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Maternal childhood emotional abuse predicts Chinese infant behavior problems: Examining mediating and moderating processes

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ABSTRACT

The current study examined the mediating effect of maternal negative expressiveness as well as the moderating effects of infant inhibitory control (IC) in the association between maternal childhood emotional abuse (CEA) and infant behavior problems. Drawing from 207 families from mainland China, 2-wave data were reported in this study when the infants were 6 months (T1) and 14 (T2) months. Mothers (Mean age = 32.85 years, $SD = 4.04$) reported their CEA on the Childhood Trauma Questionnaire-Short Form (CTQ-SF) at T1, and their negative expressiveness on the Self-Expressiveness in the Family Questionnaire (SEFQ) at T2. The Infant-Toddler Social and Emotional Assessment (ITSEA) and a reverse categorization task were used to measure infant behavior problems and IC at T2, respectively. The results showed that T1 maternal CEA, rather than physical and sexual abuse, uniquely predicted T2 negative expressiveness. Maternal negative expressiveness significantly mediated the positive relations of maternal CEA and infant externalizing, internalizing and dysregulation problems. In addition, the moderated mediation model showed that the association between maternal negative expressiveness and infant dysregulation problems was moderated by infant IC. Specifically, the mediating pathway from maternal CEA to dysregulation problems through maternal negative expressiveness was significant, only for infants with poor IC. The results were robust even after controlling for family socioeconomic status (SES), maternal childhood physical and sexual abuse. The importance of mediating and moderating processes in understanding the effect of maternal emotional abuse during childhood on infant behavior problems is discussed.

1. Introduction

Behavior problems emerge during the second half of the first year and develop rapidly in the following years (Carter, Briggs-Gowan, Jones, & Little, 2003; Lorber, Del Vecchio, & Slep, 2015). Behavior problems exhibit a remarkable stability from early childhood to adolescence (Racz, Putnick, Suwalsky, Hendricks, & Bornstein, 2017; Weeks et al., 2016). Thus, it is important to understand the effects of individual and environmental factors on infant behavior problems. Young children with mothers who experienced childhood emotional abuse (CEA) are at a greater risk for developing behavior problems, suggesting the need to elucidate the underlying mechanisms (Collishaw, Dunn, O'Connor, Golding, & Avon Longitudinal Study of Parents and Children Study

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Team, 2007; Myhre, Dyb, Wentzel-Larsen, Grøgaard, & Thoresen, 2014).

1.1. Maternal childhood emotional abuse and infant behavior problems

As a subtype of psychological maltreatment, emotional abuse during childhood involves acts of commission by caregivers that have adverse effects on child emotional development, such as spurning (hostile rejection/degradation), terrorizing (e.g., threatening) and isolating (Klika & Conte, 2018; Paul & Eckenrode, 2015). CEA is quite common and oftentimes, displays a higher prevalence than childhood physical and sexual abuse (Kuo, Khoury, Metcalfe, Fitzpatrick, & Goodwill, 2015; Moulton, Newman, Power, Swanson, & Day, 2015). Maternal CEA is associated with negative interpersonal and intrapersonal consequences, which may interfere mother-child interaction and then exert detrimental effect across generations (Bai & Han, 2016; Maneta, Cohen, Schulz, & Waldinger, 2015; Myhre et al., 2014).

Maternal childhood abuse history has been found to positively relate to behavior problems in the next generation (Madigan, Wade, Plamondon, & Jenkins, 2015; Miranda, de la Osa, Granero, & Ezpeleta, 2013; Oshio & Umeda, 2016). However, previous studies are mainly focused on physical and sexual abuse, but less attention was paid to emotional abuse. In addition, no study has examined the intergenerational linkage of maternal CEA and child behavior problems in infancy. Accumulating evidence suggests the association between maternal CEA and child social maladjustment. For example, Collishaw et al. (2007) found that children with mothers who experienced CEA tended to display more maladjustment problems, which included conduct problems, hyperactivity, emotional symptoms and peer relationship problems. Also, in another longitudinal study, Myhre et al. (2014) found that maternal CEA predicted toddler externalizing problems at 36 months.

The majority of past research has examined the link between maternal childhood abuse and child behavior problems with mother-child dyads from Western cultures. As a complementary to the existing literature, more studies are needed to test this association in the samples from other cultures. Researchers indicate that it is critical to take cultural differences into consideration when examining childhood abuse experiences (Wu, Chi, Lin, & Du, 2018). The association between maternal childhood abuse and child behavior problems in Chinese culture may be different from what is found in western cultures because of the different cultural understandings of childhood abuse. In the current study, we therefore, constructed models to test how maternal CEA impacts infant behavior problems in a moderate-size Chinese sample and further analyze the underlying mediating and moderating processes.

1.2. Mediating effect of maternal negative expressiveness

Negative expressiveness refers to the displays of negative emotions in the family context, including dominant negative emotions such as anger, contempt and blaming, and submissive negative emotions such as sadness and embarrassment (McCord & Raval, 2016). Maternal negative expressiveness contributes to the overall emotional climate of the family, which is considered as an important approach of maternal socialization of children's emotion. Family negative expressiveness at a higher frequency is related to more child externalizing, internalizing and dysregulation problems (Luebbe & Bell, 2014; McCord & Raval, 2016; Nelson et al., 2012). Furthermore, the results from longitudinal studies have supported the causal effect of maternal negative expressiveness on child behavior problems (Cummings, Cheung, & Davies, 2013). Maternal negative expressiveness is determined, at least in part, by their own childhood abuse experiences. Several studies have shown that individuals with CEA tend to experience and express more negative emotions (Ellenbogen, Trocmé, Wekerle, & McLeod, 2015; Gardner, Moore, & Dettore, 2014; Hoglund & Nicholas, 1995).

From the perspectives of bioecological model of human development, child social adjustment is affected by both distal factors and proximal factors (Bronfenbrenner & Morris, 2006). Distal factors indirectly contribute to child development through proximal factors, which are relatively more immediate. Maternal childhood abuse is considered as a distal factor in the development of child behavior problems (Madigan et al., 2015). Proximal factors, such as maternal psychopathology and parenting behaviors, have been considered to play mediating roles in linking maternal childhood abuse to child behavior problems (Madigan et al., 2015; Miranda et al., 2013; Myhre et al., 2014). Similarly, because existing research has suggested maternal negative expressiveness as both a product of maternal CEA as well as a producer of child social maladjustment, maternal negative expressiveness is tested as a mediator in the current study.

1.3. Moderating effect of infant inhibitory control

Inhibitory control (IC) is one of the core elements of executive functions, which is a higher-order cognitive-regulatory process (Diamond, 2013). IC refers to the capacity to suppress a prepotent response in favor of a subdominant response (Cuevas, Swingler, Bell, Marcovitch, & Calkins, 2012; Utendale & Hastings, 2011). Prepotent response is the dominant, almost automatic response that is activated by an external cue before response signal onset (Diamond, 2013). According to the hierarchical model of executive function development, children are able to deal with simple conflict between dominant and subdominant responses by the end of the first year, and to inhibit a prepotent response using a rule held in mind by the end of the second year (Garon, Bryson, & Smith, 2008). Previous studies have shown that child IC deficits are associated with more behavior problems (Beijers, Riksen-Walraven, Putnam, de Jong, & de Weerth, 2013; Utendale & Hastings, 2011).

From the perspective of developmental psychopathology, social maladjustment occurs as a consequence of interaction between individual characteristics and social contexts (Toth & Cicchetti, 2013). Individual characteristics can buffer or strengthen the influences of contextual factors on child social adjustment, and thus similar adverse experiences may result in different social adjustment outcomes. Growing evidence indicates that the effects of maternal socialization and maladaptive psychological functioning

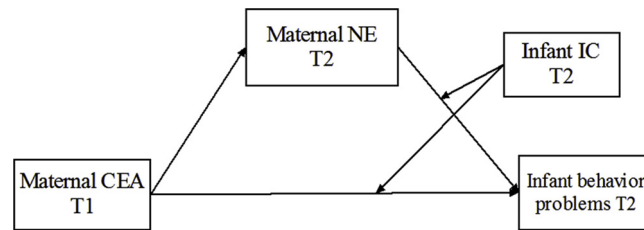


Fig. 1. Proposed moderated mediation model of maternal childhood emotional abuse, negative expressiveness, infant inhibitory control in predicting infant behavior problems.

on child behavior problems vary as a function of child IC ability. For instance, van Aken, Junger, Verhoeven, van Aken, and Deković, (2007) revealed that the association between maternal negative control, including expression of negative emotions, and child behavior problems tended to be stronger for 17-month-old toddlers with lower IC. Also, in a recent Chinese study, we found that IC at 2 years minimized the longitudinally negative impact of maternal life stress on a latent construct of toddler behavior problems composed of externalizing, internalizing and dysregulation problems (Liu, Zhou, Wang, Liang, & Shi, 2018). Additionally, behavior problems depend crucially on the goodness of fit between maternal emotion socialization and child IC (Lagacé-Séguin & Coplan, 2005; Yi, Gentzler, Ramsey, & Root, 2016). However, no study has examined whether infant IC functions as a resilience resource that mitigates the impacts of maternal childhood abuse and negative expressiveness on child behavior problems.

1.4. The present study

The present study attempted to clarify the underlying mechanisms from maternal CEA to infant behavior problems by testing the mediating effects of maternal emotional expressiveness and the moderating effects of infant IC. Both IC and behavior problems emerge during the second half of the first year, and their important periods of development occur during the second year (Carter et al., 2003; Garon et al., 2008). So far, there is no validated measurement to assess them for infants younger than 12 months. Thus, the present study focused on infant IC and behavior problems at the second year. Given the high correlations between CEA and other types of childhood abuse (Kuo et al., 2015), it is preferable to examine the effect of maternal CEA accounting for physical and sexual abuse.

The proposed moderated mediation model is illustrated in Fig. 1. The present study aimed to examine (1) whether maternal negative expressiveness mediated the link between maternal CEA at 6 months of child age (T1) and infant behavior problems at 14 months (T2), and (2) how infant IC interacted with maternal CEA and maternal negative expressiveness in predicting infant behavior problems. Maternal CEA was hypothesized to predict higher frequency of maternal negative expressiveness, which, in turn, would predict more behavior problems in infants. Moreover, infant IC was expected to buffer the negative impacts of both maternal CEA and negative expressiveness on infant behavior problems.

2. Method

2.1. Participants

The participants were from an ongoing longitudinal study on family parenting environment and child development. The families were recruited from 5 major maternal and child health care centers in urban areas of Beijing, when infants were younger than 6 months. These centers were selected from 3 different districts of Beijing. Graduate research assistants majored in psychology approached the families and explained the study in the waiting rooms when infants had routine immunization. The eligible criteria included (a) infants were healthy and full-term delivery, and (b) mothers did not have a gestational or perinatal complication. Among 351 eligible families approached, 111 (31.62%) refused to participate, 33 (9.40%) did not complete assessments. Eventually, 207 mothers and their infants (105 boys, 102 girls) were assessed when infants were 6 months (T1; Mean age = 6.36 months, $SD = 0.37$) and 14 months (T2; Mean age = 14.81 months, $SD = 0.53$). These infants were born between December 2014 and May 2016.

All participants were Chinese, and not offered any treatment from T1 to T2. All mothers were married. Demographic characteristics of the participants are presented in Table 1. Family socio-economic status (SES) was calculated based on parents' education and occupation, and family monthly income using Li's scale for Chinese urban residents (Chen et al., 2015; Li, 2010). Families who completed the assessments at only T1 or T2 ($n = 34$, 16.43%) did not significantly differ from those who completed the assessments at both T1 and T2 ($n = 173$, 83.57%) on child gender ($\chi^2(1) = .71$, $p = 0.399$), SES and any variable of interest (t s ranging from 0.08 to 1.77, $p > 0.05$). Thus, mother-infant dyads who completed the assessments for at least one of two time points were included in order to reduce estimation bias and increase statistical power.

2.2. Procedures

The study was approved by the Ethic Committee of Peking University First Hospital, and informed consent was obtained from infants' parents at both T1 and T2. Data collection at T1 were conducted between July 2015 and November 2016, while data

Table 1
Demographic characteristics of the participants (N = 207).

	Mean \pm SD or Number (%)
Infant characteristics	
Boys	105 (50.72%)
Firstborn	157 (75.85%)
Parent characteristics	
Maternal age at T1 (year)	32.85 \pm 4.04
Paternal age at T1 (year)	35.07 \pm 5.01
Length of marriage at T1 (year)	5.17 \pm 3.15
Maternal education	
High school education or less	7 (3.38%)
Associate or bachelor's degree	129 (62.32%)
Master's or doctorate degree	67 (32.37%)
Chose not to answer	4 (1.93%)
Paternal education	
High school education or less	11 (5.31%)
Associate or bachelor's degree	124 (59.90%)
Master's or doctorate degree	69 (33.33%)
Chose not to answer	3 (1.45%)
Maternal income (RMB)	
Unemployed	21 (10.14%)
Less than 6,000	63 (30.43%)
6,000-10,000	60 (28.99%)
Over 10,000	58 (28.02%)
Chose not to answer	5 (2.42%)
Paternal income (RMB)	
Less than 6000	24 (11.59%)
6000-10,000	70 (33.82%)
Over 10,000	107 (51.69%)
Chose not to answer	6 (2.90%)

collection at T2 were conducted between April 2016 and July 2017. Mothers filled out the questionnaires regarding their childhood abuse at T1, and reported negative expressiveness and infant behavior problems at T2. The questionnaires were mailed to mothers, and returned with prepaid envelopes or collected during the laboratory visit. Infant IC was assessed by a laboratory task at T2.

2.3. Measures

2.3.1. Maternal childhood abuse

Maternal childhood abuse was measured by the Childhood Trauma Questionnaire-Short Form (CTQ-SF; Bernstein et al., 2003). The CTQ-SF is a 28-item validated and widely used instrument that retrospectively assesses abuse and neglect in childhood (younger than 16 years). In the current study, mothers rated their experiences of emotional, physical and sexual abuse on 15 items which were scored from 1 (*never true*) to 5 (*very often true*). Five items for emotional abuse scale were “People in my family called me things like ‘stupid,’ ‘lazy,’ or ‘ugly,’” “My parents wished I was never born,” “I felt that someone in my family hated me,” “People in my family said hurtful or insulting things to me,” and “I believe that I was emotionally abused.” The total score is the sum of the scores on each item. Higher scores represent greater exposure to abuse. The Chinese version of CTQ-SF (Zhao et al., 2005) showed adequate Cronbach's α coefficients for the three abuse subscales (between 0.60 and 0.66). In the present study, the Cronbach's α coefficients ranged from 0.60 to 0.78.

2.3.2. Maternal negative expressiveness

The 12-item negative expressiveness subscale from the Self-Expressiveness in the Family Questionnaire (SEFQ; Halberstadt, Cassidy, Stifter, Parke, & Fox, 1995) was used to assess maternal negative expressiveness. Mothers responded on a 9-point Likert scale, ranging from 1 (*not at all frequently*) to 9 (*very frequently*). Items include “Showing contempt for another's actions,” “Expressing dissatisfaction with someone else's behavior,” “Expressing anger at someone else's carelessness,” “Sulking over unfair treatment by a family member,” “Blaming one another for family troubles,” “Putting down other people's interests,” “Showing dislike for someone,” “Going to pieces when tension builds up,” “Expressing disappointment over something that didn't work out,” “Quarreling with a family member,” “Expressing momentary anger over a trivial irritation,” and “Threatening someone.” Maternal negative expressiveness was calculated by averaging the scores of each item, with higher scores indicating higher frequency of expressing negative emotions. This measurement displayed satisfactory internal consistency with 0.82 of the Cronbach's α coefficient (Halberstadt et al., 1995). In the present study, the Cronbach's α coefficient was 0.88.

2.3.3. Infant behavior problems

Mothers rated infant behavior problems on the Infant-Toddler Social and Emotional Assessment (ITSEA; Carter et al., 2003). The ITSEA was widely used to evaluate socio-emotional problems and competencies for children aged 1–3 years. This instrument contains

three behavior problem subscales and one social competence subscale. In this study, we used the three behavior problem subscales, consisting 69 items rated on a 3-point scale (0 = *not true/rarely*, 1 = *somewhat true/sometimes*, 2 = *very true/often*). The externalizing problems were assessed by 18 items covering activity/impulsivity, aggression/defiance and peer aggression. The internalizing problem subscale was composed of 27 items measuring depression/withdrawal, general anxiety, separation distress, and inhibition to novelty. Dysregulation problems were assessed by 24 items on sleep, negative emotionality, eating, and sensory sensitivity. Three scale scores were calculated by averaging items, with higher scores indicating more behavior problems. The Chinese version of the three behavior problem subscales have been widely used in China, showing good internal consistency with Cronbach's α coefficients ranging from 0.80 to 0.83 (Zhang et al., 2009). In the present study, the Cronbach's α coefficient was 0.80 for both externalizing and dysregulation problems, and 0.77 for internalizing problems.

2.3.4. Infant inhibitory control

Most of the laboratory tasks used to measure IC (e.g., go/no-go tasks, stop-signal tasks and delay-of-gratification tasks) are adapted for children aged 2 years or older (Diamond, 2013). The age-appropriated simplified version of the reverse categorization task, developed by Johansson et al. to address the need to assess infant IC, was used in infants as young as 1 year of age (Johansson, Marciszko, Brocki, & Bohlin, 2016). Each child was tested individually. Infants were presented with six yellow blocks and were instructed to put blocks into a red or a yellow bucket. During the practice trials, infants were invited to put 6 yellow blocks into the yellow bucket. The experimenter put in one block as demonstration, then asked the infant to sort six blocks by saying "Can you put this into the yellow bucket?" and tapping on the yellow bucket. Each time one block was given. Infants were corrected if they put the block into the red bucket. After establishing the prepotent response via six successful practice trials, test trials with reversed rules were started. During the test trials, infants were instructed to put 4 yellow blocks into the red bucket. The experimenter repeated the rule and tapped on the red bucket every test trial. Infants were not corrected, and the first response was recorded. Infants had a prepotent tendency to put yellow block into the yellow bucket, and had to overcome this habitual response and execute a sub-dominant response. The total score was calculated by the total number of correctly sorted blocks during the test trials, which ranged from 0 to 4.

2.4. Data analyses

Descriptive statistics and Pearson correlations were examined for all the variables. Structural equation modeling with a bootstrapping strategy ($B = 1000$) was then performed in *Mplus* Version 7.4 (Muthén & Muthén, 1998–2015). Missing data were handled by full information maximum likelihood (FIML). All variables were standardized prior to analysis. A mediation model was first conducted to test the mediating effect of maternal negative expressiveness on the association between T1 maternal CEA and T2 infant behavior problems. Then, a moderated mediation model was conducted to examine the moderating effects of infant IC on the links between maternal CEA and infant behavior problems, and the links between maternal negative expressiveness and infant behavior problems. Maternal CEA, maternal negative expressiveness, infant IC and their two-way interactions (CEA \times IC, negative expressiveness \times IC) predicted externalizing, internalizing and dysregulation problems. The conditional indirect effects at two difference values of the moderators (at 1 *SD* below the mean and at 1 *SD* above the mean) were further analyzed for their statistical significance based on the 95% confidence intervals (95% CI).

3. Results

The means, standard deviations, and bivariate correlations of all the variables are shown in Table 2. Correlation analyses indicated that T1 maternal CEA was positively correlated with T2 maternal negative expressiveness and T2 infant internalizing

Table 2
Descriptive Statistics and Bivariate Correlations for All Study Variables.

	1	2	3	4	5	6	7	8	9	10
1. child gender	–									
2. Family SES	–.05	–								
3. Maternal CEA T1	.03	–.04	–							
4. Maternal CPA T1	–.12	–.01	.34***	–						
5. Maternal CSA T1	.06	.07	.27***	.32***	–					
6. Maternal NE T2	.04	.07	.32***	.01	–.06	–				
7. Infant IC T2	–.01	–.04	.11	.06	–.06	.05	–			
8. Externalizing T2	–.06	–.21**	.06	.01	–.06	.17*	–.02	–		
9. Internalizing T2	–.05	–.06	.19*	–.01	–.02	.34***	.03	.36***	–	
10. Dysregulation T2	–.03	–.16*	.13	–.02	–.07	.34***	–.07	.65***	.53***	–
Mean	–	16.16	6.35	5.56	5.48	4.16	2.26	.52	.48	.62
SD	–	2.24	1.76	1.31	1.35	1.23	1.28	.27	.21	.26

Notes. SES = Socioeconomic Status; CEA = Childhood Emotional Abuse; CPA = Childhood Physical Abuse; CSA = Childhood Sexual Abuse; NE = Negative Expressiveness; IC = Inhibitory Control.

* $p < .05$, ** $p < .01$, *** $p < .001$.

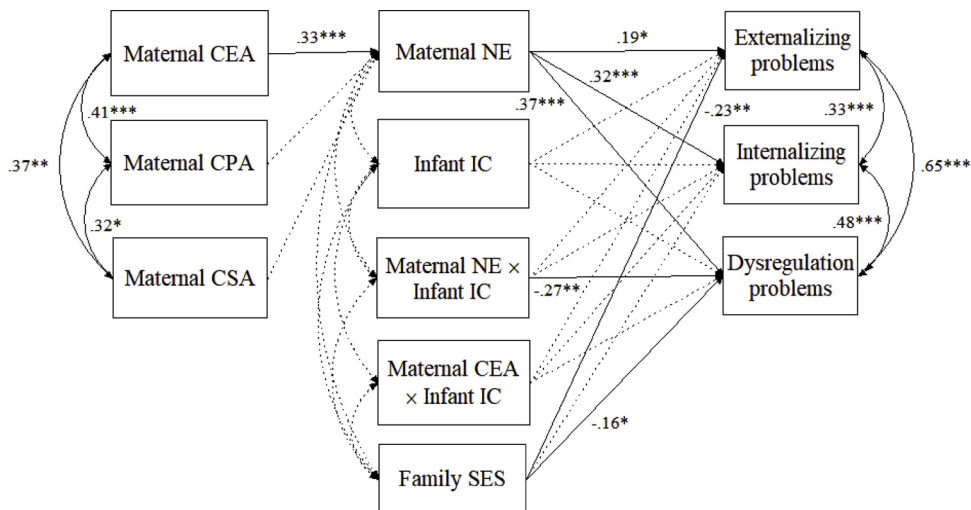


Fig. 2. Moderated mediation model predicting infant behavior problems from maternal childhood emotional abuse, negative expressiveness and infant inhibitory control.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Standardized regression coefficients for significant paths are presented. Significant paths are represented by solid lines, while non-significant paths are represented by dotted lines. All the paths from maternal CEA, CPA and CSA to behavior problems are not reported for brevity, which are not significant.

problems. Maternal negative expressiveness was positively correlated with infant externalizing, internalizing and dysregulation problems. Infant IC and behavior problems were not significantly correlated. Maternal emotional, physical and sexual abuse were positively correlated with each other. Family SES was negatively correlated with infant externalizing and dysregulation problems. Therefore, maternal physical, sexual abuse and family SES were controlled in the subsequent analyses. Child gender was not controlled because it was not associated with any variable.

3.1. Mediating effect of maternal negative expressiveness

The mediation analysis with maternal CEA as predictor, maternal negative expressiveness as mediator, infant behavior problems as outcome variables was first tested, controlling for family SES, maternal physical and sexual abuse. This model exhibited a good fit, $\chi^2(1, N = 207) = 1.63, p = .202, RMSEA = .06, CFI = 1$, and $SRMR = .02$. Maternal CEA significantly predicted maternal negative expressiveness, $\beta = .33$, 95% CI [.15, .49], whereas maternal physical and sexual abuse did not significantly predict maternal negative expressiveness. Maternal negative expressiveness was positively associated with infant externalizing problems, $\beta = .19$, 95% CI [.03, .32], internalizing problems, $\beta = .32$, 95% CI [.15, .46], and dysregulation problems, $\beta = .35$, 95% CI [.19, .50]. Maternal negative expressiveness significantly and completely mediated the effect of maternal CEA on externalizing problems, $\beta = .06$, 95% CI [.01, .13], internalizing problems, $\beta = .11$, 95% CI [.05, .18], and dysregulation problems, $\beta = .11$, 95% CI [.06, .20].

3.2. Moderating effect of infant inhibitory control

The moderated mediation analysis, with maternal CEA as predictor, maternal negative expressiveness as mediator, infant IC as moderator, and infant behavior problems as outcome variables, was tested, controlling for family SES, maternal physical and sexual abuse. This model exhibited an excellent fit, $\chi^2(1, N = 207) = .04, p = .835, RMSEA = 0, CFI = 1$, and $SRMR = .01$. As shown in Fig. 2, the paths from maternal negative expressiveness to infant externalizing, internalizing and dysregulation problems were also significant. The interaction between maternal CEA and infant IC in predicting behavior problems was not significant. The moderated mediation model was supported for infant dysregulation problems. There was a significant interaction between maternal negative expressiveness and infant IC in predicting infant dysregulation problems, $\beta = -.27$, 95% CI [-.44, -.06].

To further probe the interaction, a simple slope analysis was conducted. The conditional effects were examined at 1 SD below the mean of IC (.98) and 1 SD above the mean of IC (3.54). Maternal negative expressiveness was positively associated with infant dysregulation problems, only for infants who were low in IC (see Fig. 3). The indirect effect of maternal CEA on dysregulation problems through maternal negative expressiveness was significant for infants low in IC, $B = 0.05, SE = 0.02, 95\% CI [0.03, 0.09]$. In contrast, the indirect effect of maternal CEA on dysregulation problems through maternal negative expressiveness was not significant for infants high in IC, $B = 0.01, SE = 0.01, 95\% CI [-0.02, 0.03]$.

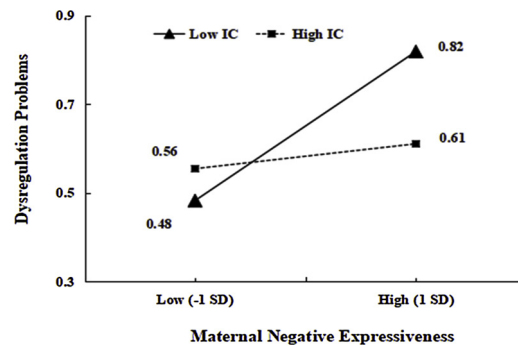


Fig. 3. Interaction between maternal negative expressiveness and infant inhibitory control in predicting infant dysregulation problems. Note. Significant paths are represented by solid lines, while non-significant paths are represented by dotted lines.

4. Discussion

The purpose of the present study was to examine the indirect effect of CEA on infant behavior problems through maternal negative expressiveness, as well as the moderating effects of infant IC. In line with our expectations, the findings indicated that maternal CEA, but not childhood physical and sexual abuse, uniquely predicted maternal negative expressiveness. Maternal negative expressiveness significantly mediated the effects of maternal CEA on infant externalizing, internalizing and dysregulation problems. Furthermore, the moderated mediation analysis showed that infant IC significantly moderated the association between maternal negative expressiveness and infant dysregulation problems. Specifically, the indirect effect of CEA on dysregulation problems through negative expressiveness was significant, only for infants with lower levels of IC.

4.1. Maternal CEA and infant behavior problems

Maternal CEA was positively correlated with infant internalizing problems. Unlike studies with Western samples, maternal physical abuse was not significantly correlated with child behavior problems (Madigan et al., 2015). Parenting practices are shaped by cultural values, which establish and maintain social and behavioral norms. Parental corporal punishment is still viewed as normal in Chinese cultural values, because traditional Chinese cultures tend to support the sayings that “rod makes a dutiful son” and “spare the rod and spoil the child” (Wu et al., 2018). Thus, the negative effect of childhood physical abuse may be mitigated in Chinese society. The lack of significant correlation between maternal sexual abuse and child behavior problems is consistent with previous research (Madigan et al., 2015).

4.2. Mediating effect of maternal negative expressiveness

The hypothesized pathway linking maternal CEA to infant behavior problems through maternal negative expressiveness was supported. The direct effect of maternal CEA on infant behavior problem was not significant after including negative expressiveness in the model. These results indicated that maternal CEA, as a distal factor, did not impact infant behavior problems directly, when taking proximal factor into consideration. Previous studies have shown that individuals with CEA are more likely to express more negative emotions (Ellenbogen et al., 2015; Gardner et al., 2014; Høglund & Nicholas, 1995). Our study provides evidence that mothers’ CEA predicts their negative expressiveness in the family. CEA may exert a detrimental effect on victim’s socio-emotional functioning, such as emotion regulation and empathy ability (Bai & Han, 2016; Maneta et al., 2015). Hence, individuals experiencing emotional abuse in childhood may tend to express more negative emotions across different contexts. More importantly, maternal CEA uniquely predicts negative expressiveness over and above other forms of childhood abuse, which is consistent with previous study suggesting that CEA is uniquely associated with difficulties in emotion regulation (Kuo et al., 2015). More studies are needed to elucidate the unique association between CEA and socio-emotional functioning (e.g., emotion identification, attachment, empathy, and prosocial behaviors), which may lead to a deeper understanding of the negative consequences of childhood abuse.

Our study also found that maternal negative expressiveness was related to more infant externalizing, internalizing and dysregulation problems. Previous studies examining the association between maternal negative expressiveness and child behavior problems have mainly focused on preschool-aged children or older children (Cummings et al., 2013; McCord & Raval, 2016). The results found in this study contribute to the growing literature by extending this link to infants as young as 14 months of age, and also support the importance of maternal negative expressiveness in child social maladjustment. Maternal negative expressiveness is theorized to be associated with child emotional insecurity, and hypothesized to impair child emotion regulation and emotion understanding abilities, which, in turn, may increase the risks for externalizing, internalizing and dysregulation problems (Are & Shaffer, 2016; Cummings et al., 2013).

4.3. Moderating effect of infant IC

As expected, the mediating effect of maternal negative expressiveness was moderated by infant IC for infant dysregulation problems as the outcome variable. Infants whose mothers expressed more negative emotions in the family were prone to exhibit more dysregulation problems, but their IC would protect them from this detrimental impact. The effects of maternal emotional socialization and maladaptive psychological functioning on child dysregulation problems depend to a large extent on child IC. In another study, we also found that child IC attenuated the impact of maternal life stress on a latent construct of behavior problems mainly indicated by dysregulation problems (Liu et al., 2018). Prior studies investigating child behavior problems have focused exclusively on externalizing or internalizing problems, but less attention was paid to dysregulation problems. However, dysregulation problems, which include problems in sleeping and eating, negative emotionality and sensory sensitivity, should not be ignored in child behavior problems (Carter et al., 2003). In addition, dysregulation problems have been found to be the most frequently detected in infants as young as 1 year of age (Sanner, Smith, Wentzel-Larsen, & Moe, 2016).

Infants who have difficulties in IC task and experience high levels of maternal negative expressiveness at the same time are rated by their mothers with a higher dysregulation problem score. IC, the ability to manage attention, thoughts, emotions and behaviors, has been shown to contribute to the modulation of emotion-related activities (Carlson & Wang, 2007). Children with IC deficits are more likely to have lower levels of emotion understanding ability and less likely to inhibit negative emotional responses elicited by environment (Carlson & Wang, 2007). Because of a lack of capacity to manage emotions and behaviors by themselves, children who fail to develop adequate IC abilities may tend to modulate emotional responses in accordance with maternal reactions, guidance and model (Yi et al., 2016). Therefore, infants who are characterized by low levels of IC may imitate more emotionally dysregulated behaviors (e.g., negative emotionality) from mothers who express more negative emotions through observational learning process.

IC has been frequently studied in a framework of temperament or executive functions, and is considered as a core component of self-regulation development in these frameworks (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013). The development of IC is consistently linked to functional maturation of the frontal cortex in the developmental cognitive neuroscience research (Cuevas et al., 2012). Also, the refinement of IC is shaped over time by contextual factors, such as parenting behaviors (Fay-Stammbach, Hawes, & Meredith, 2014). IC could be improved through training individuals in the activities, such as go/no-go task and stop-signal task (Berkman, Kahn, & Merchant, 2014). Infants with lower levels of IC show greater vulnerability to maternal negative expressiveness, and thus develop more dysregulation problems. It may be possible to reduce dysregulation problems by improving IC abilities.

Maternal negative expressiveness was positively associated with infant externalizing and internalizing problems, but these links were not significantly moderated by infant IC. IC capacity in 14-month-old infants is just emerging and relatively immature (Beijers et al., 2013; Cuevas et al., 2012). There is evidence that IC may not be sufficiently developed to regulate externalizing problems before preschool ages (Utendale & Hastings, 2011). Suurland et al. (2016) found that the moderating effect of child IC on physical aggression was presented in 4-to 5-year-old children but not in younger children. Replicating this study in the samples of toddlers and preschoolers could further clarify the developmental changes of the moderating effects of child IC.

4.4. Limitations

Several limitations of this study need to be noted. First, both maternal negative expressiveness and infant behavior problems were assessed by mother report, which may be vulnerable to subjective biases. Future study should consider to measure these variables by observation or interview. The second limitation is related to the assessment issues for maternal CEA. The history of emotional abuse may be under-estimated because the CTQ-SF only assess a limited set of psychological maltreatment experiences. In addition, emotional abuse was assessed retrospectively, which may introduce recall bias. For example, mothers may over-report abuse history, because memories and emotions associated with negative childhood experiences may be reactivated during interaction with their children. Finally, this study did not examine mother-infant attachment. This could be an interesting topic for future studies because maternal childhood maltreatment is related to maternal attachment with their children (Ludmer et al., 2018).

4.5. Implications and applications

Infants with mothers who have experienced CEA are not doomed to behavior problems. The differential mediating and moderating processes may be masked if a global construct of infant behavior problems is used. The lack of consistency in the mechanisms underlying the relations of maternal negative expressiveness and three behavior problem domains highlights the need of designing intervention programs aiming at different domains of behavior problems. Intervention focusing on strengthening IC may be beneficial for reducing infant dysregulation problems for those infants whose mothers suffered from CEA. In comparison, interventions designed to alleviate infant externalizing and internalizing problems may be most effective if they aim at reducing maternal negative expressiveness. In conclusion, the current study extends the existing literature by clarifying the mechanisms underlying the relation between maternal CEA and infant behavior problems. The findings establish a unique association between CEA and negative expressiveness, and suggest that the effect of maternal CEA on infant behavior problems is explained by maternal negative expressiveness. In addition, infant IC functions as a critical moderator of the association between maternal negative expressiveness and infant dysregulation problems.

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Conflict of interest

The authors declare that they have no conflict of interest.

Ethics approval

The study was approved by the Ethic Committee of Peking University First Hospital. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from infants' parents at two time points.

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