreover, Table 4 (Model 2) suggested that parenting stress was positively associated with NIUMP. Finally, the total indirect effect was significant (effect = 0.18, 95% CI [0.15, 0.22]). The simple and serial mediation effects of parenting stress and NIUMP were statistically significant (maternal COVID-19 distress → parenting stress → problematic media use: effect = 0.13, 95% CI [0.11, 0.16]; maternal COVID-19 distress → NIUMP → problematic media use: effect = 0.02, 95% CI [0.003, 0.03]; maternal COVID-19 distress → parenting stress → NIUMP → problematic media use: effect = 0.03, 95% CI [0.02, 0.04]). Thus, two parallel mediation paths and a serial mediation path were identified, supporting Hypotheses 2, 3, and 4.

Testing for the Moderated Mediation Effect

Table 4 (Model 1) indicated that the interaction between supportive co-parenting and maternal COVID-19 distress significantly impacted parenting stress. In other words, supportive co-parenting moderated the relationship between maternal COVID-19 distress and parenting stress. A simple slope test was conducted to further explain the moderation effect of supportive co-parenting, as Aiken and West suggested,⁸² and the results are shown in Figure 3. When mothers' perceived supportive co-parenting was at low levels, the positive effect of COVID-19 distress on parenting stress was

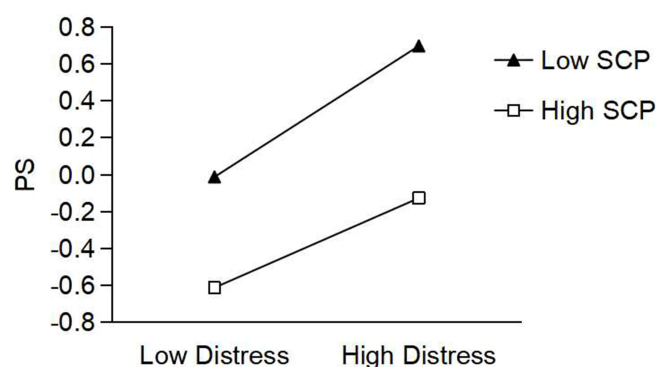


Figure 3 The Moderating Effect of Supportive Co-parenting on the Relationship between Maternal COVID-19 Distress and Parenting Stress.

Note: Distress: maternal COVID-19 distress.

Abbreviations: PS, parenting stress; SCP, supportive co-parenting.

Table 5 Conditional Process Analysis

Path	Condition	Effect	SE	95% Confidence Interval	
				Lower	Upper
Distress→PS→PMU	M-ISD	0.12	0.02	0.09	0.16
	M+ISD	0.08	0.01	0.06	0.11
	Difference	−0.04	0.02	−0.08	−0.002
Distress→PS→NIUMP→PMU	M-ISD	0.03	0.01	0.02	0.04
	M+ISD	0.02	0.004	0.01	0.03
	Difference	−0.01	0.005	−0.02	−0.001

Note: Distress: maternal COVID-19 distress.

Abbreviations: PS, parenting stress; PMU, problematic media use; NIUMP, negative instrumental use of media in parenting.

stronger ($\beta_{simple} = 0.36, p < 0.001, 95\% \text{ CI } [0.29, 0.42]$). However, this effect was weaker when mothers' perceived supportive co-parenting was at high levels ($\beta_{simple} = 0.24, p < 0.001, 95\% \text{ CI } [0.18, 0.31]$). As the level of supportive co-parenting increased, the positive effect of maternal COVID-19 distress on parenting stress decreased, supporting Hypotheses 5.

Moreover, the moderated simple and serial mediation effect results are shown in Table 5. Firstly, the mediation effect of parenting stress was moderated by supportive co-parenting. For mothers with perceived high levels of supportive co-parenting, the indirect effect of COVID-19 distress on children's problematic media use through parenting stress was significantly lower than for mothers with perceived low levels of supportive co-parenting. The difference value is -0.04 , 95% confidence interval (95% CI $[-0.08, -0.002]$) did not contain 0. Hypothesis 6 was verified. Secondly, the serial mediation effect of parenting stress and NIUMP was moderated by supportive co-parenting. For mothers with perceived high levels of supportive co-parenting, the indirect effect of COVID-19 distress on children's problematic media use through parenting stress and NIUMP was significantly lower than for mothers with perceived low levels of supportive co-parenting. The difference value is -0.01 , 95% confidence interval (95% CI $[-0.02, -0.001]$) did not contain 0. Thus, these results supported Hypothesis 7.

Discussion

The current study explored the association between maternal COVID-19 distress and children's problematic media use and the mechanisms underlying this relation. Our findings indicated that maternal COVID-19 distress was positively related to problematic media use in children, while parenting stress and NIUMP mediated this relationship, and supportive co-parenting was a moderator.

Influence of Maternal COVID-19 Distress on Children's Problematic Media Use

Our results suggested maternal COVID-19 distress was positively associated with children's problematic media use. This finding aligns somewhat with Park et al's study, demonstrating that the higher the mother's psychological stress level, the more time the child spends on media.¹⁰ As discussed above, mothers, the primary caregivers, experienced more mental suffering as well as additional responsibilities during the COVID-19 lockdown,^{8,83} thus experiencing higher levels of psychological stress and distress.²¹ Identifying and being responsive to the needs of children can be more difficult for parents in too much distress.⁸⁴ Specifically, depressed or distressed mothers lack the enthusiasm and patience to interact with their children and be less likely to participate in children's activities.⁸⁵ Thus, on the one hand, distressed mothers are more inclined to permit their children to use media and less to restrict or monitor children's media use.^{51,86} On the other hand, the likelihood of children using or relying on media and experiencing behavioral problems would increase.^{37,87} Moreover, the result supported the IT-CPU and demonstrated that proximal factors (such as maternal distress) have a more direct and powerful impact on children's problematic media use than distal factors (such as the COVID-19 pandemic).⁴

Mediation of Parenting Stress

Moreover, parenting stress was discovered to mediate the link between maternal COVID-19 distress and children's problematic media use, which is consistent with previous studies. For example, Babore et al found that parenting stress mediated the relationship between maternal distress and children's behavioral problems.⁴² When parents had poorer psychological health and higher mental distress, perceived parenting stress was higher,^{7,40} which means that general psychological distress may trigger or exacerbate parenting stress. However, parenting stress is a risk factor for children's overexposure to media.¹⁴ Parents with higher parenting stress are more likely to have less regulation on children's media use and manage their stress by allowing their children to use media,^{56,88} which leads to children being over-exposed to media,⁸⁹ thereby causing poor social adjustment.⁹⁰ These findings supported the stress process model, demonstrating that primary stress (such as COVID-19 distress) is a source of secondary stress (such as parenting stress), which damages the quality of parenting and is not favorable to children's well-being.⁴⁴ Therefore, parents in disadvantaged situations especially need psychological support and parenting guidance.

Mediation of Negative Instrumental Use of Media in Parenting

Furthermore, our findings also indicated that NIUMP mediated the relationship between maternal COVID-19 distress and children's problematic media use. This result is coherent with Hails et al's study, which suggested that parental COVID-19 distress impacted children's behavioral problems via negative parenting practices.⁵³ Distressed parents, in particular, may believe that media is a beneficial parenting tool because it could occupy children and provide parents with a temporary escape from their negative emotions.^{4,13} However, parents use digital media as babysitters, modifiers, and distractors (ie, NIUMP), which may lead to more screen time,^{16,46} increase the likelihood of media addiction,⁵² and adversely impact on children's physical and mental development.^{47,91} The results supported the uses and gratifications theory, indicating that parents choose media devices for children to relieve their distress or achieve parenting goals;^{12,15} however, these parenting practices can cause media use problems in children. Also, our findings further validated the IT-CPU, suggesting that in the association between proximal factors (eg, maternal COVID-19 distress) and children's problematic media use, the maintaining factors (eg, NIUMP) are the bridge.⁴ Although families experienced more distress or stress during the COVID-19 lockdown, it may also be a good time for family members to bond closely. Instead of relying on electronic babysitters, parents should spend more time with their children and engage in activities such as parent-child games and reading.

Serial Mediation of Parenting Stress and Negative Instrumental Use of Media

In addition, the path of influence from maternal COVID-19 distress to children's problematic media use was relatively complex. Our findings indicated that parenting stress and NIUMP were confirmed to sequentially mediate the relation, which supported the stress process model, the uses and gratifications theory, and the IT-CPU. Maternal COVID-19 distress is a major source of parenting stress during home quarantine.⁴³ However, mothers with high parenting stress would be less involved in childrearing and turn to other helpful and convenient methods, such as digital media.^{57,92} For example, Radesky et al's research indicated that higher levels of parenting stress were more likely to lead parents to rely on digital media to manage or regulate children's behavior and that these parenting behaviors are NIUMP.^{57,58} However, these negative digital practices would cause excessive screen exposure and developmental problems in children.^{15,49,93} To prevent children's problematic media use and address the concerns related to the COVID-19 pandemic or similar adverse events, distressed parents, particularly mothers, should be offered psychological health interventions and scientific parenting support.

Moderation of Supportive Co-Parenting

Finally, the study revealed that supportive co-parenting moderated the link between maternal COVID-19 distress and parenting stress, which confirmed the ecological model of co-parenting and suggested that supportive co-parenting plays a buffering or protective role in the impact of risk factors on family outcomes.⁶⁴ Our results are consistent with the study by Jam et al, who found that supportive co-parenting attenuated the influence of stressful events on parenting stress.¹⁷ The supportive co-parenting relationship is a valuable and supportive resource for distressed mothers during the COVID-19 pandemic or in adverse situations;

thus, the relationship can effectively mitigate the effects of maternal distress on parenting stress. Our findings further revealed that supportive co-parenting moderated the mediation effect of parenting stress between maternal distress and children's problematic media use, and the serial mediation effect of parenting stress and NIUMP. Researchers argued that supportive co-parenting could, in theory, alleviate family stress and its effects, promote parental adjustment, and enhance child social adjustment,⁶⁰ which was confirmed by the current empirical study. Future research should continue to explore other protective factors, such as parental mindfulness, to enhance the functioning of families and members in adverse situations.

Conclusion

The current study investigated the relationship between maternal COVID-19 distress and problematic media use in children, and our findings showed that: (1) maternal COVID-19 distress was positively related to children's problematic media use; (2) parenting stress and NIUMP partially mediated the association between maternal COVID-19 distress and children's problematic media use, respectively, and parenting stress and NIUMP acted as serial mediators in this relationship; and (3) supportive co-parenting moderated the association between maternal COVID-19 distress and parenting stress, and supportive co-parenting buffered the mediating effect of parenting stress and the serial mediating effect of parenting stress and NIUMP. These findings suggested that the critical to prevent children's problematic media use is to enhance parents' mental health and the quality of digital parenting.

This study has some limitations. First, the current study was a cross-sectional study that can only establish correlations and can not identify causality and direction of effects among variables. Future studies should use a longitudinal design to explore these relationships and examine the effects' direction over time. Second, although our study took multiple approaches to reduce sample bias in the questionnaire (such as setting reverse-scoring items), it could only be avoided partially. Future studies should take various measures to reduce bias, including observation and interviews. Third, two items were used to assess maternal COVID-19 distress, which is relatively simple and convenient but needs to be more accurate.

The current study, nevertheless, has some theoretical and practical implications. First, this study comprehensively explored the mechanism underlying the pathways of influence from maternal COVID-19 distress to children's problematic media use in China, which bridges the gap where previous research has mainly focused on the direct impact of parental distress on children's screen time.⁹ Second, the empirical research confirmed that variables related to parents are essential in better examining and understanding children's media use and well-being. These findings provide information for future research to promote family adaptation and child developmental outcomes in crisis or disadvantaged situations. Third, our findings can inform the prevention and intervention efforts of researchers, social agencies, and policymakers, which aim to promote parental adaptation and tackle children's media use problems in China. These efforts should target parents, especially distressed mothers in adverse circumstances, to help them address poorer mental health, cope with parenting stress, and enforce scientific digital parenting practices.

Data Sharing Statement

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

Ethics Approval

Approval was obtained from the ethics committee of Shanghai Normal University (Approval Number: 2022-043). The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

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Disclosure

The authors declare that they have no conflicts of interest.

References

- Daniel SJ. Education and the COVID-19 pandemic. *Prospects*. 2020;49(1–2):91–96. doi:10.1007/s11125-020-09464-3
- Shi J, Shi H, Wang Y, et al. Electric screen time of urban preschoolers during and before COVID-19. *Chin J Sch Health*. 2022;43(03):345–349. doi:10.16835/j.cnki.1000-9817.2022.03.007
- Liu X, Liu Z, Li Y. Study of screen exposure of children aged 3–12 in Xi'an during winter vacation in 2020. *Chin J Woman Child Health Res*. 2021;32(10):1541–1547.
- Domoff SE, Borgen AL, Radesky JS. Interactional theory of childhood problematic media use. *Hum Behav Emerg Technol*. 2020;2(4):343–353. doi:10.1002/hbe2.217
- Lăzăroiu G, Adams C. Viral panic and contagious fear in scary times: the proliferation of COVID-19 misinformation and fake news. *Anal Metaphys*. 2020;19:80–86. doi:10.22381/AM1920209
- Prime H, Wade M, Browne DT. Risk and resilience in family well-being during the COVID-19 pandemic. *Am Psychol*. 2020;75(5):631–643. doi:10.1037/amp0000660
- Spinelli M, Lionetti F, Pastore M, Fasolo M. Parents' stress and children's psychological problems in families facing the COVID-19 outbreak in Italy. *Front Psychol*. 2020;11:1713. doi:10.3389/fpsyg.2020.01713
- Di Giorgio E, Di Riso D, Mioni G, Cellini N. The interplay between mothers' and children behavioral and psychological factors during COVID-19: an Italian study. *Eur Child Adolesc Psychiatry*. 2021;30(9):1401–1412. doi:10.1007/s00787-020-01631-3
- Sahithya BR, Kashyap RS, Roopesh BN. Perceived stress, parental stress, and parenting during COVID-19 lockdown: a preliminary study. *J Indian Assoc Child Adolesc Ment Health*. 2020;16(4):44–63. doi:10.1177/0973134220200404
- Park S, Chang HY, Park E, et al. Maternal depression and children's screen overuse. *J Korean Med Sci*. 2018;33(34):e219. doi:10.3346/jkms.2018.33.e219
- Spinelli M, Lionetti F, Setti A, Fasolo M. Parenting stress during the COVID-19 outbreak: socioeconomic and environmental risk factors and implications for children emotion regulation. *Fam Process*. 2021;60(2):639–653. doi:10.1111/famp.12601
- Rubin AM. Uses, gratifications, and media effects research. *Perspect Media Eff*. 1986;1986:281–301.
- Coyne SM, Radesky J, Collier KM, et al. Parenting and digital media. *Pediatrics*. 2017;140(Suppl 2):S112–S116. doi:10.1542/peds.2016-1758N
- McDaniel BT, Radesky JS. Longitudinal associations between early childhood externalizing behavior, parenting stress, and child media use. *Cyberpsychol Behav Soc Netw*. 2020;23(6):384–391. doi:10.1089/cyber.2019.0478
- Beyens I, Eggermont S. Putting young children in front of the television: antecedents and outcomes of parents' use of television as a babysitter. *Commun Q*. 2014;62(1):57–74. doi:10.1080/01463373.2013.860904
- Tang L, Darlington G, Ma DWL, Haines J. Guelph family health study. Mothers' and fathers' media parenting practices associated with young children's screen-time: a cross-sectional study. *BMC Obes*. 2018;5(1):1–10. doi:10.1186/s40608-018-0214-4
- Jam FG, Maarefvand M, Hosseinzadeh S, Khubchandani J. The effectiveness of a co-parenting intervention on parenting stress among divorced Iranian adults. *Child Youth Serv Rev*. 2021;130:106265. doi:10.1016/j.childyouth.2021.106265
- Bastiaansen C, Verspeek E, van Bakel H. Gender differences in the mitigating effect of co-parenting on parental burnout: the gender dimension applied to COVID-19 restrictions and parental burnout levels. *Soc Sci*. 2021;10(4):127. doi:10.3390/socsci10040127
- Forner D, Leslie PK, Aldaihani A, et al. Psychosocial distress in parents with children awaiting surgery during the COVID-19 pandemic. *Children*. 2022;9(1):87. doi:10.3390/children9010087
- Bratu S. The fake news sociology of COVID-19 pandemic fear: dangerously inaccurate beliefs, emotional contagion, and conspiracy ideation. *Ling Philos Invest*. 2020;19:128–134. doi:10.22381/LPI19202010
- Meraya AM, Syed MH, Yasmeen A, et al. COVID-19 related psychological distress and fears among mothers and pregnant women in Saudi Arabia. *PLoS One*. 2021;16(8):e256597. doi:10.1371/journal.pone.0256597
- Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res*. 2020;288:112954. doi:10.1016/j.psychres.2020.112954
- Tchimtchoua Tamo AR. An analysis of mother stress before and during COVID-19 pandemic: the case of China. *Health Care Women Int*. 2020;41(11–12):1349–1362. doi:10.1080/07399332.2020.1841194
- Kazak AE, Alderfer M, Enlow PT, et al. COVID-19 exposure and family impact scales: factor structure and initial psychometrics. *J Pediatr Psychol*. 2021;46(5):504–513. doi:10.1093/jpepsy/jsab026
- Dollberg DG, Gamliel KH, Levy S. Mediating and moderating links between coparenting, parental mentalization, parents' anxiety, and children's behavior problems. *J Fam Psychol*. 2021;35(3):324–334. doi:10.1037/fam0000728
- Hoffman JA, Miller EA. Addressing the consequences of school closure due to COVID-19 on children's physical and mental well-being. *World Med Health Policy*. 2020;12(3):300–310. doi:10.1002/wmh3.365
- Rocha HAL, Correia LL, Leite AJM, et al. COVID-19 and children's screen time in Ceará, Brazil: a repeated cross-sectional survey. *J Child Media*. 2022;16(3):415–423. doi:10.1080/17482798.2021.2007967
- Warren R, Aloia L. Parenting Style, Parental stress, and mediation of children's media use. *West J Commun*. 2019;83(4):483–500. doi:10.1080/10570314.2019.1582087
- Tsitsika AK, Andrieu EK, Psaltopoulou T, et al. Association between problematic internet use, socio-demographic variables and obesity among European adolescents. *Eur J Public Health*. 2016;26(4):617–622. doi:10.1093/eurpub/ckw028
- Hu BY, Johnson GK, Teo T, Wu Z. Relationship between screen time and Chinese children's cognitive and social development. *J Res Child Educ*. 2020;34(2):183–207. doi:10.1080/02568543.2019.1702600
- Domoff SE, Borgen AL, Foley RP, Maffett A. Excessive use of mobile devices and children's physical health. *Hum Behav Emerg Technol*. 2019;1(2):169–175. doi:10.1002/hbe2.145
- Domoff SE, Harrison K, Gearhardt AN, Gentile DA, Lumeng JC, Miller AL. Development and validation of the problematic media use measure: a parent report measure of screen media addiction. *Children Psychol Pop Media Cult*. 2019;8(1):2–11. doi:10.1037/ppm0000163
- Li J, Wang J, Xiao B, Li Y, Li H. Translation and validation of the Chinese version of the problematic media use measure. *Early Educ Dev*. 2023;1–16. doi:10.1080/10409289.2023.2193856

34. Dwairej DA, Obeidat HM, Alfarajat EM, Dwairej LA. Translation and psychometric testing of the Arabic version of the problematic media use measure short form for children. *Hum Behav Emerg Technol*. 2022;1–8. doi:10.1155/2022/4034602
35. Pemppek TA, McDaniel BT. Young children's tablet use and associations with maternal well-being. *J Child Fam Stud*. 2016;25(8):2636–2647. doi:10.1007/s10826-016-0413-x
36. Duch H, Fisher EM, Ensari I, Harrington A. Screen time use in children under 3 years old: a systematic review of correlates. *Int J Behav Nutr Phys Act*. 2013;10:102. doi:10.1186/1479-5868-10-102
37. Connors NA, Tripathi SP, Clubb R, Bradley RH. Maternal characteristics associated with television viewing habits of low-income preschool children. *J Child Fam Stud*. 2007;16(3):415–425. doi:10.1007/s10826-006-9095-0
38. Chen CY, Byrne E, Vélez T. A preliminary study of COVID-19-related stressors, parenting stress, and parental psychological well-being among parents of school-age children. *J Child Fam Stud*. 2022;31(6):1558–1569. doi:10.1007/s10826-022-02321-1
39. Abidin RR. The determinants of parenting behavior. *J Clin Child Adolesc Psychol*. 1992;21(4):407–412. doi:10.1207/s15374424jccp2104_12
40. Marzilli E, Cerniglia L, Tambelli R, et al. The COVID-19 pandemic and its impact on families' mental health: the role played by parenting stress, parents' past trauma, and resilience. *Int J Environ Res Public Health*. 2021;18(21):11450. doi:10.3390/ijerph182111450
41. Seguin D, Kuenzel E, Morton JB, Duerden EG. School's out: parenting stress and screen time use in school-age children during the COVID-19 pandemic. *J Affect Disord Rep*. 2021;6:100217. doi:10.1016/j.jadr.2021.100217
42. Babore A, Trumello C, Lombardi L, et al. Mothers' and children's mental health during the COVID-19 pandemic lockdown: the mediating role of parenting stress. *Child Psychiatry Hum Dev*. 2023;54(1):134–146. doi:10.1007/s10578-021-01230-6
43. Cimino S, Marzilli E, Tambelli R. Psychological distress due to COVID-19 in parents and children's emotional and conduct problems: the mediation role of couple adjustment and parenting stress. *Psychol Hub*. 2021;38(2):15–22. doi:10.13133/2724-2943/17526
44. Pearlin LI. The sociological study of stress. *J Health Soc Behav*. 1989;30(3):241–256.
45. Nikken P. Parents' instrumental use of media in childrearing: relationships with confidence in parenting, and health and conduct problems in children. *J Child Fam Stud*. 2019;28(2):531–546. doi:10.1007/s10826-018-1281-3
46. Elias N, Sulkin I. Screen-assisted parenting: the relationship between toddlers' screen time and parents' use of media as a parenting tool. *J Fam Issues*. 2019;40(18):2801–2822. doi:10.1177/0192513X19864983
47. Nichols DL. The context of background TV exposure and children's executive functioning. *Pediatr Res*. 2022;92(4):1168–1174. doi:10.1038/s41390-021-01916-6
48. Setliff AE, Courage ML. Background television and infants' allocation of their attention during toy play. *Infancy*. 2011;16(6):611–639. doi:10.1111/j.1532-7078.2011.00070.x
49. Gao HY, Cui YF, Fang YY. The relationship between parental mediation of screen exposure and early childhood development outcomes. *J Educ Stud*. 2022;18(01):113–125. doi:10.14082/j.cnki.1673-1298.2022.01.012
50. Samudra PG, Flynn RM, Wong KM. Coviewing educational media: does coviewing help low-income preschoolers learn auditory and audiovisual vocabulary associations? *AERA Open*. 2019;5(2):1–12. doi:10.1177/2332858419853238
51. Tang L, Hruska V, Ma DWL, Haines J. Parenting under pressure: stress is associated with mothers' and fathers' media parenting practices in Canada. *J Child Media*. 2020;15(12):1–16. doi:10.1080/17482798.2020.1765821
52. Benedetto L, Ingrassia M. Digital parenting: raising and protecting children in media world. In: *Parenting: Studies by an Ecocultural and Transactional Perspective*. London: IntechOpen; 2021:127–148.
53. Hails KA, Petts RA, Hostutler CA, et al. COVID-19 distress, negative parenting, and child behavioral problems: the moderating role of parent adverse childhood experiences. *Child Abuse Negl*. 2021;130:105450. doi:10.1016/j.chiabu.2021.105450
54. Waller F, Prandstetter K, Jansen E, et al. Screen use: its association with caregiver mental health, parenting, and children's ADHD symptoms. *Fam Rel*. 2023;1–17. doi:10.1111/fare.12869
55. Daks JS, Peltz JS, Rogge RD. Psychological flexibility and inflexibility as sources of resiliency and risk during a pandemic: modeling the cascade of COVID-19 stress on family systems with a contextual behavioral science lens. *J Contextual Behav Sci*. 2020;18:16–27. doi:10.1016/j.jcbs.2020.08.003
56. Walton K, Simpson JR, Darlington G, Haines J. Parenting stress: a cross-sectional analysis of associations with childhood obesity, physical activity, and TV viewing. *BMC Pediatr*. 2014;14(1):244. doi:10.1186/1471-2431-14-244
57. Radesky JS, Peacock-Chambers E, Zuckerman B, Silverstein M. Use of mobile technology to calm upset children: associations with social-emotional development. *JAMA Pediatr*. 2016;170(4):397–399. doi:10.1001/jamapediatrics.2015.4260
58. Radesky JS, Silverstein M, Zuckerman B, Christakis DA. Infant self-regulation and early childhood media exposure. *Pediatrics*. 2014;133(5):e1172–e1178. doi:10.1542/peds.2013-2367
59. Yan L, Gan Y, Ding X, Wu J, Duan H. The relationship between perceived stress and emotional distress during the COVID-19 outbreak: effects of boredom proneness and coping style. *J Anxiety Disord*. 2021;77:102328. doi:10.1016/j.janxdis.2020.102328
60. Wang Z, Cheng N. Co-parenting and the influence on child adjustment. *Adv Psychol Sci*. 2014;22(06):889–901. doi:10.3724/SP.J.1042.2014.00889
61. Karela C, Petrogiannis K. Risk and resilience factors of divorce and young children's emotional well-being in Greece: a correlational study. *J Educ Develop Psychol*. 2018;8(2):68–81. doi:10.5539/jedp.v8n2p68
62. McHale JP, Kuersten-Hogan R, Rao N. Growing points for coparenting theory and research. *J Adult Dev*. 2004;11(3):221–234. doi:10.1023/B:JADE.0000035629.29960.ed
63. Feinberg ME. Coparenting and the transition to parenthood: a framework for prevention. *Clin Child Fam Psychol Rev*. 2002;5(3):173–195. doi:10.1023/a:1019695015110
64. Feinberg ME. The internal structure and ecological context of coparenting: a framework for research and intervention. *Parent Sci Pract*. 2003;3(2):95–131. doi:10.1207/S15327922PAR0302_01
65. Madarevic M, Van Esch L, Lambrechts G, Ceulemans E, Van Leeuwen K, Noens I. Parenting behaviours among mothers of pre-schoolers on the autism spectrum: associations with parenting stress and children's externalising behaviour problems. *Res Autism Spectr Disord*. 2022;90:101901. doi:10.1016/j.rasd.2021.101901
66. Osborne LA, Reed P. Stress and self-perceived parenting behaviors of parents of children with autistic spectrum conditions. *Res Autism Spectr Disord*. 2010;4(3):405–414. doi:10.1016/j.rasd.2009.10.011

67. Eisinga R, Grotenhuis MT, Pelzer B. The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? *Int J Public Health*. 2013;58(4):637–642. doi:10.1007/s00038-012-0416-3
68. Abidin RR. *Parenting Stress Index (PSI) Manual*. 3rd ed. Odessa: FL Psychological Assessment Resources; 1995.
69. Dou C, He Q, Mai J. Parenting stress and related factors in parents of adolescence with depression. *Chin J Health Psychol*. 2011;19(08):980–982. doi:10.13342/j.cnki.cjhp.2011.08.020
70. Qin X, Su X, Gao L. A study on parenting stress of parents of autistic children. *Chin J Nurs*. 2008;10:931–933.
71. Chen BB. Chinese adolescents' sibling conflicts: links with maternal involvement in sibling relationships and coparenting. *J Res Adolesc*. 2019;29(3):752–762. doi:10.1111/jora.12413
72. Stright AD, Bales SS. Coparenting quality: contributions of child and parent characteristics. *Fam Relat*. 2003;52(3):232–240. doi:10.1111/j.1741-3729.2003.00232.x
73. Wartella E, Rideout V, Lauricella AR, Connell S. Parenting in the age of digital technology. Poster presented at: The Center on Media and Human Development, School of Communication, Northwestern University; June 4; 2013; Washington, D.C.
74. Kaiser HF. An index of factorial simplicity. *Psychometrika*. 1974;39(1):31–36. doi:10.1007/BF02291575
75. McHarg G, Ribner AD, Devine RT, Hughes C, NewFAMS Study Team. Infant screen exposure links to toddlers' inhibition, but not other EF constructs: a propensity score study. *Infancy*. 2020;25(2):205–222. doi:10.1111/inf.12325
76. Lapiere MA, Piotrowski JT, Linebarger DL. Background television in the homes of US children. *Pediatrics*. 2012;130(5):839–846. doi:10.1542/peds.2011-2581
77. Hayes AF. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York: Guilford publications; 2017.
78. Hayes AF. An index and test of linear moderated mediation. *Multivariate Behav Res*. 2015;50(1):1–22. doi:10.1080/00273171.2014.962683
79. Anand S, Krosnick JA. Demographic predictors of media use among infants, toddlers, and preschoolers. *Am Behav Sci*. 2005;48(5):539–561. doi:10.1177/0002764204271512
80. Comstock G, Scharrer E. The use of television and other screen media. In: Singer DG, Singer JL, editors. *Handbook of Children and the Media*. London: Sage Publications, Inc; 2012:13–44.
81. Zhou H, Long L. Statistical remedies for common method biases. *Adv Psychol Sci*. 2004;12(06):942–950.
82. Aiken LS, West SG. *Multiple Regression: Testing and Interpreting Interactions*. London: Sage Publications, Inc; 1991.
83. Giannotti M, Mazzoni N, Bentenuto A, Venuti P, de Falco S. Family adjustment to COVID-19 lockdown in Italy: parental stress, coparenting, and child externalizing behavior. *Fam Process*. 2022;61(2):745–763. doi:10.1111/famp.12686
84. Scaramella LV, Sohr-Preston SL, Callahan KL, Mirabile SP. A test of the family stress model on toddler-aged children's adjustment among Hurricane Katrina impacted and nonimpacted low-income families. *J Clin Child Adolesc Psychol*. 2008;37(3):530–541. doi:10.1080/15374410802148202
85. Rodrigo López MJ, Martín Quintana JC, Cabrera Casimiro E, Máiquez Chaves ML. Las competencias parentales en contextos de riesgo psicosocial. *Psychosoc Interv*. 2009;18(2):113–120.
86. Pedrotti BG, Mallmann MY, Almeida CRS, et al. Infants' and toddlers' digital media use and mothers' mental health: a comparative study before and during the COVID-19 pandemic. *Infant Ment Health J*. 2022;43(1):24–35. doi:10.1002/imhj.21952
87. Neville RD, McArthur BA, Eirich R, Lakes KD, Madigan S. Bidirectional associations between screen time and children's externalizing and internalizing behaviors. *J Child Psychol Psychiatry*. 2021;62(12):1475–1484. doi:10.1111/jcpp.13425
88. Nabi RL, Krcmar M. It takes two: the effect of child characteristics on U.S. parents' motivations for allowing electronic media use. *J Child Media*. 2016;10(3):285–303. doi:10.1080/17482798.2016.1162185
89. Shin E, Choi K, Resor J, Smith CL. Why do parents use screen media with toddlers? The role of child temperament and parenting stress in early screen use. *Infant Behav Dev*. 2021;64:101595. doi:10.1016/j.infbeh.2021.101595
90. Lin HP, Chen KL, Chou W, et al. Prolonged touch screen device usage is associated with emotional and behavioral problems, but not language delay, in toddlers. *Infant Behav Dev*. 2020;58:101424. doi:10.1016/j.infbeh.2020.101424
91. Liang T, Kuhle S, Veugelers PJ. Nutrition and body weights of Canadian children watching television and eating while watching television. *Public Health Nutr*. 2009;12(12):2457–2463. doi:10.1017/S1368980009005564
92. Conger RD, Elder GH, Lorenz FO, Simons RL, Whitbeck LB. *Families in Troubled Times: Adapting to Change in Rural America*. New York: A. de Gruyter; 1994.
93. Dubois L, Farmer A, Girard M, Peterson K. Social factors and television use during meals and snacks is associated with higher BMI among pre-school children. *Public Health Nutr*. 2008;11(12):1267–1279. doi:10.1017/S1368980008002887

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