Predictive Effect of Maternal Life Stress in Early Childhood on Behavioral Problems at Age 5: A Chain Mediation Analysis Postprint

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Abstract

Through five waves of longitudinal measurements over five years with 107 toddlers and their mothers, this study examined the predictive effect of maternal life stress during early childhood (9 to 38 months) on child behavior problems at age 5 and its underlying mechanisms. The results revealed that maternal life stress during early childhood exhibited relative stability, though the ranking of major life events causing such stress changed over time. The mechanisms through which early maternal life stress influenced child behavior problems operated in two ways: On one hand, there was a direct effect of maternal life stress on emotional symptoms and conduct problems in children at age 5. On the other hand, an indirect effect was observed through the reduction of maternal positive parenting behaviors, which subsequently affected children' s emotional symptoms and peer problems. Additionally, early maternal life stress also impacted children' s hyperactivity and prosocial behavior through a chain mediation effect involving positive parenting and child effortful control. Conclusion: Maternal life stress has predictive effects on child behavior problems, with mechanisms including both direct effects of maternal life stress and indirect effects through positive parenting and effortful control.

Full Text

The Predictive Effects of Maternal Life Event Stress in Early Childhood on 5-year-old Child Behavioral Problems: A Chained Mediation Model

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Abstract

Through five waves of longitudinal measurements spanning five years with 107 children and their mothers, this study examined the predictive effects of maternal life stress during early childhood (9–38 months) on children' s behavioral problems at age 5 and the underlying mechanisms. Results revealed that maternal life stress demonstrated relative stability during early childhood, though the ranking of primary stress-inducing life events changed over time. The mechanisms through which early maternal life stress influenced child behavioral problems operated in two ways: first, through direct effects on children' s emotional symptoms and conduct problems at age 5; second, through indirect effects via reduced maternal positive parenting behaviors, which subsequently affected children' s emotional symptoms and peer problems. Additionally, early maternal life stress impacted children' s hyperactivity and prosocial behavior through a chained mediation pathway involving positive parenting and child effortful control. Conclusion: Maternal life stress predicts child behavioral problems through both direct effects and indirect pathways involving positive parenting and effortful control.

Keywords: maternal life event stress; behavior problem; positive parenting; effortful control; preschooler

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Introduction

Recent research on early human development reveals that while the genetic sequence carried by embryos/fetuses outlines the framework of individual development, environmental factors modify and alter specific developmental processes within these frameworks during the critical early developmental period from 0 to 3 years. The human brain responds and adapts to various early experiences, thereby supporting the acquisition and development of language, cognition, emotion, and social competencies (Carrano, 2014). With the publication of *The Lancet*' s series on "Early Child Development in Developing Countries" (Series 1, 2007; Series 2, 2011) and the latest "Advancing Early Childhood Development: From Science to Scale" (Series 3, 2016), scholars from neuroscience,

psychology, pediatrics, and economics have conveyed a unified message: a good start in life is fundamental to ensuring future sustainable development (Black et al., 2016; Britto et al., 2017).

Conversely, low-quality early caregiving environments have detrimental effects on child development. Previous scholars have focused on examining how family poverty ("hard environment") influences child development, proposing that economic disadvantage affects children' s growth through two pathways (Evans & Kim, 2013). The first pathway concerns caregiver investment—impoverished families cannot provide cognitively stimulating environments, such as lower frequency of reading interactions and fewer age-appropriate toys and educational materials. The second pathway concerns the quality of caregiver responsiveness —low-income families experience more conflict, and caregivers employ harsher parenting methods (e.g., corporal punishment) rather than positive, responsive interactions. However, in 21st-century China, alongside economic reforms and poverty alleviation policies that have increased family income and material abundance, intense social competition has also surged, creating substantial life stress. This life stress may constitute a "soft environment" distinct from economic poverty that affects child development. Evans and Kim (2013) suggest that caregivers are more susceptible than children to the effects of stressful life circumstances. As primary caregivers, mothers experiencing high-intensity life stress may create a stressful developmental environment for children, which can affect infants' and toddlers' cognitive, emotional, and social development through multiple pathways, leading to later behavioral problems (Lake & Chan, 2014).

Maternal life event stress refers to stress-inducing events that mothers experience in daily life, such as marital discord, financial strain, serious illness of family members, work or study pressure, and difficulty caring for children. Caregivers typically face two types of stress experiences: pressure from various negative events in life and work environments, and parenting stress directly related to childrearing responsibilities (Liu, Deng, Zhang, Liang, & Lu, 2015). The maternal life stress examined in this study represents the sum of these two stress experiences. While some researchers argue that parenting stress is more closely linked to child behavioral problems (Liu et al., 2015), others contend that marital conflict or other negative life events also increase maternal parenting stress and subsequently affect child behavioral problems (Anthony et al., 2005). The cumulative risk model posits that risk factors do not operate independently but rather accumulate and interconnect, jointly producing negative outcomes (Liu, Tian, & Tan, 2015). For example, low-quality marital relationships, inadequate social support systems, and financial strain increase maternal parenting stress, which may in turn reduce marital quality and increase sensitivity to work pressure (Hibel, Mercado, & Trumbell, 2012). Therefore, this study argues that comprehensively examining maternal life stress aligns better with Bronfenbrenner's bioecological theory and has greater ecological validity (Tudge et al., 2016). Previous research has primarily focused on maternal parenting stress while relatively neglecting the physical and psychological impacts of other environmental factors (e.g., economic pressure, work stress, interpersonal tension) on mothers.

Thus, our first research question concerns what major life events cause maternal psychological stress in modern society.

Numerous domestic and international studies have examined the impact of maternal parenting stress on child behavioral problems, yielding relatively consistent results showing positive correlations between high parenting stress and child behavioral problems. However, few studies have investigated the predictive effects of maternal life stress on child behavioral problems. Maternal life stress accumulates from various negative life events, with each event representing a risk factor. Rutter (1979) first discovered that the number of risk factors positively correlated with the severity of child behavioral problems. Risk factors such as poverty, parenting conflict, caregiver psychological problems, and parental marital discord all increase children' s susceptibility to negative developmental outcomes (Chronis et al., 2007). Physiological psychology research indicates that multiple negative experiences disrupt children' s physiological systems. Hanson et al. (2015) studied 128 children who experienced three types of early adversity—neglect, physical abuse, and low socioeconomic status—and found, compared to 41 healthy control children, that early negative experiences may lead to smaller amygdala and hippocampal volumes, which positively correlate with behavioral problems. Additionally, research has found that maternal life stress during pregnancy correlates with child temperament difficulties and behavioral problems, even showing negative effects on children' s academic achievement assessed ten years later (Li et al., 2013). Such research has focused primarily on the predictive effects of multiple negative life events experienced during pregnancy, often explaining findings from medical or physiological perspectives. However, early childhood is a critical period for brain development and the development of language, cognition, and other abilities (Black et al., 2016), and particularly the preschool period represents the emergence and onset stage of behavioral problems (Lü, Chen, & Wang, 2003). Therefore, our second research question examines whether maternal life stress during early childhood has predictive effects on preschool children' s behavioral problems.

Previous research suggests that maternal life stress may influence child behavioral problems through two mechanisms: direct and indirect effects. Empirical studies on direct effects have focused on the direct impact of parenting stress on child behavioral problems (Anthony et al., 2005; Crnic, Gaze, & Hoffman, 2005). This may occur because, on one hand, most studies rely on maternal reports for both parenting stress and child behavioral problems, and mothers with higher parenting stress tend to evaluate children' s behaviors more negatively (Crnic et al., 2005). On the other hand, "parenting distress," as a component of parenting stress, represents a negative emotional state that directly affects children' s emotional security and leads to behavioral problems (Liu et al., 2015). Whether the more ecologically valid construct of maternal life stress can exert direct effects on child behavioral problems warrants further examination. Indirect effect studies emphasize the mediating role of parenting behaviors, suggesting that maternal life stress impairs positive parenting practices, weakens children' s positive adaptation, and consequently leads to behavioral problems.

Positive parenting includes maternal sensitivity to children' s physical and emotional needs, providing appropriate responses, offering rich stimulation for environmental exploration, and serving as a scaffold (Black & Aboud, 2011). Positive parenting directly affects child development through caregiver-child interactions, promoting positive adaptation to the environment, mitigating negative development, and protecting children from various physical and psychological problems (Dong, Liang, Zhang, & Wang, 2017). Positive parenting plays a critical protective and promotive role in child development, particularly during early life (Britto et al., 2017; Singla, Kumbakumba, & Aboud, 2015). Existing research demonstrates that higher maternal life stress correlates with fewer positive parenting behaviors (Lee, 2003; Tan, Camras, Deng, Zhang, & Lu, 2012). Lee (2003) conducted an intervention study with 605 mother-infant dyads and found that mothers experiencing more negative life events tended to use avoidant coping strategies. Tan et al. (2012) studied 133 preschool children and their families, finding that mothers under various family stressors (including housing crowding, marital discord, financial strain, and work pressure) tended to develop permissive and authoritarian parenting styles. Both Lee (2003) and Tan et al. (2012) found that lack of positive parenting negatively affected child behavioral problems.

The indirect effects of maternal life stress manifest not only through impacts on mothers' own positive parenting behaviors but also through influences on children' s effortful control development (Gartstein, Bridgett, Young, Panksepp, & Power, 2013), which subsequently affects child behavioral problems. Effortful control refers to children' s ability to inhibit dominant responses while executing subdominant responses. This concept has dual attributes: on one hand, it is a temperamental trait with biological, neurological, physiological, and genetic foundations; on the other hand, it is a product of parent-child relationships, with positive parent-child relationships and secure attachment being critical factors for children' s development of self-regulation abilities (Kochanska & Kim, 2014). Research has found that stressful experimental environments reduce performance on Stroop tasks (a measure of effortful control components), leading researchers to infer that other chronic life stressors also harm effortful control development (Gulley, Hankin, & Young, 2015). Effortful control is an important variable affecting socioemotional development and academic achievement during the preschool period (Allan & Lonigan, 2011), with higher effortful control promoting adaptive behavior development and reducing behavioral problems (Tiberio et al., 2016). Ages 2–7 represent a period of steady improvement in children's attention and emotion regulation abilities (Sawyer, Millerlewis, Searle, Sawyer, & Lynch, 2015), with the preschool period being a stage of rapid effortful control development that is susceptible to caregiving environments and gradually imprinted by parental practices. Positive parenting behaviors effectively promote effortful control development in preschool children (Spinrad et al., 2007; Chang, Olson, Sameroff, & Sexton, 2011), making effortful control more likely to mediate the relationship between parenting behaviors and behavioral problems during this period (Tiberio et al., 2016; Chang et al., 2011).

In summary, besides direct effects, two potential mediators may exist between maternal life stress and child behavioral problems: positive parenting and effortful control. However, previous research has two main limitations. First, most studies have focused on mechanisms linking maternal parenting stress to behavioral problems, with insufficient research on high-intensity life stress faced by modern mothers. The maternal stress construct has not received adequate attention in previous research. Second, prior studies have examined relationships among two or three variables among maternal stress, positive parenting, effortful control, and behavioral problems, lacking investigation of the four-variable mechanism within a more complete system. Therefore, our third research question examines: Through what pathways does maternal life stress affect child behavioral problems—through direct effects, or through indirect effects on maternal parenting behaviors and child effortful control?

Method

Participants

In collaboration with maternal and child health hospitals, healthy 6-month-old infants and their families were recruited from urban Beijing to participate in the study, with follow-up assessments when children were 9 months (T1), 14 months (T2), 25 months (T3), 38 months (T4), and 61 months (T5). At 6 months, the total sample consisted of 106 mother-infant dyads (57 girls, 49 boys). Fourteen participants were lost across the five follow-up waves, yielding an overall attrition rate of 13.2%. Additional participants were recruited at 25 months (n = 7), 38 months (n = 2), and 61 months (n = 6), resulting in a final sample of 107 children (57 girls, 53.3%; 50 boys, 46.7%). All participants completed at least one time point of data collection. Little' s MCAR test on the main variables across five time points yielded $^{2} = 199.46$, $p = 0.22$, indicating that missing data were missing completely at random. Chi-square tests revealed no significant differences between participants who completed all five waves and those who completed at least one wave in terms of child gender, parental education level, or income level. Similarly, the 15 participants recruited at 25, 38, and 61 months did not differ significantly from the original 106 participants recruited at 6 months on these demographic variables, allowing them to be included as a homogeneous sample.

At T1, children' s mean age was 9.75 months (SD = 0.46); at T2, 14.30 months (SD = 0.84); at T3, 25.14 months (SD = 1.14); at T4, 38.33 months (SD = 1.05); and at T5, 61.08 months (SD = 0.72). Mothers' mean age at childbirth was 30.84 ± 3.52 years. The median education level for both mothers and fathers was college. The median income level was 3000–6000 RMB for mothers and 6000–10000 RMB for fathers.

Measures

Demographic Variables Survey. At T1–T5, mothers completed the Family Basic Information Questionnaire, which included child gender and age, maternal age at childbirth, parental education levels, occupational types, income levels, and other basic information.

Maternal Life Event Scale. Adapted from the Life Event Scale developed by Yang and Zhang (1990), mothers reported at T1–T4 on life events causing psychological stress. The scale includes 14 items covering potential life events such as marital discord, housing shortage, divorce, spouse death, conflict with spouse' s parents, difficulty caring for the child, major life changes, and work/study pressure. Mothers rated each event' s nature (positive, negative, neutral) and psychological impact (none, mild, moderate, severe). International research often uses the total intensity score of multiple negative life events to measure maternal life stress (Li et al., 2013), and Chinese scholars have used the total impact score of negative life events to represent psychological risk (Liu, Tian, & Tan, 2015). Following these precedents, this study defined the sum of psychological impact scores for all negative events as the cumulative stress index, with higher values indicating greater maternal life stress. Internal consistency coefficients for the maternal life stress scale across the four time points ranged from 0.88 to 0.92.

Alabama Parenting Questionnaire–Preschool Version (APQ-PV). This questionnaire assesses parental parenting behaviors (Clerkin, Marks, Policaro, & Halperin, 2007). At T5, mothers completed the positive parenting dimension, which contains 12 items (e.g., "When your child does something well, you hug or kiss him/her"). Each item was rated on a 5-point scale (1 = never to 5 = always), with higher total scores indicating higher positive parenting levels. The internal consistency coefficient for the positive parenting dimension in this study was 0.80.

Children' s Behavior Questionnaire–Short Version (CBQ-SV). Developed by Putnam and Rothbart (2006) and translated and revised by Dong et al. in China, this questionnaire measures temperament in children aged 3–7 years, including three dimensions: extraversion, negative affectivity, and effortful control. At T5, mothers rated how well each item described their child' s daily behavior on a 7-point scale (1 = extremely inappropriate to 7 = extremely appropriate). Higher mean scores indicated higher effortful control levels. The internal consistency coefficient for effortful control in this study was 0.78.

Strengths and Difficulties Questionnaire (SDQ). Developed by Goodman (2001) and first introduced in China by Kou, Du, and Xia (2005), mothers rated children' s daily behavioral performance at T5. The questionnaire contains 25 items rated on a 3-point scale (0 = not true to 2 = certainly true). It includes overall difficulties and five subscales: emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behavior. In this study, the internal consistency coefficient was 0.80 for all items and 0.63 for subscales with the total

questionnaire.

Procedure

During the five-year longitudinal study, questionnaires were distributed five times at different time points, with varying scoring and response formats. At T1–T4, mothers completed the Maternal Life Event Stress Scale at home. At T5, mothers completed questionnaires related to positive parenting and child effortful control at home, and completed the behavioral problems questionnaire in the laboratory.

Data Analysis

Data were analyzed using SPSS 22.0 and Mplus 7.4. Missing values in Mplus modeling were handled using Full Information Maximum Likelihood (FIML), which utilizes all available information from observed variables.

Results

Common Method Bias Test

Since all questionnaires were completed by mothers, Harman' s single-factor test was first used to examine common method bias. Factor analysis results did not reveal a single extracted factor, and the first factor accounted for only 12.79% of variance, indicating no serious common method bias in this study.

Sources of Maternal Life Stress

Across different periods, the psychological stress caused by negative life events was generally consistent with their frequency. At T1–T4, six life events occurred frequently and caused relatively high psychological stress: "housing shortage,""work/study pressure,""self or family member seriously ill/injured,""conflict with spouse' s parents," "difficulty caring for child," and "low quality in marital relationship." Notably, at T1, "housing shortage" ranked highest in frequency, while at T2 and T3, "work/study pressure" ranked highest. At T4, "difficulty caring for child" rose to first place in both frequency and psychological stress, while the frequency of "low quality in marital relationship" increased to tie with "conflict with spouse' s parents" (third place), though its psychological impact exceeded that of "conflict with spouse' s parents."

Correlation Analysis

Means, standard deviations, and correlations for maternal life stress across five waves, positive parenting, child effortful control, and behavioral problems are presented in Table 1 . Results showed significant positive correlations among maternal life stress at the four time points. Positive parenting was significantly or marginally significantly negatively correlated with maternal life stress at each

time point. Effortful control was marginally significantly negatively correlated with maternal life stress at T3. Children' s emotional symptoms, conduct problems, and peer problems were significantly or marginally significantly positively correlated with early maternal life stress. Hyperactivity was not significantly correlated with maternal life stress at T1–T4, but all four behavioral problem dimensions were significantly negatively correlated with positive parenting and effortful control. Prosocial behavior was marginally significantly negatively correlated with maternal life stress at T2 and significantly positively correlated with positive parenting and effortful control. T-tests revealed no significant gender differences in outcome variables. Correlation analysis showed that maternal education level at T5 was significantly negatively correlated with hyperactivity ($r = -0.33$, $p < 0.01$) and peer problems ($r = -0.23$, $p < 0.05$), but not with emotional symptoms, conduct problems, or prosocial behavior. Therefore, maternal education level was controlled for in subsequent models predicting hyperactivity and peer problems.

Direct and Indirect Effects of Maternal Life Stress on Child Behavioral Problems

Based on research hypotheses and correlation results from Table 1, a latent variable was created by combining maternal life stress scores from the four time points (9–38 months) to represent early maternal life stress (effectively controlling measurement error). Maternal education level at T5 was included as a control variable. A chained mediation model was constructed examining relationships among early maternal life stress, positive parenting, child effortful control, emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behavior. To verify the mediating relationships among positive parenting, effortful control, and behavioral problems at T5, three theoretical models were constructed following the analytic approach of Wu, Liang, Lu, and Wang (2017). All three models shared the feature that maternal life stress directly affected positive parenting, effortful control, and behavioral problems. The models differed in their ordering: Model 1 specified positive parenting → effortful control → behavioral problems; Model 2 specified behavioral problems → positive parenting → effortful control; and Model 3 specified behavioral problems → effortful control → positive parenting.

Although all three models demonstrated acceptable fit indices (^{2} test ps > 0.05, CFIs > 0.90, RMSEAs < 0.08), Satorra-Bentler corrected chi-square difference tests comparing models revealed that Model 1 fit significantly better than Model 2 ($\Delta\,^2$ (10) = 28.65, $p < 0.05$) and Model 3 ($\Delta\,^2$ (7) = 29.49, $p < 0.05$). Therefore, Model 1 results were accepted, with fit indices of $^2(31) = 40.51$, $p = 0.12$, RMSEA = 0.05, CFI = 0.95, TLI = 0.90, SRMR = 0.07.

Following the principle of parsimony in structural equation modeling, nonsignificant paths were removed from Model 1. Comparison between the full and revised models showed no significant difference ($\Delta\,^2(7) = 11.96$, $p > 0.10$), and the revised model was more concise with acceptable fit indices ($^2(38) = 48.13$,

p = 0.13, RMSEA = 0.05, CFI = 0.95, TLI = 0.92, SRMR = 0.08). The final model is presented in Figure 1 [Figure 1: see original paper].

Model results showed that early maternal life stress significantly positively predicted children's conduct problems (= 0.48, p < 0.001), marginally significantly positively predicted emotional symptoms (= 0.33, p < 0.10), and significantly negatively predicted maternal positive parenting (= -0.52, p < 0.01). Maternal positive parenting significantly positively predicted child effortful control (= 0.42, p < 0.001), marginally significantly negatively predicted emotional symptoms (= -0.25, p < 0.10), and significantly negatively predicted peer problems (= -0.42, p < 0.001). Child effortful control significantly negatively predicted hyperactivity (= -0.44, p < 0.001) and significantly positively predicted prosocial behavior (= 0.35, p < 0.01).

Given the relatively small sample size, Bootstrapping (5,000 resamples) was used to test mediation effects, following researcher recommendations (Wen & Ye, 2014). Direct effects included two paths: (1) maternal life stress → conduct problems, effect = 0.48, 90% CI [0.22, 0.66]; (2) maternal life stress → emotional symptoms, effect = 0.33, 90% CI [0.04, 0.64].

Mediation test results are presented in Table 2 . Results indicated four significant indirect paths through which early maternal life stress affected child behavioral problems via positive parenting and effortful control: (1) maternal life stress → positive parenting → emotional symptoms; (2) maternal life stress → positive parenting → peer problems; (3) maternal life stress → positive parenting → effortful control → hyperactivity; (4) maternal life stress → positive parenting → effortful control → prosocial behavior. These findings demonstrate that maternal positive parenting indirectly buffers the effects of early life stress on preschoolers' emotional symptoms and peer problems, while both positive parenting and child effortful control chain-mediate the effects of maternal life stress on hyperactivity and prosocial behavior.

Discussion

This study analyzed five-year longitudinal data, finding that urban mothers' life stress demonstrates relative stability during early childhood, and that early maternal life stress affects child behavioral problems through both direct and indirect pathways that differ across various behavioral problems (conduct problems, emotional symptoms, hyperactivity, peer problems) and prosocial behavior. We discuss these results below.

Relative Stability of Maternal Life Stress in Early Childhood

Across the five waves spanning five years, this study found that maternal life stress demonstrated relative stability during early childhood. Specifically, the following factors consistently and stably influenced mothers' perceived life stress: "housing shortage," "work/study pressure," "self or family member seriously ill/injured," "conflict with spouse' s parents," "difficulty caring for child," and

"low quality in marital relationship."From a socioeconomic development perspective, high living costs creating substantial life pressure represents a distinctive feature of urban life. With continuously rising prices and housing costs coupled with childbirth, housing shortage has become a major challenge for many urban families. From a work/study perspective, in the internet era, rapid information technology updates compel young parents to continuously pursue further education to adapt to increasingly competitive work environments. The "12th Survey on Quality of Life of Chinese Women in Cities (2016)" published by *Women of China* magazine and the Huakun Women's Life Survey Center reported that over 86% of married women experience work pressure, with more than 57% feeling "high work pressure," showing variation across cities—mothers in first-tier cities reported higher proportions of intense work pressure. From an environmental change perspective, increasingly severe environmental pollution in recent years poses serious challenges to urban residents' quality of life and physical health, with elderly and infants being particularly vulnerable populations under air pollution exposure, experiencing rapid pathological reactions that exacerbate urban mothers' life stress and psychological anxiety. Additionally, from a coparenting perspective, to share urban living economic pressures, both parents participate in the workforce, creating a widespread phenomenon of grandparental involvement in daily childcare, which leads to coparenting conflicts that intensify relationship tensions between married women and their spouse' s parents. From the perspective of maternal role characteristics and child development features, despite grandparental coparenting involvement, traditional Chinese culture positions mothers as primary caregivers who bear most daily childcare responsibilities while also participating in professional work. The infancy and toddlerhood period represents a critical stage for children' s self-awareness development and the emergence of the first period of defiance, making "difficulty caring for child" one of the primary aspects of maternal life stress during early childhood.

In this study, compared to 9–25 months, both the frequency and psychological impact of "difficulty caring for child" and "low quality in marital relationship" increased at 38 months. One possible explanation is that after children enter kindergarten around age 3, both children and mothers experience separation anxiety, which positively correlates and mutually influences each other (Peleg, Halaby, & Whaby, 2006). Therefore, mothers reported higher psychological stress at this time. Peleg et al. also found that children of working mothers had greater difficulty adapting to kindergarten, creating additional maternal life stress. Furthermore, the arrival of children represents a risk factor for parental marital happiness. As family size increases, couples face more intense economic pressure and heavier housework burdens. When children enter kindergarten, couples may also face disagreements in educational philosophies, further contributing to marital discord (Tsang, Harvey, Duncan, & Sommer, 2003). To date, no domestic longitudinal studies have examined maternal life events during early childhood, making this research an important contribution to this gap.

Direct Effects of Early Maternal Life Stress on Child Behavioral Problems

This study demonstrated that higher maternal life stress predicted more emotional symptoms and conduct problems in children. First, mothers experiencing more negative life events face more risk factors affecting their own mental health. Mothers under prolonged high life stress experience more depression and anxiety, creating a negative family atmosphere. Children living long-term with highly stressed mothers are exposed to this negative emotional atmosphere for extended periods, maintaining high stress levels that harm emotional security and generate anxiety, tension, and other emotional symptoms. Under this sense of insecurity, children' s personalities tend toward either overcontrol (timid withdrawal) or undercontrol (high aggression) (Shen, 2008). A meta-analysis found that compared to externalizing problems like hyperactivity, children' s internalizing problems such as emotional symptoms showed stronger correlations with maternal risk factors (Connell & Goodman, 2002), making them more susceptible to direct negative effects from maternal life stress. These findings also support Chang, Shelleby, Cheong, and Shaw (2012), who followed 310 preschool children and found that children with high negative emotionality facing cumulative risk factors (including poverty, housing shortage, parental discord, and maternal depression) showed more severe emotional dysregulation. On the other hand, in high-stress families, children' s normal material or emotional needs often go unmet, creating psychological insecurity and disappointment that triggers conduct problems such as stealing and lying (Sun et al., 2016).

Indirect Effects of Early Maternal Life Stress on Child Behavioral Problems

This study found that indirect effects of early maternal life stress first manifested through reduced maternal positive parenting behaviors, which increased children' s emotional symptoms and peer problems. When mothers experienced more stressful life events, their risk of depression increased, making it difficult to maintain positive parenting behaviors (Lee, 2003). Mothers with higher life stress showed lower involvement and sensitivity related to positive parenting, instead tending to use harsh, authoritarian discipline. Punitive or negative parenting increases child behavioral problems (Tan et al., 2012). A recent study of high-risk families also found that lack of positive parenting increased children' s anxiety, depression, and other emotional symptoms (Howell & Barrett-Becker, 2016). Regarding protective effects against peer problems, secure parent-child attachment represents an important factor. However, when mothers experience high life stress, anxious and depressed mothers lack the energy or patience to meet and respond to children' s emotional needs, reducing positive parenting behaviors. The absence of maternal warmth and responsiveness threatens the formation of secure attachment, and insecure attachment makes it difficult for children to establish trusting interpersonal relationships, leading to poor social skills. Zheng and Cen (2006) found that children experiencing negative parent-

ing lacked initiative in peer interactions, making it difficult for them to become popular and increasing their likelihood of peer rejection.

Second, indirect effects of early maternal life stress also manifested through impacts on children' s self-regulation development via reduced positive parenting, leading to increased hyperactivity and decreased prosocial behavior. Positive parenting guides children in regulating negative emotions and promotes effortful control development (Chang, Shaw, Dishion, Gardner, & Wilson, 2015). A study of 3–3.5-year-old children demonstrated that maternal positive parenting behaviors enhanced children' s effortful control abilities (Lengua, Honorado, & Bush, 2007). Similarly, Shelleby et al. (2012) found that increasing positive parenting behaviors significantly improved children' s behavioral control. Our results support these previous findings. However, early maternal life stress, as a risk factor, damages maternal positive parenting behaviors, affecting children' s effortful control development. Children with poor effortful control cannot effectively inhibit impulses or regulate behaviors when encountering environmental stimuli, often showing symptoms of inattention and hyperactivity (Olson, Sameroff, Kerr, Lopez, & Wellman, 2005). Infant effortful control development is closely linked to the gradual maturation of cortical inhibitory functions. However, when infants and toddlers are chronically exposed to high maternal life stress, excessive early negative experiences may affect brain development, potentially leading to insufficient inhibitory function and hyperactive behavior—an area warranting further empirical investigation. Additionally, this study found that the pathway from maternal life stress to prosocial behavior was significant only through the positive parenting → effortful control sequence. This result resembles Bae and Lim' s (2012) study of 3–5-year-old children, which found that when simultaneously considering effortful control and positive parenting, child effortful control more directly predicted prosocial behavior, while positive parenting affected prosocial behavior through effortful control. The researchers explained that prosocial behavior development requires children to first develop better cognitive abilities, and effortful control development helps children shift focus from themselves to others, generating empathy.

Limitations and Implications

This study' s innovation lies in its four-wave longitudinal assessment of maternal life stress during infancy and toddlerhood to examine its predictive effects on child behavioral problems. Compared to examining only maternal parenting stress, the maternal stress construct in this study has greater ecological validity. However, several limitations exist. First, the sample size was relatively small and primarily comprised families with higher socioeconomic status from urban Beijing, requiring caution when generalizing findings to other regions and socioeconomic groups. Second, due to resource constraints in the longitudinal design, the collection of mediator and outcome variables did not consider temporal sequencing, requiring caution in causal inference. Third, this study did not examine interactive effects of maternal life stress across multiple time points on

child development; future research should incorporate more longitudinal data modeling approaches. Fourth, all variables were measured using questionnaires. Although procedural controls were implemented to reduce common method bias, potential influence cannot be completely ruled out. Future research should combine experimental tasks with questionnaires to further validate these findings.

Despite these limitations, this study has important practical implications. Results suggest that interventions should give equal attention to risk factors (maternal life stress) and protective factors (positive parenting and effortful control). That is, interventions should both reduce maternal life stress (e.g., improving marital quality, enhancing employee learning opportunities, reducing work pressure, improving social support systems) and enhance mothers' positive parenting abilities and skills. Notably, maternal life stress can directly cause children' s conduct problems, requiring societal attention. The study advocates for "caring for mothers" initiatives—when focusing on early child development, we must attend not only to children themselves but also to mothers who create nurturing environments, as mothers' lived experiences and resulting psychological environments significantly affect child development.

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Appendix 1: Maternal Life Event Scale

Below are life events that everyone may encounter. Whether an event is good or bad can be judged based on personal circumstances. These events may have psychological effects on individuals (experienced as tension, pressure, excitement, or distress), with varying degrees and duration of impact. Please mark the most appropriate answer with a checkmark. (For events that did not occur, mark "did not occur" and skip the nature, psychological impact, and duration columns).

Event	Occurrence Time	Nature of Event	Psychological Impact	Impact Duration
1. Addition of new family member				
2. Marital discord				
3. Living separately from spouse (due to work)				
4. Housing shortage				
5. Spouse death				
6. Conflict with spouse's parents				

Event	Occurrence Time	Nature of Event	Psychological Impact	Impact Duration
7. Self or family member seriously ill/injured				
8. Death of family member				
9. Difficulty caring for child				
10. Major life changes				
11. Unemployment				
12. Starting new job				
13. Work/study pressure				

Note: The original table formatting has been preserved while translating the content for clarity.

Note: Figure translations are in progress. See original paper for figures.