Psychology Research and Behavior Management

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ORIGINAL RESEARCH

# The Relationship Between Maternal Problematic Mobile Phone Use and Hyperactive Behavior in Preschool Children: The Moderating Effect of Family Parenting Support on Chain Mediation

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**Purpose:** The issue of excessive mobile phone use among mothers currently is growing increasingly significant due to the rapid growth of smartphones and other technological items. Given that women are the primary caregivers for preschool-aged children, it is imperative to thoroughly investigate the detrimental impacts of mothers' problematic mobile phone use on the hyperactive behaviors of their children, as well as the underlying mechanisms.

**Methods:** In this study, 924 Chinese mothers and their children are surveyed. The study looks into the moderating effects of parenting support in this context as well as the chain mediating roles of mothers' parent-child interaction disorder and work-family conflict in the effects of mothers' problematic cell phone use on preschoolers' hyperactive behaviors. Analysis is conducted on the moderating impact of parental support in this as well.

**Results:** The results find that boys have significantly higher levels of hyperactive behavior than girls; maternal problematic cell phone use significantly positively predicts preschoolers' hyperactive behavior; maternal problematic cell phone use could indirectly affect preschoolers' hyperactive behavior through the chain-mediated effects of work-family conflict and parent-child interaction disorder, and parenting support moderates the predictive effects of parent-child interaction disorder on preschoolers' hyperactive behavior.

**Conclusion:** This study reveals potential ways in which mothers' problematic mobile phone use affects preschoolers' hyperactivity behaviors in the Chinese context. The findings provide a multidimensional (protective and risk factors) indication of how to reduce the impact of mothers' problematic mobile phone use on preschoolers' levels of hyperactivity behaviors, which would contribute to improving children's mental health. However, this is a cross-sectional study and other factors may also play an important role in this pathway.

**Keywords:** problematic mobile phone use, work-family conflict, parent-child interaction disorder, hyperactive behavior, parenting support

## Introduction

Hyperactivity refers to excessive physical activity at inappropriate times, excessive fidgeting, moving hands and feet, or talking too much.[1] Recent years have witnessed that the problem of hyperactivity behavior in preschool children become increasingly prominent.[2,3] Moreover, the age of diagnosis of Attention Deficit and Hyperactivity Disorder (ADHD) in children has been accelerated to 4 years of age, with about two-thirds of children with ADHD experiencing the onset of the disease before school age.[4] Research has revealed that hyperactive behavior not only impacts seriously on children's learning, but if not intervened promptly, it may also lead to behavior disorders or criminal behavior, which in turn affects children's sound development.[5,6] In this context, early detection of hyperactive behavior in children, understanding of the



Received: 21 May 2024
Accepted: 4 July 2024
Published: 10 July 2024

influencing mechanisms behind them, and the adoption of effective interventions should be undertaken, which will help to safeguard the subsequent sound development of children.

## Maternal Problematic Mobile Phone Use and Hyperactive Behavior in Preschool Children

Problematic mobile phone use, also known as mobile phone addiction or mobile phone dependence, refers to the excessive or uncontrolled use of mobile phones and the development of a strong and persistent sense of craving for and dependence on mobile phones, which affects the user's psychological and social functioning.[7] Parental problematic mobile phone use is found to be a significant predictor of problematic behavior such as emotional dysregulation in children.[8] Furthermore, when there is excessive use of mobile phones by mothers, children are less likely to feel warmth and affection from their mothers, which is essential for secure attachment and healthy psychological development.[9] Excessive maternal mobile phone use during interactions with children may lead to externalizing behavioral issues in children, such as "can't sit still, restless, or hyperactive", "easily frustrated" and "temper tantrums or hot temper".[10] Maternal problematic mobile phone use behavior is often accompanied by indifference or neglect of children, and children who experience neglect are at high risk of developing problems such as hyperactivity.[11]

## Potential Mediating and Chain Mediating Role of Work-Family Conflict and Parent-Child Interaction Disorder

The impact of the mother's work on the family is gradually gaining importance in research on factors influencing the development of children's behavior. Work-family conflict refers to a particular form of role conflict that arises as a result of incompatible role pressures in the work and family spheres.[12] The spillover of strain from work to home may occur when individuals have problematic mobile phone use behavior,[13] and excessive use of mobile phones can also negatively influence an individual's work-family conflict situation.[13,14] In addition, when there is a conflict between the mother's work and family, children are more likely to develop internalized problem behavior, such as emotional problems like depression and anxiety, and behavioral problems like hyperactivity.[15,16] The influence of the mother's work status on the family's parenting environment can play a significant role in the emotional and behavioral problems of preschool children.[17] The spillover hypothesis suggests that an individual's negative emotions or behavior can be transferred from work to non-work situations and that work-family conflict, as a negative emotional perception, may be transferred to the mother's parenting situation thus negatively affecting child development.[18,19]

In addition, among the many factors contributing to the development of children's behavior, the quality of parent-child interactions in the home environment has received much scrutiny. Parent-child interaction disorder refers to the fact that in the process of interaction with children, parents feel that their children are too far away from their expectations, and they feel less about their children's growth and feedback, so they feel disappointed and have a sense of gap with their children, and finally lead to parent-child relationship disorder.[20] When mothers use mobile phones excessively, the time for parent-child interaction will inevitably decrease accordingly. Some believe that the frequent use of mobile phones by mothers in the family will lead to a detachment of the parent-child relationship, which in turn will increase problematic behavior such as hyperactivity in children.[21] In addition, when children try to get more attention from parents who use mobile phones, parents may have a more severe parenting response and be angry about interrupting mobile phone use.[22] At the same time, studies have confirmed that parent-child interaction disorder has a significant positive impact on children's hyperactivity and other problem behaviors.[23,24]

In addition, it has been suggested that there is a degree of correlation between the effects of maternal work-family conflict and disorders of parent-child interaction on child development and that work-family conflict is a significant predictor of parent-child interaction.[25,26] Research suggests that the dual stress between work and family may lead to negative emotions such as parenting stress in mothers[27] and that these stresses may also have an indirect negative impact on children through adverse parent-child interactions.[28] Based on the above analysis and the formulation of hypotheses two and three, work-family conflict and disorders of parent-child interaction may mediate the relationship between

mothers' problematic mobile phone use and preschoolers' hyperactivity, respectively, while there is also a significant correlation between work-family conflict and disorders of parent-child interaction.

## Parenting Support as a Moderator

However, not all preschool children in undesirable home environments develop problematic behavior, because the mother, as the primary caregiver, may have access to effective external help, such as parenting support from family members.[29,30] Family parenting support is found to be an effective influence on mothers' perceived stress in terms of disorders in parent-child interactions and work-family conflict.[31–33] In addition, the support of elders and friends can help alleviate the mother's role constraints and health stress caused by child-rearing, while the support of spouses can affect the emotional and parent-child interaction stress felt by the mother during child-rearing.[34] At the same time, family childcare support is the primary factor in alleviating individual work-family conflict.[35] However, some studies have also shown that access to childcare support exacerbates working women's sense of conflict between work and family.[36]

## Hypotheses

Based on the above analysis, this study takes preschool children and their mothers as the research object, explores the influence of a maternal problematic mobile phone use on preschoolers' hyperactivity behavior by constructing a moderated chain mediation model, investigates the mediating role of work-family conflict and parent-child interaction disorder, and analyzes the moderating effect of family parenting support in this model to provide relevant research support for the prevention and alleviation of preschoolers' hyperactive behavior, the following Hypotheses are proposed:

**H1**. Maternal problematic mobile phone use significantly and positively predicts hyperactive behavior in preschool children.

**H2**. Work-family conflict mediates the relationship between mothers' problematic mobile phone use and preschoolers' hyperactive behavior.

**H3**. Parent-child interaction disorder is another mediating variable between mothers' problematic mobile phone use and preschoolers' hyperactive behavior.

**H4**. Work-family conflict and disorders of parent-child interaction act as chain mediators between maternal problematic mobile phone use and preschoolers' hyperactive behavior.

**H5**. Family parenting support can mediate the effects of work-family conflict on preschoolers' hyperactive behavior in the chain mediation model.

**H6**. Family parenting support can moderate the influence of parent-child interaction disorder in the chain mediation model on preschoolers' hyperactivity behavior.

The theoretical model is shown in Figure 1.

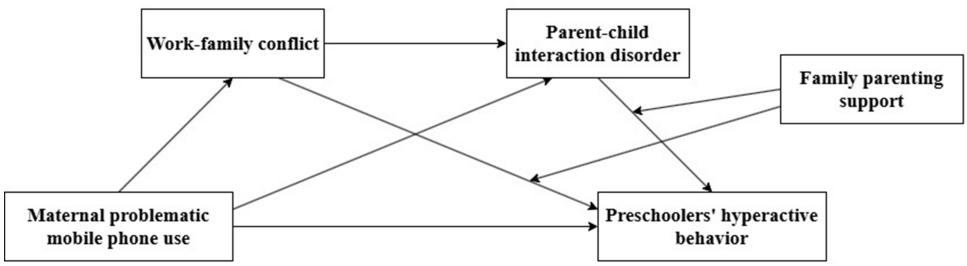


**Figure 1** The proposed moderated mediation model.

# Methods

## Participants and Procedure

A total of 976 mothers and their children are sampled from southeast China through convenient cluster sampling. Invalid samples include subjects with regular answers and missing data. After eliminating invalid data, there are 924 valid data, with an effective rate of 94.67%.

In the final valid sample, the mothers are between 26 and 45 years old (M=36.42, SD=4.99), and the children are between 3 and 6 years old (M=4.26, SD=0.83); There are 460 boys (49.78%) and 464 girls (50.22%). There are 276 only children (29.87%) and 648 non-only children (70.13%). In terms of mother's educational background, 78 (8.44%) are in primary school or below, 114 (12.34%) are in junior high school (including junior high school graduates), 179 (19.37%) are in high school, secondary school, technical school (including those that have not graduated from high school), 233 (25.22%) are in junior college (including night college and open university), 297 (32.14%) are in full-time bachelor's degree. 23 graduate students (master or doctor) (2.49%); In terms of working hours, 201 (21.75%) are full-time mothers, 275 (29.76%) for 8 hours or less, 384 (41.56%) for 8–10 hours, and 64 (6.93%) for 10 hours or more. In terms of family structure, 105 (11.36%) are divorced or single-parent families, 569 (61.58%) are nuclear families with a couple and children, 220 (23.81%) are divorced or single-parent families and 30 (3.25%) are other family forms.

## Measures

### Problematic mobile phone use

This study adopts the Chinese version of the Problematic Mobile Phone Use Scale (MPPUS), which is revised by Leung Wing-chi on the basis of the MPPUS by Bianchi et al[37,38] It consists of four dimensions: loss of control, withdrawal, avoidance, and inefficacy. The scale consists of 17 items and is scored on a Likert-5 point scale, with higher scores indicating higher levels of problematic mobile phone use among mothers. The Cronbach's α coefficient for the scale in this study is 0.891. Validated factor analyses of the scale show a positive fit for the indicators: $\chi 2/df = 5.611$, TLI = 0.902, CFI = 0.918, RMSEA = 0.071, SRMR = 0.056.

### Work-Family Conflict

The Work-Family Conflict Scale, developed by Carlson and revised by Chinese scholars, is utilized in this study.[39] The scale is divided into two directions: work-interference-family (WIF) and family-interference-work (FIW), and three levels: time-based, behavior-based and stress-based, with a total of 18 items. The scale is scored on a Likert-5 point scale, with higher scores indicating higher levels of conflict faced by mothers. In this study, the Cronbach's α coefficient of this scale is 0.919. The results of confirmatory factor analysis show that all indexes are well fitted: $\chi 2/df = 7.719$, TLI = 0.943, CFI = 0.962, RMSEA = 0.085, SRMR = 0.047.

### Parent-Child Interaction Disorder

In this study, the short-form Parenting Stress Scale (PSI-SF) developed by Abidin and revised by Chinese scholars is employed.[20] The scale is divided into three dimensions: parenting worries, parent-child interaction disorder, and difficult children, with a total of 36 items. The present study uses the Parent-Child Interaction Dysfunction dimension to measure the level of parent-child interaction. The scale is scored on a Likert-5 point scale, with higher scores indicating higher levels of parent-child interaction dysfunction. The Cronbach's alpha coefficient for the scale in this study is 0.924. Validated factor analyses of the scale show a good fit for the indicators: $\chi 2/df = 7.102$, TLI = 0.838, CFI = 0.848, RMSEA = 0.081, SRMR = 0.075.

### Hyperactive Behavior

The Strengths and Difficulties Questionnaire (SDQ) developed by Goodman is selected for this study,[40] the Chinese version of which is revised by Kou et al. Its validity has been confirmed.[41] The test comprises 25 items, including four problem behavior dimensions, namely emotional symptoms, conduct problems, hyperactive behavior and peer interaction problems, as well as a pro-social behavior dimension. In this study, the hyperactive behavior dimension is chosen to measure the level of hyperactivity in preschool children, based on a Likert-3 point scale, with higher scores indicating higher levels of hyperactivity in children. The Cronbach's α coefficient for the scale in this study is 0.701. Validated

factor analysis of the scale revealed a good fit for the indicators: $\chi 2/df = 5.444$, TLI = 0.907, CFI = 0.875, RMSEA = 0.069, SRMR = 0.022.

### Parenting Support

The parenting anxiety scale compiled by Ma is used in this study.[42] The scale consists of 16 items, which are divided into four dimensions: parenting awareness, parenting behavior, parenting support, and parenting influence. In this study, the parenting support dimension of the scale is used to measure mothers' perceived level of family parenting support. Reverse scoring is adopted for some items, and Likert-5 points are adopted for all items. The higher the score, the higher the perceived level of family parenting support. In this study, the Cronbach's α coefficient of this scale is 0.883. Confirmatory factor analysis of the scale shows that the indicators are well fitted: $\chi 2/df = 6.791$, TLI = 0.846, CFI = 0.874, RMSEA = 0.079, SRMR = 0.067.

## Statistical Analyses

The study is conducted by using SPSS 26.0 statistical software with SPSS macros PROCESS, Amos 23.0 prepared by Hayes to process the data for reliability and validity tests, descriptive statistics, correlation analyses, regression analyses, and chain mediation in moderated effects tests.

# Results

## Common Method Deviation Test

Since the data in this study are obtained from the mothers' self-reports, a common method bias test is conducted in this study, and the data are analyzed by unrotated principal component factor analysis using Harman's one-way test, with a set eigenvalue greater than 1.[43] The Results showed that there are eight factors with an eigenvalue of greater than 1, and that the first factor had 25.91% explained variance, which is much lower than the 40% critical value. Consequently, there is no serious common method bias in the data of this study.

## Analysis of the Overall Characteristics and Demographic Variability of Hyperactive Behavior in Preschool Children

The average score of hyperactive behavior of preschool children in this study is 0.732, with a standard deviation of 0.419. In addition, according to the norms developed by previous scholars,[41],734 children (79.44%) in this study display no hyperactive behavior, 98 children (10.61%) have a borderline level of hyperactive behavior, and 92 children (9.96%) have an abnormal level of hyperactive behavior. Notably, 20.56% of the preschoolers demonstrate elevated levels of hyperactive behavior, underscoring the critical importance of focusing on the developmental trajectories of this particular subgroup of children.

In an attempt to explore the specific characteristics of hyperactive behavior in preschool children, the present study uses independent samples *t*-test and one-way ANOVA to examine the differences in children's levels of hyperactive behavior in terms of gender, grade level, number of children in the family, mother's educational level, mother's age, mother's working hours, and family structure. The results demonstrate that the differences in hyperactive behavior among preschool children are not significant in terms of children's grades; they are highly pronounced in terms of gender, number of children in the family, mother's education, mother's age, mother's working hours, and family structure.

Preschool boys exhibit notably higher levels of hyperactive behavior compared to girls, while children from single-child households demonstrate significantly elevated levels of hyperactive behavior in contrast to those from two-child and multi-child families. Moreover, preschoolers with mothers possessing a high school education or lower display markedly increased levels of hyperactive behavior compared to children with mothers holding a college degree. This difference persists as children with mothers having a bachelor's or postgraduate degree also exhibit higher levels of hyperactive behavior. Children born to mothers aged 21–30 years tend to display significantly more hyperactive behavior than those with mothers aged 31–40 years and 41–50 years. Additionally, children of mothers who are full-time caregivers or work over 10 hours per day exhibit notably higher levels of hyperactive behavior than those with mothers working 8–10 hours or less than 8 hours. Notably, children from divorced or single-parent families demonstrate

considerably higher levels of hyperactive behavior compared to those from nuclear families, three-generation households, and other family structures. For further details, refer to Tables S1 and S2 in the Supplementary Material.

## Relationship Between Mothers' Problematic Mobile Phone Use and Preschoolers' Hyperactive Behavior

In this study, the mothers' problematic mobile phone use scores are statistically analyzed, and the results show that the scores of all dimensions are slightly lower than the theoretical median of 3, and the overall level is moderately low, with the highest scores on the withdrawal dimension and the lowest scores on the inefficacy dimension. The correlation analysis also reveals that loss of control, withdrawal, avoidance, and ineffectiveness all show a highly positive correlation with preschoolers' hyperactivity, with correlation coefficients of 0.165, 0.080, 0.098, and 0.121, respectively, as shown in Table 1.

On the premise that maternal problematic mobile phone use and its dimensions are significantly associated with the hyperactive behavior of preschool children, the present study further explores the extent to which maternal problematic mobile phone use affects the hyperactive behavior of preschool children. Demographic variables that differ significantly on hyperactive behavior, notably child gender, mother's education, mother's age, mother's working hours, number of children in the family, and family structure, are used as control variables, and maternal problematic mobile phone use is used as the independent variable for linear regression analyses. The results demonstrate that maternal problematic mobile phone use ($\beta$ = 0.160, $t$ = 5.030, $P$ < 0.001) positively predict preschoolers' hyperactive behavior after excluding confounding by variables such as child sex, number of children, mother's age, mother's education, mother's working hours and family structure. Each 1 standardized unit increase in maternal problematic mobile phone use is associated with a 0.160 standardized unit elevation in preschoolers' hyperactive behavior, suggesting that higher levels of maternal problematic mobile phone use increase pre-school preschoolers' hyperactive behavior, as detailed in Table 2.

## Chain-Mediated Effect Test

To start with, work-family conflict and parent-child interaction disorder are correlated with mothers' problematic mobile phone use and preschoolers' hyperactive behavior. The results demonstrate a two-by-two significant correlation ($p$ < 0.001) between maternal problematic mobile phone use, work-family conflict, parent-child interaction dysfunction, and preschoolers' hyperactive behavior. More specifically, maternal problematic mobile phone use is significantly and positively correlated with work-family conflict, parent-child interaction dysregulation, and child hyperactivity; work-family conflict is significantly and positively correlated with parent-child interaction dysregulation and child hyperactivity; and parent-child interaction dysregulation is significantly and positively correlated with child hyperactivity, as detailed in Table 3.

This study then proceeds to test the chain mediation effect, using the non-parametric percentile Bootstrap method to test the mediation effect, applying model 6 of the PROCESS plug-in for the SPSS macro program to test the chain mediation effect of work-family conflict, parent-child interaction disorder in the relationship between mothers' problematic mobile phone use and preschoolers' hyperactivity behavior. Findings reveal that work-family conflict and disorders of parent-child interaction act as chain mediators between mothers; problematic mobile phone use and preschoolers'

**Table 1** Means, Standard Deviations, and Correlations of the Variables in This Study (N = 924)

| Variables | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| Loss of control | 1.794 | 0.620 | — | — | — | — | — | — |
| Withdrawal | 2.126 | 0.898 | 0.501*** | — | — | — | — | — |
| Avoidance | 2.088 | 0.887 | 0.404*** | 0.464*** | — | — | — | — |
| Ineffectiveness | 1.702 | 0.844 | 0.585*** | 0.463*** | 0.487*** | — | — | — |
| Maternal problematic mobile phone use | 1.933 | 0.614 | 0.829*** | 0.832*** | 0.702*** | 0.729*** | — | — |
| Preschoolers' hyperactivity behavior | 0.732 | 0.419 | 0.165*** | 0.080* | 0.098** | 0.121*** | 0.139*** | — |

**Notes**: *$p$ < 0.05, **$p$ < 0.01, ***$p$ < 0.001.

**Table 2** Results of Regression Analysis of Maternal Problematic Mobile Phone Use and Preschoolers' Hyperactive Behavior

| Model | | | *B* | *SE* | *β* | *t* | VIF |
|---|---|---|---|---|---|---|---|
| **Common Element** | | | **0.518** | **0.141** | **—** | **3.685*** ** | **—** |
| **Independent variable** | **Maternal problematic mobile phone use** | | **0.109** | **0.022** | **0.160** | **5.030*** ** | **1.055** |
| Control variable | Gender | Boys | 0.124 | 0.026 | 0.149 | 4.779*** | 1.012 |
| | | Girls | 0 | — | — | — | — |
| | Number of children in the family | One | 0.119 | 0.063 | 0.130 | 1.880 | 4.982 |
| | | Two | 0.018 | 0.058 | 0.020 | 0.303 | 4.629 |
| | | Three or more | 0 | — | — | — | — |
| | Maternal age | 21 ~ 30 years old | 0.189 | 0.052 | 0.140 | 3.635*** | 1.564 |
| | | 31 ~ 40 years old | −0.002 | 0.036 | −0.002 | −0.058 | 1.561 |
| | | 41 ~ 50 years old | 0 | — | — | — | — |
| | Mother's educational background | Primary school or below | 0.137 | 0.096 | 0.091 | 1.434 | 4.217 |
| | | Junior high school | 0.144 | 0.092 | 0.113 | 1.567 | 5.494 |
| | | High school or secondary school | 0.194 | 0.089 | 0.184 | 2.185* | 7.387 |
| | | Junior college | 0.096 | 0.087 | 0.100 | 1.110 | 8.453 |
| | | Full-time bachelor's degree | 0.005 | 0.085 | 0.005 | 0.056 | 9.498 |
| | | Graduate students (master or doctor) | 0 | — | — | — | — |
| | Mother's working hours | Full-time mothers | −0.116 | 0.058 | −0.114 | −1.998* | 3.405 |
| | | 8 hours or less | −0.195 | 0.056 | −0.213 | −3.511*** | 3.852 |
| | | 8–10 hours | −0.178 | 0.054 | −0.210 | −3.304** | 4.211 |
| | | 10 hours or more | 0 | — | — | — | — |
| | Family structure | Divorced or single-parent families | 0.025 | 0.082 | 0.019 | 0.301 | 4.043 |
| | | Nuclear family | −0.096 | 0.074 | −0.112 | −1.295 | 7.835 |
| | | The big family of three generations | −0.014 | 0.078 | −0.014 | −0.183 | 6.534 |
| | | Other family forms | 0 | — | — | — | — |
| $R^2$ | | | | | 0.135 | | |
| F | | | | | 8.308*** | | |
| Dependent variable: Preschoolers' hyperactive behavior | | | | | | | |

**Notes**: *$p$ < 0.05, **$p$ < 0.01, ***$p$ < 0.001.
**Abbreviations**: SE, standard error; VIF, variance inflation factor.

**Table 3** Correlations of All Variables in This Study (N = 924)

| Variables | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1. Maternal problematic mobile phone use | — | — | — | — |
| 2. Work-family conflict | 0.381*** | — | — | — |
| 3. Parent-child interaction disorder | 0.173*** | 0.491*** | — | — |
| 4. Preschoolers' hyperactive behavior | 0.139*** | 0.259*** | 0.288*** | — |

**Note**: ***$p$ < 0.001.

hyperactivity, with a mediation effect value of 0.087, which accounts for 54.50% of the total effect of mothers' problematic mobile phone use on preschoolers' hyperactive behavior. The results of the mediating effect are shown in Table 4 and Figure 2.

Specifically, the mediating effect consists of three pathways of indirect effects: indirect effect 1 (0.043) through the pathway of "maternal problematic mobile phone use → work-family conflict → preschoolers' hyperactive behavior"; indirect effect 2 (0.002) through the pathway of "maternal problematic mobile phone use → parent-child interaction disorder → preschoolers' hyperactive behavior"; and indirect effect 3 (0.002) through the pathway of "maternal

**Table 4** Regression Analysis of the Relationship of Variables in the Intermediary Model

| Outcome Variable | Predictive Variable | *R* | $R^2$ | *F* | *β* | t |
|---|---|---|---|---|---|---|
| WFC | MPMPU | 0.437 | 0.191 | 13.402 | 0.384 | 12.505*** |
| PCID | MPMPU | 0.523 | 0.274 | 20.063 | 0.009 | 0.286 |
| | WFC | — | — | — | 0.496 | 15.740*** |
| PHB | MPMPU | 0.434 | 0.189 | 11.685 | 0.073 | 2.185* |
| | WFC | — | — | — | 0.113 | 2.996** |
| | PCID | — | — | — | 0.221 | 6.299*** |

**Notes**: *$p$ < 0.05, **$p$ < 0.01, ***$p$ < 0.001; All variables in the model are standardized and included in the regression equation.
**Abbreviations**: WFC, work-family conflict; MPMPU, maternal problematic mobile phone use; PCID, parent-child interaction disorder; PHB, preschoolers' hyperactive behavior.

problematic mobile phone use → work-family conflict → parent-child interaction disorder → preschoolers' hyperactive behavior". The effect sizes of the three paths as a percentage of the total effect size are 26.88%, 1.25%, and 26.25%, in that order, and the Bootstrap 95% confidence intervals for indirect effect 1 and indirect effect 3 do not include 0, that is, path 1 and path 3 are significant. The results of the mediated effects decomposition are shown in Table 5.

## Moderated Mediation Effect Test

The moderating effect of this chain mediation is examined in this study using Model 88 of the PROCESS plug-in for the SPSS macro program. When family parenting support is put into the chain mediator model, the product term of work-family conflict and family parenting support is not a significant predictor of preschoolers' hyperactivity (β = 0.021, $t$ = 0.600, $P$ > 0.05), whereas the product term of disorders of parent-child interactions and family parenting support is a significant predictor of preschoolers' hyperactivity ($\beta$ = - 0.069, $t$ = −2.119, $P$ < 0.05), suggesting that the relationship between "maternal problematic mobile phone use → work-family conflict → work-family conflict → parenting support" is not a significant predictor. P < 0.05), indicating that family parenting support moderated the predictive effect of parent-child disorders on preschoolers' hyperactive behavior in the pathway of "maternal problematic mobile phone use→work-family conflict→parent-child disorders→preschoolers' hyperactive behavior". To be specific, the chain mediation effect for low-level family parenting support is 0.050, with a 95% confidence interval excluding 0 and a significant moderated chain mediation effect; the chain mediation effect for medium-level family parenting support is 0.037, with a 95% confidence interval excluding 0 and a significant moderated chain mediation effect; and the chain mediation effect for high-level family parenting support is 0.024, with a 95% confidence interval excluding 0, with a significant moderated chain-mediated effect. It indicates that the level of family parenting support would affect the pathway from parent-child interaction disorder to preschoolers' hyperactive behavior, and the chain-mediated effect is stronger for low levels of family parenting support than for high levels of family parenting support. The results of the moderating effects are shown in Table 6, and the results of the moderating effects at various levels of family parenting support are shown in Table 7.

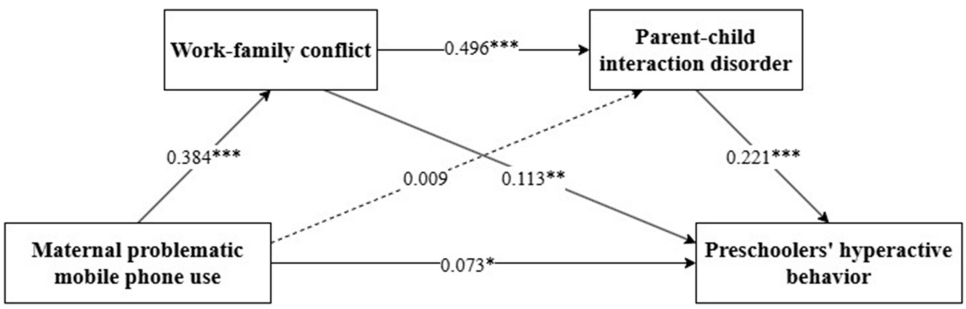


**Figure 2** Chain-mediated effect of work-family conflict and parent-child interaction disorder. All the path coefficients were standardized *$p$ < 0.05; **$p$ < 0.01; ***$p$ < 0.001.

**Table 5** Standardized Bootstrap Estimates and 95% Confidence Intervals for Indirect Effects

| Model Pathway | Effect | 95% CI | | Relative Mediating Effect |
|---|---|---|---|---|
| | | *LLCI* | *ULCI* | |
| MPMPU → WFC → PHB | 0.043 | 0.015 | 0.075 | 26.88% |
| MPMPU → PCID → PHB | 0.002 | −0.012 | 0.017 | 1.25% |
| MPMPU → WFC → PCID → PHB | 0.042 | 0.027 | 0.058 | 26.25% |

**Notes**: All the path coefficients were standardized.
**Abbreviations**: WFC, work-family conflict; MPMPU, maternal problematic mobile phone use; PCID, parent-child interaction disorder; PHB, preschoolers' hyperactive behavior; LLCI, the lower limit of 95% confidence interval; ULCI, the upper limit of 95% confidence interval.

**Table 6** Moderated Mediation Effect Test

| Outcome Variable | Predictive Variable | *R* | $R^2$ | *F* | *β* | *t* |
|---|---|---|---|---|---|---|
| PHB | — | 0.458 | 0.210 | 11.428 | — | — |
| | MPMPU | — | — | — | 0.049 | 1.486 |
| | WFC | — | — | — | 0.094 | 2.473* |
| | PCID | — | — | — | 0.193 | 5.438*** |
| | FPS | — | — | — | −0.139 | −4.353*** |
| | WFC × FPS | — | — | — | 0.021 | 0.600 |
| | PCID × FPS | — | — | — | −0.069 | −2.119* |

**Notes**: *$p$ < 0.05, ***$p$ < 0.001; All variables in the model are standardized and included in the regression equation.
**Abbreviations**: WFC, work-family conflict; MPMPU, maternal problematic mobile phone use; PCID, parent-child interaction disorder; PHB, preschoolers' hyperactive behavior; FPS, family parenting support.

**Table 7** Moderating Effects of Different Parenting Support Levels in Families

| Family Parenting Support | Effect | Boot SE | *LLCI* | *ULCI* |
|---|---|---|---|---|
| Low level of family childcare support | 0.050 | 0.010 | 0.032 | 0.071 |
| Medium level of family childcare support | 0.037 | 0.008 | 0.023 | 0.052 |
| High level of family childcare support | 0.024 | 0.010 | 0.004 | 0.044 |

**Note**: All the coefficients were standardized.
**Abbreviations**: Boot SE, bootstrap standard error; LLCI, the lower limit of 95% confidence interval; ULCI, the upper limit of 95% confidence interval.

Further simple slope analyses reveal that the effect of parent-child interaction disorder on preschoolers' hyperactive behavior is more pronounced for mothers who receive low levels of family parenting support, while the effect of parent-child interaction disorder on preschoolers' hyperactive behavior is less pronounced for mothers who receive high levels of family parenting support. In other words, access to high levels of family parenting support mitigates the negative effects of parent-child interaction disorder on preschoolers' hyperactive behavior more strongly than for mothers who receive low levels of family parenting support. Simple slope results are shown in Figure 3.

# Discussion

## Differences in Hyperactive Behavior of Preschool Children Across Demographic Characteristics

In this study, it is found that the detection rate of preschool children with hyperactive behavior at abnormal or borderline levels in the sample reached 20.56%, which is much higher than the detection rate of ADHD in Chinese

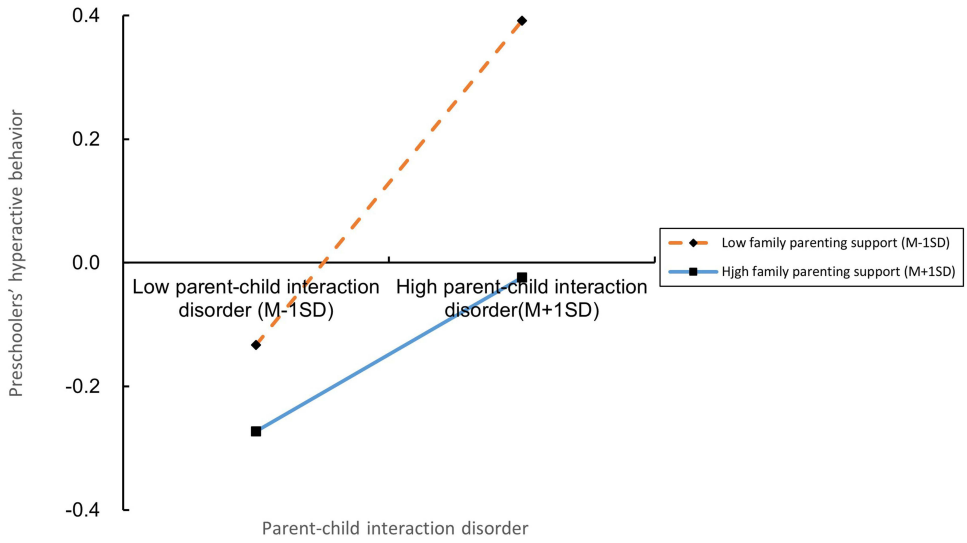


**Figure 3** Moderated mediation model.

children and adolescents, which is 6.26%,[44] while 57.37% of them are boys, and the percentage of boys is greater than that of girls in all school segments, which is similar to that of the previous study.[45] However, the proportion of children in the sample with hyperactive behavior at borderline and abnormal levels gradually declines with the rise of school segments, specifically 38.95% of children in small classes, 36.84% of children in middle classes, and 24.21% of children in large classes. It can be observed that the number of children displaying hyperactive behavior gradually decreases with age, which is similar to the same argument made by the previous authors.[46] Meanwhile, although boys show higher rates of hyperactive behavior detection than girls, studies have illustrated that cultural biases (eg, gender expectations) can lead to lower rates of hyperactive behavior detection in girls,[45] making it difficult to accurately estimate gender differences. The results of this part of the study may also be influenced by cultural bias, which leads to the under-detection of hyperactivity behavior in girls.

Moreover, the results of the study also demonstrate that the level of hyperactive behavior of children in single-child families is remarkably higher than that of two-child and multi-child families. The possible reason for this is that in two-child and multi-child families, children can obtain support and response from their siblings when they are indifferent or neglected by their mothers,[47] thus reducing the possibility of hyperactive behaviors. At the same time, the level of children's hyperactive behavior diminished as the mother's education advanced, and the influence brought about by the mother's education on children's hyperactive behavior is to a greater extent reflected in parenting styles and sensitivities,[48] with mothers with higher education being more likely to adopt a scientific approach to resolving children's problematic behavior such as hyperactivity and thus lowering the level of children's hyperactive behavior. Children's hyperactive behavior equally demonstrates remarkable differences by mother's age, with children of younger mothers having higher levels of hyperactive behavior than children of older mothers, and the disparity caused by mother's age may be because younger individuals typically face higher levels of work-family conflict,[49] and their energy is more easily distracted by events other than childcare. The higher levels of hyperactive behavior in children of mothers who work long hours and full-time mothers may be attributed to the inability of mothers to rationalize the distribution of time between work and family life,[50] which puts a damper on child development. Next, children from divorced or single-parent families have significantly higher levels of hyperactive behavior than children from other families, and mothers in divorced or single-parent families often do not have access to effective and positive external support, which in turn hurts child development.[51] The results of the above analysis of the differences in hyperactivity in preschool children across demographic characteristics show that different environmental factors play an essential role in children's development as well.

## Maternal Problematic Mobile Phone Use as a Risk Factor for Increased Hyperactive Behavior in Preschoolers

The results of this study show that mothers' problematic mobile phone use can significantly positively predict preschool children's hyperactivity behavior and is a risk factor for children to develop higher levels of hyperactivity behavior, which also echoes the findings of existing studies.[8,10] One possible explanation is that the mother's excessive use of mobile phones is often accompanied by indifference and neglect of children,[11] and the mother's frequent neglect of communication with children will lead to the alienation of children from their mothers, and then affect the parent-child relationship between each other.[52] From the child's perspective, the lack of timely response from the mother in terms of parent-child dialogue and emotional communication can also cause a degradation of parent-child intimacy, an intensification of conflict and dependency, and eventually lead to high levels of emotional or hyperactivity behaviors in the child.[53] Moreover, in terms of the parenting perspective, high-frequency use of mobile phones drastically reduces mothers' attention and responsiveness to parenting behavior, especially when mothers use mobile phones around their children, and the reduction in the level of parenting sensitivity is even more pronounced.[10,54] When children are frustrated by their mothers' responses, negative emotional responses and impulsive behavior of disobeying their mothers maybe two ways to express frustration.[54] On the other hand, mothers whose children suffer from behavioral problems may also seek support and various types of parenting information on the internet and social media or use their mobile phones as a distraction from the frustrations of parenting.[55] It is evident that appropriate use of mobile phones by mothers in the parenting environment or access to positive and effective parenting information while using mobile phones in various ways to create a supportive warm and harmonious family atmosphere for children is necessary for the healthy development of preschool children.

## Maternal Work-Family Conflict and Parent-Child Interaction Disorder Also Deserve Attention

This study reveals that problematic mobile phone use by mothers can influence hyperactivity in preschool children through the mediating effect of work-family conflict. Specifically, maternal problematic mobile phone use positively predicts work-family conflict,[13,14] and work-family conflict positively predicts preschool children's hyperactivity behavior,[16,56] which is consistent with previous research findings. According to the spillover hypothesis,[18] excessive use of mobile phones by individuals directly contributes to the spillover of work demands to the non-work domain, which can give rise to a certain degree of work-family conflict in individuals. In addition,[13] the use of mobile phones during non-working hours is found to affect the extent to which an individual recovers from fatigue, which in turn negatively affects the individual's family atmosphere.[57] Mothers engaged in professions that demand constant connectivity may often experience problematic mobile phone use, leading to potential social psychological distress such as increased social anxiety.[58] According to the scarcity hypothesis, an individual's time and resources are limited, and in the case of work-family conflict, mothers may give up some of their family activities, parent-child interactions, or work-related opportunities, thereby generating fatigue, distress, or emotional withdrawal, which may be a pathway through which work-family conflict affects mothers' children.[17] Moreover, the Diathesis-Stress Model suggests that children with certain risk or vulnerability characteristics are more susceptible to the detrimental effects of unfavorable environments, leading to poorer developmental outcomes.[59] Subsequently, mothers with high levels of work-family conflict typically show lower emotional and behavioral involvement with their children,[60] are less likely to engage in leisure and parenting activities with their children,[61] are more strict, irritable, and less likely to respond warmly to parenting behavior.[62] The aforementioned maternal behaviors increase the likelihood of children developing problematic behaviors, such as hyperactivity.

Nevertheless, this research does not demonstrate that mothers' problematic mobile phone use can be influenced by pre-school children's hyperactive behavior through the mediating role of disorders in parent-child interactions. This is somewhat of a discrepancy with the findings of previous studies.[21,63] However, the frequency of parent-child interactions does not significantly predict the level of hyperactive behavior in preschool children.[23] Nonetheless, with the development of the economy and the advent of the Internet era, Chinese parents have paid more attention to parenting, and it has

become more convenient for mothers to obtain knowledge related to parent-child interaction,[55] making the quality of parent-child interactions continue to improve, leading to the lowest degree of parent-child interaction disorder instead of the parental stress perceived by mothers.[64] Also, it is found that even though some mothers had excessive mobile phone use, these mothers also gain a wealth of knowledge about parenting from their mobile phones, which could facilitate the mothers to effectively improve the quality of parent-child interactions.[55] This might be an essential reason why disorders of parent-child interactions could not play a significant mediating role between mothers' problematic mobile phone use and preschool children's hyperactive behavior.

In addition, the present study uncovers that maternal problematic mobile phone use could exert an influence on preschool children's hyperactive behavior through the chain-mediated effects of work-family conflict and disorders in parent-child interactions. The specific chain-mediated pathway is manifested as maternal problematic mobile phone use positively predicted work-family conflict,[13,14] work-family conflict then positively predicted disorders of parent-child interactions,[25] which ultimately influenced preschool children's hyperactive behavior.[23] One possible explanation is that work-family conflict stemming from an individual's sense of workload is an efficacious predictor of his or her behavioral performance in the family.[65] Furthermore, adverse impacts on mothers within the workplace can have a detrimental effect on family relationships, which may subsequently manifest in children's developmental outcomes. For instance, it has been found that mothers' work stress can negatively affect children's development through role overload and parent-child conflict,[66] which may be the reason why mothers facing high levels of work-family conflict are more likely to have a greater impact on the hyperactive behavior of their preschool children. In this light, it is imperative for mothers to balance the work-family conflict brought about by excessive use of mobile phones so that parent-child interactions in the family environment are not adversely affected by it, thereby minimizing the risk of hyperactive behavior in children.

### Positive Family Parenting Support Can "Help" Children to Some Extent

The present findings suggest that parenting support moderates the effects of disorders in parent-child interactions on preschoolers' hyperactive behavior in this chain-mediated model. Parenting dysfunctions are more likely to trigger hyperactivity in children of mothers with low levels of parenting support than in mothers with high levels of parenting support. The results of this research endorse the buffering effect model of social support, which suggests that social support influences an individual's perception and judgment of potentially stressful events, and that it reduces the negative impact of stressors.[67] At the same time, social support theory suggests that the family assumes a fundamental role in the social support system and that family support is the factor that has the greatest impact on parenting stressors such as mothers' parent-child interaction disorder,[68] and that high levels of support dampen the negative effects of stressful events on mothers,[34,67] thereby improving children's undesirable behavior such as hyperactivity.[31] It is evident that mothers receiving high levels of family parenting support can not only alleviate the mothers' stress in various aspects but also play a crucial role in the healthy development of children.[29] Therefore, other members of the family should also pay attention to parenting, providing timely assistance and support to mothers, creating a conducive environment for the healthy growth of children together.

It is crucial to acknowledge that the findings of this study do not establish a causal relationship between family parenting support and the potential moderation of maternal work-family conflict on hyperactive behavior in preschool children. This departure from existing research outcomes challenges the prevailing notion that robust support systems inherently serve as protective factors in this context.[34] This may be attributed to the family parenting support received by mothers does not effectively improve the negative feelings experienced by mothers in their work.[36] However, some scholars hold the idea that organizational support and work atmosphere can effectively regulate individual work-family conflicts, reducing the interference of work on the family.[69] As a result, maternal work-family conflict may be influenced to a greater extent by factors other than family support within the social support system.

## Limitations and Future Study Directions

Several limitations should be noted in this study. Firstly, due to the utilization of a cross-sectional design, causal inferences regarding the association between maternal problematic mobile phone use and hyperactivity issues in preschoolers cannot be definitively established. To address this limitation, a longitudinal study is warranted. Secondly,

the reliance on self-reported data from mothers may introduce social desirability bias, suggesting the need for future research employing experimental methodologies to attain more objective data. Lastly, while the study primarily focuses on the impact of maternal factors and parent-child interactions on preschoolers' hyperactivity behaviors, it is essential to recognize the significant influence of peer relationships and kindergarten environments on the physical and mental well-being of preschoolers. Subsequent research endeavors could explore the contribution of additional facets of social support in elucidating the relationship between maternal maladaptive behaviors and hyperactivity issues in preschoolers.

## Conclusion

The results of this study indicate significant differences in the levels of hyperactive behavior in preschool children across demographic variables such as child gender, number of children in the family, maternal education, maternal age, maternal working hours, and family structure. Problematic mobile phone use by mothers shows a significant association with hyperactive behavior in preschool children. Work-family conflict mediates the relationship between problematic mobile phone use by mothers and hyperactive behavior in preschool children. Moreover, work-family conflict and parent-child interaction discordance act as a chain-mediated pathway between problematic mobile phone use by mothers and hyperactive behavior in preschool children. Lastly, the study reveals that family parenting support can mitigate the negative impact of parent-child interaction discordance on hyperactive behavior in preschool children. In Conclusion, the present study reveals potential pathways for how mothers' problematic mobile phone use affects preschoolers' hyperactivity behaviors. The findings provide insights from multiple perspectives (work interfering with family, parent-child interaction disorder, and parenting support) to mitigate the adverse effects of mothers' problematic mobile phone use on preschoolers' hyperactivity behaviors, and ultimately, to promote healthy development and reduce delinquent behaviors.

## Data Sharing Statement

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

## Ethics Approval and Informed Consent

Informed consent was obtained from all participants and their legal guardians. In accordance with the ethical principles of the WMA Declaration of Helsinki, the process of executing this study was approved by the Ethics Committee of Northeast Normal University under approval number KY2023-96.

## Acknowledgments

We would like to thank all those who contributed to this study. In particular, we would like to express our gratitude to Ms. Yili Xu for her data proofreading work on the original manuscript.

## Funding

This study was supported by the National Social Science Foundation of China in 2022 to the project "The study of new industrial workers' children generally beneficial childcare services in urban integration" provided to Dongqing Yu (No: 22BSH060).

## Disclosure

The authors declare that they have no competing interests.

## References

1. Ya-fen Z, Guan-hao H, Li-hua H, Dan-xia X, Wei-kang Y, Wei-qing C. Associations between preschool children's hyperactive behaviors, parents' type D personality and family environment. *Chin J Dis Con Prevent*. 2021;25(5):583–588. doi:10.16462/j.cnki.zhjbkz.2021.05.016
2. Feng-huan L, Ya-song D, Wen-qing J, Li-cong Z, Jin-lei S, Run-pu G. Study on the emotional and behavioral problems and its influencing factors of school-aged children in Shanghai. *Chinese Journal of Child Health Care*. 2018;26(2):137–140. doi:10.11852/zgetbjzz2018-26-02-07
3. Jarraya S, Wagner M, Jarraya M, Engel FA. 12 weeks of kindergarten-based yoga practice increases visual attention, visual-motor precision and decreases behavior of inattention and hyperactivity in 5-year-old children. *Front Psych*. 2019;10:796. doi:10.3389/fpsyg.2019.00796

4. Thomaidis L, Choleva A, Janikian M, et al. Attention Deficit/Hyperactivity Disorder (ADHD) symptoms and cognitive skills of preschool children. *Psychiatrike= Psychiatriki*. 2017;28(1):28–36. doi:10.22365/jpsych.2017.281.28
5. Biederman J. Attention-deficit/hyperactivity disorder: a selective overview. *Biol Psychi*. 2005;57(11):1215–1220. doi:10.1016/j.biopsych.2004.10.020
6. Pfiffner LJ, Rooney ME, Jiang Y, Haack LM, Beaulieu A, McBurnett K. Sustained effects of collaborative school-home intervention for attention-deficit/hyperactivity disorder symptoms and impairment. *J Am Acad Child Adolesc Psych*. 2018;57(4):245–251. doi:10.1016/j.jaac.2018.01.016
7. Kim J-H. Psychological issues and problematic use of smartphone: ADHD's moderating role in the associations among loneliness, need for social assurance, need for immediate connection, and problematic use of smartphone. *Comp Human Beh*. 2018;80:390–398. doi:10.1016/j.chb.2017.11.025
8. Hong W, Liu R-D, Ding Y, Oei TP, Zhen R, Jiang S. Parents' phubbing and problematic mobile phone use: the roles of the parent–child relationship and children's self-esteem. *Cyberpsych Behav Social Net*. 2019;22(12):779–786. doi:10.1089/cyber.2019.0179
9. Flores PJ *Addiction as an attachment disorder*. Jason Aronson; 2004.
10. McDaniel BT, Radesky JS. Technoference: parent distraction with technology and associations with child behavior problems. *Child Develop*. 2018;89(1):100–109. doi:10.1111/cdev.12822
11. Pinquart M. Associations of parenting dimensions and styles with externalizing problems of children and adolescents: an updated meta-analysis. *Develop Psych*. 2017;53(5):873. doi:10.1037/dev0000295
12. Greenhaus JH, Beutell NJ. Sources of conflict between work and family roles. *Acad Manage Rev*. 1985;10(1):76–88. doi:10.2307/258214
13. Derks D, Bakker AB. Smartphone use, work–home interference, and burnout: a diary study on the role of recovery. *Applied Psych*. 2014;63(3):411–440. doi:10.1111/j.1464-0597.2012.00530.x
14. Derks D, ten Brummelhuis LL, Zecic D, Bakker AB. Switching on and off…: does smartphone use obstruct the possibility to engage in recovery activities? *European J Work Organ Psych*. 2014;23(1):80–90. doi:10.1080/1359432X.2012.711013
15. Meng W, Jin-qin H, Jian-guo L, Zhi-yan C. Teacher work family conflict to children depression impact: a moderated mediation model. *Chin J Clin Psychol*. 2021;29(4):758–762. doi:10.16128/j.cnki.1005-3611.2021.04.019
16. Hess S, Pollmann-Schult M. Associations between mothers' work-family conflict and children's psychological well-being: The mediating role of mothers' parenting behavior. *J Child Fam Stud*. 2020;29:1561–1571. doi:10.1007/s10826-019-01669-1
17. Lan C, Li J. How maternal employment influences children's emotional and behavioral problems: The moderation effect of maternal mindsets and the mediation effect of home raising environment. *Stud Early Child Educ*. 2020;2:57–67. doi:10.13861/j.cnki.sece.2020.02.005
18. Staines GL. Spillover versus compensation: a review of the literature on the relationship between work and nonwork. *Human Relations*. 1980;33(2):111–129. doi:10.1177/001872678003300203
19. Dinh H, Cooklin AR, Leach LS, Westrupp EM, Nicholson JM, Strazdins L. Parents' transitions into and out of work-family conflict and children's mental health: longitudinal influence via family functioning. *Soc sci med*. 2017;194:42–50. doi:10.1016/j.socscimed.2017.10.017
20. Luo J, Wang M-C, Gao Y, et al. Refining the parenting stress index–short form (PSI-SF) in Chinese parents. *Assessment*. 2021;28(2):551–566. doi:10.1177/1073191119847757
21. Zu J, Yang W, Zhou T, Teng W, Dan F. The impact of parental phubbing on young children's problem behavior: An adjusted intermediary model. *Stud Early Child Educ*. 2022;(6):34–48. doi:10.13861/j.cnki.sece.2022.06.013
22. Hiniker A, Sobel K, Suh H, Sung Y-C, Lee CP, Kientz JA Texting while parenting: how adults use mobile phones while caring for children at the playground. 2015:727–736.
23. Poulain T, Ludwig J, Hiemisch A, Hilbert A, Kiess W. Media use of mothers, media use of children, and parent–child interaction are related to behavioral difficulties and strengths of children. *Int J Environ Res Public Health*. 2019;16(23):4651. doi:10.3390/ijerph16234651
24. Zhao J, Zhang Y, Jiang F, et al. Excessive screen time and psychosocial well-being: the mediating role of body mass index, sleep duration, and parent-child interaction. *J Pediatr*. 2018;202:157–162.e1. doi:10.1037/dev0000295
25. Baker JK, Messinger DS, Ekas NV, Lindahl KM, Brewster R. Nonexpert ratings of family and parent–child interaction. *J Family Psychol*. 2010;24(6):775. doi:10.1037/a0021275
26. Swerbenski HG, Sturge-Apple ML, Koven M, Davies PT. Strengths-based spillover models: constructive interparental conflict, parental supportive problem solving, and development of child executive functioning. *J Family Psychol*. 2023;37:1060–1071. doi:10.1037/fam0001109
27. Zhang P, Lin X. The spell of companionship: Family life, work pressure, and childcare anxiety among young urban parents. *China Youth Study*. 2020;(4):69–77. doi:10.19633/j.cnki.11-2579/d.2020.0056
28. Farmer AY, Lee SK. The effects of parenting stress, perceived mastery, and maternal depression on parent–child interaction. *J Social Serv Res*. 2011;37(5):516–525. doi:10.1080/01488376.2011.607367
29. Yue Y, Ren Y. The influence of family support on the learning quality of 5~6 years old children. *Stud Early Child Educ*. 2021;7:5–16. doi:10.13861/j.cnki.sece.2021.07.002
30. Yue Y, Zhang Y. Status of family support and improvement strategies of preschool children. *Stud Early Child Educ*. 2020. doi:10.13861/j.cnki.sece.2020.10.001
31. Belsky J. The determinants of parenting: a process model. *Child Development*. 1984;55:83–96. doi:10.2307/1129836
32. Gui-xia H. The buffering function of reproduction support in women's career break——based on the third issue of Chinese women's social status investigation report. *Collect Women's Stud*. 2014;(4):27–33. doi:10.3969/j.issn.1004-2563.2014.04.004
33. Jian S, Yu-xiang Z. Married women's fertility and its effect on their employment: The role of economic assistance and care support. *Collect Women's Stud*. 2015;(4):16–23. doi:10.3969/j.issn.1004-2563.2015.04.002
34. Wang Y, Dong Q, Liu G. A study of the relationship between social support and mothers' parenting difficulties. *Psych Develop Educ*. 1994;2:49–54.
35. Gao L, Jin W. Work-family conflict mediates the association between job demands and life and job satisfaction in Chinese middle-level managers. *Curr Psychol*. 2015;34:311–320. doi:10.1007/s12144-014-9259-9
36. Jiang J. A study of gender differences in work-family balance and factors affecting it. *Zhejiang Academic J*. 2015;3:219–224. doi:10.16235/j.cnki.33-1005/c.2015.03.029

37. Bianchi A, Phillips JG. Psychological predictors of problem mobile phone use. *Cyberpsychology & Behavior*. 2005;8(1):39–51. doi:10.1089/cpb.2005.8.39
38. Leung L. Linking psychological attributes to addiction and improper use of the mobile phone among adolescents in Hong Kong. *J Child Media*. 2008;2(2):93–113. doi:10.1080/17482790802078565
39. Carlson DS, Kacmar KM, Williams LJ. Construction and initial validation of a multidimensional measure of work–family conflict. *J Vocation Behav*. 2000;56(2):249–276. doi:10.1006/jvbe.1999.1713
40. Goodman R. The Strengths and Difficulties Questionnaire: a research note. *J Child Psychol Psychiatry*. 1997;38(5):581–586. doi:10.1111/j.1469-7610.1997.tb01545.x
41. Kou J, Du Y, Xia L. Reliability and validity of "children strengths and difficulties questionnaire" in Shanghai norm. *Shanghai Arch Psych*. 2005;17(1):25–28.
42. Ma J Research on the status and strategy of kindergarten teachers' parenting anxiety. East China Normal University; 2013.
43. Podsakoff PM, MacKenzie SB, Lee J-Y, Podsakoff NP. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J Appl Psychol*. 2003;88(5):879. doi:10.1037/0021-9010.88.5.879
44. Wang T, Liu K, Li Z, et al. Prevalence of attention deficit/hyperactivity disorder among children and adolescents in China: a systematic review and meta-analysis. *BMC Psych*. 2017;17:1–11. doi:10.1176/ajp.2006.163.4.716
45. Kessler RC, Adler L, Barkley R, et al. The prevalence and correlates of adult ADHD in the United States: results from the national comorbidity survey replication. *Am J Psychi*. 2006;163(4):716–723. doi:10.1176/ajp.2006.163.4.716
46. Fischer M, Barkley RA, Smallish L, Fletcher K. Executive functioning in hyperactive children as young adults: attention, inhibition, response perseveration, and the impact of comorbidity. *Develop Neuropsych*. 2005;27(1):107–133. doi:10.1207/s15326942dn2701_5
47. Pressman LJ, Loo SK, Carpenter EM, et al. Relationship of family environment and parental psychiatric diagnosis to impairment in ADHD. *J Am Acad Child Adolesc Psych*. 2006;45(3):346–354. doi:10.1097/01.chi.0000192248.61271.c8
48. Huang C, Pan S, Sun Y, Zhu X, Zhou G. Analysis of temperament types and related factors in children with ADHD. *Zhejiang Clin Med J*. 2016;18(5):836–838.
49. Matthews RA, Bulger CA, Barnes-Farrell JL. Work social supports, role stressors, and work–family conflict: the moderating effect of age. *J Vocation Behav*. 2010;76(1):78–90. doi:10.1016/j.jvb.2009.06.011
50. Allen TD, Finkelstein LM. Work–family conflict among members of full-time dual-earner couples: An examination of family life stage, gender, and age. *J Occup Health Psych*. 2014;19(3):376. doi:10.1037/a0036941
51. Hui L, Tao H, Guang-cheng L, et al. Study on the current situation and characteristics of single-parental children's self-supporting behavior. *Chin J Clin Psychol*. 2019;27(5):1045–1048. doi:10.16128/j.cnki.1005-3611.2019.05.039
52. Ante-Contreras D Distracted parenting: How social media affects parent-child attachment. California State University; 2016.
53. Ying-jie W, Yi Z, Yan L. Maternal psychological flexibility and six years old children's problem behaviors: The mediating role of parent-child relationship. *Chin J Clin Psychol*. 2021;29(1):118r122. doi:10.16128/j.cnki.1005-3611.2021.01.023
54. Radesky J, Miller AL, Rosenblum KL, Appugliese D, Kaciroti N, Lumeng JC. Maternal mobile device use during a structured parent–child interaction task. *Academic Pediatrics*. 2015;15(2):238–244. doi:10.1016/j.acap.2014.10.001
55. Radesky JS, Kistin C, Eisenberg S, et al. Parent perspectives on their mobile technology use: the excitement and exhaustion of parenting while connected. *J Dev Behav Pediatr*. 2016;37(9):694–701. doi:10.1097/DBP.0000000000000357
56. Yucel D, Latshaw BA. How do mothers' and fathers' work–family conflict impact children's problem behaviors? *J Family Issues*. 2021;42(3):571–598. doi:10.1177/0192513X20926209
57. Derks D, van Duin D, Tims M, Bakker AB. Smartphone use and work–home interference: the moderating role of social norms and employee work engagement. *J Occup Organ Psych*. 2015;88(1):155–177. doi:10.1111/joop.12083
58. Green M, Kovacova M, Valaskova K. Smartphone addiction risk, depression psychopathology, and social anxiety. *Analys Metaphys*. 2020;19:52–58. doi:10.22381/AM1920205
59. Belsky J, Pluess M. Beyond risk, resilience, and dysregulation: Phenotypic plasticity and human development. *Develop Psych*. 2013;25(4pt2):1243–1261. doi:10.1017/S095457941300059X
60. Repetti RL, Wood J. Effects of daily stress at work on mothers' interactions with preschoolers. *J Fam Psychol*. 1997;11(1):90. doi:10.1037/0893-3200.11.1.90
61. Roeters A, Van Der Lippe T, Kluwer ES. Work characteristics and parent-child relationship quality: the mediating role of temporal involvement. *J Marr Fam*. 2010;72(5):1317–1328. doi:10.1111/j.1741-3737.2010.00767.x
62. Cooklin AR, Westrupp E, Strazdins L, Giallo R, Martin A, Nicholson JM. Mothers' work–family conflict and enrichment: associations with parenting quality and couple relationship. *Child Care Health Dev*. 2015;41(2):266–277. doi:10.1111/cch.12137
63. De-lan F, Pei-zhen S, Jin L, Di Q. Research on the relationship between parent-child interaction disorder and behavior problems of preschool children. *J Shaanxi Xueqian Normal Univer*. 2020;36(10).
64. Hong X, Zhu W, Zhao S. Study on young parents' infant and toddler care support and parenting stress–based on research data from 13 cities across China. *J Chin Youth Soci Scie*. 2020;2. doi:10.16034/j.cnki.10-1318/c.20200410.002
65. Ilies R, Schwind KM, Wagner DT, Johnson MD, DeRue DS, Ilgen DR. When can employees have a family life? The effects of daily workload and affect on work-family conflict and social behaviors at home. *J Appl Psychol*. 2007;92(5):1368. doi:10.1037/0021-9010.92.5.1368
66. Crouter AC, Bumpus MF, Maguire MC, McHale SM. Linking parents' work pressure and adolescents' well being: insights into dynamics in dual earner families. *Develop Psych*. 1999;35(6):1453. doi:10.1037/0012-1649.35.6.1453
67. Alloway R, Bebbington P. The buffer theory of social support–a review of the literature. *Psychol Med*. 1987;17(1):91–108. doi:10.1017/S0033291700013015
68. Vaux A Social support: Theory, research, and intervention. Praeger publishers; 1988.
69. Kwan HK Antecedents and outcomes of family-supportive supervisor behaviors. Drexel University; 2014.