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Grandmothers are part of the parenting network, too! A longitudinal study on coparenting, maternal sensitivity, child attachment and behavior problems in a Chinese sample

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Abstract

Grandmothers are important in Chinese families. This study explored the early emerging mother-grandmother-infant network and its association with child's socioemotional development in multigenerational families in a non-WEIRD country. The analytic sample included 60 children (T1: M_{age} = 6.5 months) and their caregivers residing in Beijing. Measures used were the Strange Situation Procedure (SSP), the Lausanne Trilogue Play (LTP), the Maternal Behavior Q-Sort (MBQS), and the Infant-Toddler Social and Emotional Assessment. Structural equation and path modeling revealed that (1) more grandmaternal neutral/watching coparenting behaviors at the first assessment were related to more secure infant-mother attachment relationships at the second assessment (T2: M_{age} = 1 year); (2) maternal sensitivity at T2 was a partial mediator between earlier undermining and neutral/watching coparenting behaviors and young children's

externalizing problems at the final assessment (T3: $M_{age} = 2$ years). Findings are discussed in terms of the roles played by mother-grandmother coparenting network in the children's socioemotional development.

KEYWORDS
attachment, coparenting, externalizing problems, grandmothers, internalizing problems, Lausanne Trilogue Play, Strange Situation Procedure

1 | INTRODUCTION

Infants' early dyadic experience in a relational network with parents and caregivers has been widely recognized to play an important role in children's socioemotional development (Bakermans-Kranenburg, 2021; Dagan & Sagi-Schwartz, 2020; Van IJzendoorn et al., 1992). In addition, coparenting receives increasing attention as research has suggested that it predicts children's adjustment in unique ways (McHale & Sirotkin, 2019). Coparenting usually refers to a shared activity and responsibility between two caregivers for the care and raising of their child(ren) (McHale, 2007). Most coparenting studies include Western families from WEIRD countries (Henrich et al., 2010) and mainly focus on the mother-father-child network or "triangle" (Teubert & Pinquart, 2010), whereas mother-grandmother coparenting is a common phenomenon in most Asian cultures. In the current longitudinal study, we explore for the first time the associations between observations of mother-grandmother-infant network and child socioemotional development in the large but understudied Chinese culture.

From the perspective of intergenerational solidarity, the mutuality of support between grandparents and adult children may promote intergenerational cohesion (Bengston & Schrader, 1982). In addition, Chinese grandparents tend to consider the well-being of the family before their own interests (Goh, 2006; Goh & Kuczynski, 2010), and they are often willing to put aside their own lives to support their adult children. This is also consistent with the Confucian value of filial piety that governed family relationships in China for thousands of years (F. Chen et al., 2011). In the Confucian system, both the roles and the duties of two generations are connected through mutual interdependence (Hwang, 1999). In large Chinese cities (e.g., Beijing), well-educated and highly skilled individuals are encouraged to stay and pursue better career development opportunities. In this context of fierce competition and economic pressures, grandparents temporarily or permanently move to the large city, live with their adult children, and provide childcare, not only because of cultural expectation, but also to provide instrumental and potentially emotional support to their offspring. This is evident in both domestic and internationally migrating Chinese families (Qi, 2018; Zhu et al., 2019).

A survey indicated that Chinese fathers who live with children aged 2 and younger spent only 0.73 h a day on care in 2017, whereas mothers or grandparents spent more than 3 h per day on childcare (Du et al., 2018). According to recent data collected in the China Longitudinal Aging Social Survey (CLASS), 60% of the elderly were taking care of their grandchildren in 2014, and half of them were providing care more than 9 h a day (Song et al., 2018). Grandmothers play a pivotal role in urban Chinese families, and the coparenting dynamics operative in parent-grandparent-child network, parent-child relationship and children's socioemotional development have become an issue of increasing attention (Li &

Liu, 2019; Li & Liu, 2020). Given that grandmaternal involvement usually begins from baby's birth in China, understanding the mother-grandmother-infant network during infancy is important, without denying the importance of fathers in the Chinese context.

In Western cultures, coparenting of mothers and *maternal* grandmothers has been studied most frequently and this rather exclusive focus on matrilineal caregivers might reflect a skewed distribution of tasks and responsibilities in child rearing with larger roles for the mothers and their mothers (Bakermans-Kranenburg et al., 2019; Barnett et al., 2012; Daly & Perry, 2017). In the traditional Chinese patrilineal kinship system, however, women are under the tutelage of male kin throughout their lifetime, in particular through the three obediences ("三从"), their father when unmarried, their husband within marriage, and their son in their old age (Pang-White, 2013). Taking care of grandchildren has been consequently seen as a responsibility of the *paternal* grandparents who live in the same household or in close proximity, and in the past maternal grandparents were not expected to contribute as much (Ng & Wang, 2019). In the context of rapid social change, for example, the implementation of the "One-Child Policy" and the rapid economic development since the 1970s, C. Zhang et al. (2019) revealed however that maternal grandmothers have become more involved in childcare than in previous generations, especially in the contemporary urban "4-2-1 family" (four grandparents, two parents, and one child), certainly a rather extended network of relationships woven around the child.

McHale (1995) identified two dimensions of coparenting relationships between mothers and fathers, *supportive* coparenting, in which mother and father support each other in their caregiving and parenting decisions, and *undermining* coparenting, in which one or both caregivers actively undermine their partner's parenting. We assume that this differentiation could also be applied to the coparenting alliance between mothers and grandmothers (McHale et al., 2013). Moreover, mother-grandmother coparenting may involve conflicting expectations in which grandparents are expected to "be there" while at the same time not to "interfere" (Mason et al., 2007; Thomas, 1990). Hoang and Kirby (2020) also indicated that in Asian cultures overcontrol and overinvolvement from the grandparents might be a major issue contributing to potential conflict and tension in the coparenting relationship. Thus, a third possible element, *neutral/watching*, was added in this study to capture the moments of "be there" but not "interfere."

There have been only few empirical studies of mother-grandmother coparenting during early childhood in China. Three recent studies highlighted the contribution of the harmonious parent-grandparent coparenting relationship (higher level of coparenting agreement, closeness and support, and lower level of coparenting conflict and undermining) to the parent-preschooler relationship and preschooler's socioemotional outcomes (Li & Liu, 2019; Li & Liu, 2020; Li et al., 2020). However, taking care of an infant instead of a preschooler is a "24/7" job, whether by a parent or by a grandparent who is on call; thus, the coparenting dynamics operative in parent-grandparent-infant network may be different from the preschooler studies. In the somewhat similar and interdependent Turkish culture (see the cultural distance between Turkey and China on child rearing values computed by Muthukrishna et al., 2020), Salman-Engin et al. (2018) examined mothers and infants playing together with grandmothers in Turkish families. They found that grandmothers tried to draw attention and showed more distracting behaviors to infants and less watching/not affectively engaged behaviors in the triangle when compared with mothers. Based on these results, we expected that Chinese grandmothers may display similar patterns of triadic behavior in their relational network. Moreover, Salman-Engin et al. (2018) also revealed that the coparental network involving maternal grandmothers was characterized by significantly higher family warmth than when the coparental network involved paternal grandmothers. We expected this difference between maternal and paternal grandmothers to be present in Chinese families as well.

From a family system perspective on attachment, family relationships at the triadic level (mother-grandmother-child) may influence the quality of the attachment relationship at the dyadic level (mother-child) via direct and indirect mechanisms (Bakermans-Kranenburg, 2021; Brown et al., 2010; Dagan & Sagi-Schwartz, 2020; Van IJzendoorn et al., 1992). It is possible that infants who witness cooperative, coordinated, and supportive coparental interactions perceive their caregivers as trustworthy caregivers to whom they can turn in times of distress, danger, or illness (Fearon et al., 2006). In contrast, infants who are exposed to discordant, conflicted, and competitive coparental interactions may experience feelings of insecurity and uncertainty towards each coparent (Caldera & Lindsey, 2006). In addition, from Davies and Cummings' (1994) emotional security hypothesis it may be derived that children's repeated exposure to undermining behaviors between caregivers over time contributes to emotional insecurity, and subsequent difficulties with regulating their own emotions leading to more behavior problems (Davies & Martin, 2013). A meta-analysis of 59 studies evaluated the link between four dimensions of coparenting between mothers and fathers (cooperation, agreement, conflict, and triangulation) and children's attachment and behavior problems (Teubert & Pinquart, 2010). Based on the small but significant effects for the direct associations between coparenting and children's outcomes found in this meta-analysis, we expect coparenting behaviors of mothers and grandmothers also to be a predictor of child's socioemotional outcomes.

According to Belsky's (1984) process model of the determinants of parenting contextual sources of support and stress, the support from grandmothers with childcare might be a double-edged sword for mothers' parenting. On the bright side, the support of grandparents with childcare helps mothers to attend to their children and at the same time focus on doing well at work (Hoang & Kirby, 2020; Mustillo et al., 2021). The support that social networks provide may enhance mothers' self-esteem and parental efficacy, and consequently, increase the patience and sensitivity that mothers need in the parenting role (Leerkes & Crockenberg, 2002; Li & Liu, 2019). On the darker side, the tension and conflict in the parent-grandparent-child network may become a source of stress and disruption of mothers' parenting (Barnett et al., 2012). Mothers and paternal grandmothers come from different families and sometimes from different regions or social classes, and it might be more difficult for them to share parenting values, styles, and practices than for mothers and maternal grandmothers (C. Zhang et al., 2019). In general, conflicts about childrearing attitudes and practices between two generations in the daily interactions seem to be common, especially among well-educated and highly skilled mothers whose exposure to Western values may lead them to resist the authority of their own mother or mother-in-law. Mothers appear to feel that when differences in opinions about parenting occur, the strength of the daughter-mother bond makes the conflict negotiation an easier process (C. Zhang et al., 2019), but the competition of authority in parenting between mothers and paternal grandmothers may often result in suspicion and hostility (Zou et al., 2015).

An important component of parenting is sensitive responsiveness. Maternal sensitivity is characterized by a mother's ability to effectively notice, interpret, and respond to the child's cues and signals (Ainsworth et al., 1978/2015). It is not only central to the parenting behavior in early childhood, but it is also a key predictor of child-mother secure attachment development (De Wolff & Van IJzendoorn, 1997; Verhage et al., 2016). Despite the lack of support for the link between observed parental coparenting and maternal sensitivity in one study (Brown et al., 2010), a more recent study found that both supportive and undermining coparenting reported by parents were associated with maternal emotional availability (Kim et al., 2021), of which caregiver sensitivity is a central component (Biringen et al., 2014). Moreover, empirical studies have provided evidence for associations between maternal sensitivity and child's socioemotional outcomes (attachment: Liang et al., 2021;

externalizing problems: Xing et al., 2016) in the Chinese culture. Against this background, we also have reason to hypothesize that coparenting's impact on child's socioemotional outcomes could be indirect and mediated by the quality of dyadic caregiver-child interactions (e.g., maternal sensitivity) in the parent-grandparent-child network.

To date, there are limited studies on the direct and indirect effects of parent-grandparent coparenting on child's behavior problems. Barnett et al. found that mother's perception of supportive coparenting from grandmothers was not linked to child's behavior problems directly or indirectly via mother's positive and harsh parenting behaviors (Barnett et al., 2011), but mother-grandmother conflict presented a risk for child's behavior problems directly and indirectly via mother's negative parenting behaviors (Barnett et al., 2012). These studies indicated that the coparenting process between mother and grandparent might be more complex than that between mother and father. Noticeably, the relevant studies on parent-grandparent coparenting in Western cultures focused on high-risk families, and the results cannot be automatically extended to Chinese three-generation families. Though some researchers explored the current parent-grandparent coparenting relationship and its influence on children's socioemotional development in China, most studies are cross-sectional (Li & Liu, 2019; Xing et al., 2016). Only a few studies paid attention to the longitudinal association between the parent-grandparent co-parenting relationship and children's socioemotional development (Li et al., 2020), but they relied on self-reported coparenting, rather than observations of coparenting quality.

The present exploratory study was conceptualized to address the dearth of studies on early emerging mother-grandmother-infant network and its influence on children's socioemotional development in multigenerational families in a Chinese culture. We chose to approach this issue by systematically observing and evaluating triadic family interaction among "mother-grandmother-infant" triads. Two main research questions guided our research:

The first question asks whether there are any differences between coparenting behaviors in mother-maternal grandmother-infant network and mother-paternal grandmother-infant network, and whether there are differences between mothers' and grandmothers' coparenting behaviors. We expected more supportive coparenting behaviors and less undermining coparenting behaviors in the mother-maternal grandmother-infant network than in the mother-paternal grandmother-infant network. We also hypothesize that grandmothers exhibit higher levels of supportive, lower levels of undermining and more neutral/watching coparenting behaviors than mothers because mothers are expected to play the role of primary caregiver feeling the strains and stresses of raising a child. The second question addresses the extent to which mother-grandmother coparenting behaviors are associated with child's socioemotional outcomes (attachment, externalizing, and internalizing behaviors) and whether the relations between coparenting and child development are mediated by maternal sensitivity. We expect more supportive, less undermining and more neutral/watching coparenting behaviors to be associated with more secure infant-mother attachment and less behavior problems, (partly) mediated by higher levels of observed maternal sensitivity.

2 | METHODS

2.1 | Participants

This study was part of a longitudinal study that has been following 96 infants (54 girls) and their families from infancy to school age since 2010 (for more information, see Liang

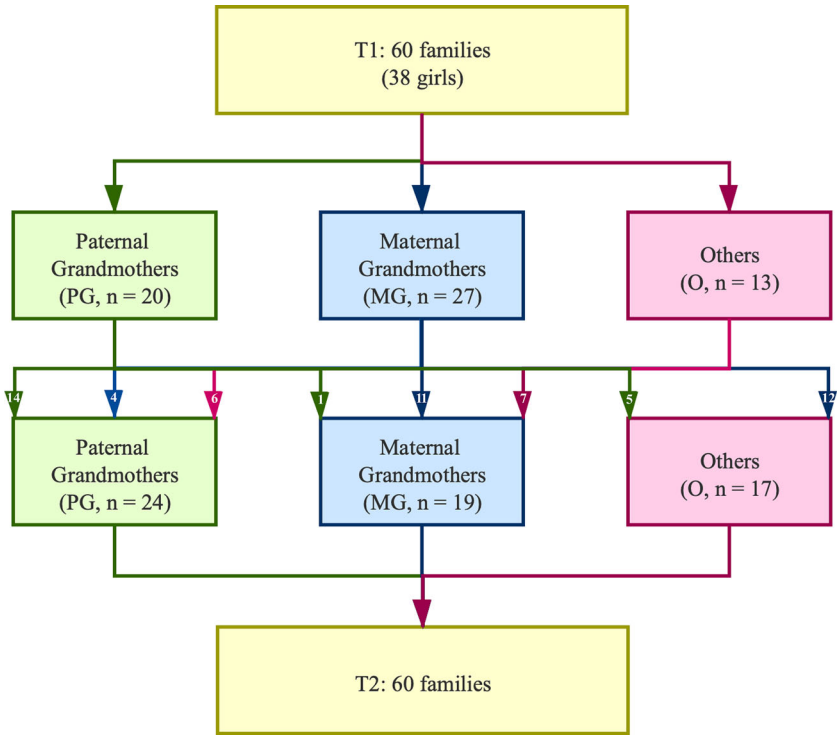

FIGURE 1 Flowchart of participants. *Note*: The numbers of the infants who were coparented by their paternal grandmothers at 6 months old were shown in the green triangles; the numbers of the infants who were coparented by their maternal grandmothers at 6 months were shown in the blue triangles; the numbers of the infant who were coparented by others at 6 months were shown in the purple triangles

et al., 2019; Wu et al., 2017). All families from the original sample allowed two research assistants to visit their homes when infants were aged 6 months old (T1: $M = 194$ days, $SD = 11.8$), 76 families were visited by two research assistants when children were aged 1 year old (T2: $M = 450.2$ days, $SD = 30.2$), 74 families visited the laboratory when children were at the same age, and 77 families visited the laboratory when children were 2 years old (T3: $M = 742.8$ days, $SD = 29.1$). In the present study, 36 children and their families were excluded from the final data analysis because in these families no female grandparents participate in any data collection. In the final 60 families (38 girls), 47 grandmothers (maternal grandmothers: 57.45%) were videotaped in family interaction tasks at T1 and 43 grandmothers (maternal grandmothers: 44.19%) were videotaped in family interaction tasks at T2. See Figure 1 for a flowchart of recruitment.

2.2 | Procedure

Home visits had two parts: (a) a triadic family interaction involving mother, grandmother, and child and (b) a dyadic infant-mother interaction. During the home visits, research assistants worked with the family to identify an area relatively free from distraction where family interactions could be videotaped. In both dyadic and triadic interactions, caregivers were instructed to play with their infant like normally they would do. The design of triadic family interaction tasks was modified from the Lausanne Trilogue Play paradigm (LTP; Fivaz-Depeursinge & Corboz-Warnery, 1999; see for a recent application of the LTP

in attachment research Witte et al., 2020). Two caregivers were arranged to sit on the floor and the infant was arranged to sit on a standard infant carrier seat suitable for the child's age. They formed an equilateral triangle to encourage face-to-face trilogue interactions. The caregivers' positions faced the infant's seat and were oriented toward one another at an approximately 60° angle to facilitate their interaction with both the infant and one another. Caregivers were asked not to move the infant's seats because the cameras could not record them adequately if they moved. The entire interaction was recorded by two cameras (one for each caregiver's face). Mothers and their children engaged in a 20-min semi-structured free-play task with a standardized set of toys after the triadic family interaction (see Liang et al., 2015, 2019 for more details).

McHale (2007) and Salman-Engin et al (2018) recommended to observe the coparenting patterns at 3 months post-partum, because a crystallized coparenting pattern has often not firmly taken hold prior to 3 months. In Beijing women employees usually are allowed to have at least 98 days off after having given birth (Decree of the State Council of the People's Republic of China, 1988/2012). Accordingly, mothers and grandmothers may adjust their coparenting patterns after mothers go back to work. Thus, in this study we evaluated the coparental network at 6 months post-partum. At the 6-month assessment, research assistants brought three sets of toys, including a colorful cloth book, a color gel pen, and a piece of paper, as well as two rattle and squeaker sound toys. At the 1-year assessment, research assistants brought another three sets of toys, including a keyboard xylophone toy, a building rings stacker, and two cups of figure puppets. In each visit, they instructed mothers and grandmothers using these toys each at a time. On average, the triadic family interaction took 10 minutes.

Following Ainsworth et al. (1978/2015), the widely used Strange Situation Procedure (SSP) was implemented to evoke infant-mother attachment behaviors at the 1-year laboratory visit. Families were assigned a 2-h slot in advance of the test day, at which time a research assistant led them to the observation room from the campus of the university. Care was taken to ensure children were reasonably calm and comfortable in the lobby adjacent to the observation room, while the mother was instructed on the SSP. The research assistant then introduced the dyad to the unfamiliar room and served as timekeeper, with a second female research assistant acting as "stranger."

The mothers were asked to complete questionnaires to provide or update information on family demographics and their child's behavior problems during each data collection.

2.3 | Measures

2.3.1 | Coparenting

To evaluate triangular interactions and observed coparenting during the triadic family interaction tasks, a variation of Belsky et al.'s (1995) coparenting coding system was used. To quantify coparenting behaviors, two recordings of each family were reviewed in four steps. The first step involved identifying coparenting incidents, that is, occasions in which one caregiver initiated one activity and the other caregivers explicitly or implicitly supported and/or undermined the other caregiver's parenting goals, desires, or intentions. The second step in coding involved evaluating grandmother's coparenting behaviors as supportive, undermining or neutral/watching during the episodes of initiated activities by mother. The third step in coding involved evaluating mother's coparenting behaviors as supportive, undermining or neutral/watching during the episodes of initiated activities by grandmother. Finally, the frequencies of different coparenting behaviors within the same dimensions were aggregated. Considering the duration of some videos was more or less

than 10 minutes (range was 8.47−13.28 minutes), the frequencies of different coparenting behaviors were standardized to a period of 10 minutes.

Supportive coparenting behaviors included repeat, agree, promoting the interaction between infant and the other caregiver, supplement to enrich the activities, turning the infant's attention to the other caregiver, inviting the other caregiver to participate in the interaction, receiving the invitation from the other caregiver and simultaneously initiated behaviors with the same goals. Undermining coparenting behaviors included ignore, disagree, interference, interrupt, oppose or stop the other caregiver's ongoing behaviors, contempt, and simultaneously initiated behaviors with different goals. Neutral/watching behaviors meant one caregiver being engaged in the task, but not performing any coparenting initiatives (e.g., one caregiver is quietly watching the interaction between infant and the other caregiver). For 30 of families, two trained coders coded the behaviors independently. This allowed for verification of inter-rater reliability, which was found to be satisfactory, with average intraclass correlation ICC = 0.88.

2.3.2 | Maternal sensitivity

Maternal sensitivity was assessed using the Maternal Behavior Q-Sort (MBQS) based on the dyadic interaction tasks during each visit by two graduate students. Per standard guidelines (Pederson et al., 2009), the 72 items of the MBQS, each describing potential maternal behaviors, were first sorted into nine clusters, ranging from very similar to very unlike the observed mother's behaviors. For 20 families, two trained assistants sorted the items independently. This allowed for verification of inter-rater reliability, which was found to be satisfactory, with intraclass correlation ICC = 0.95. In a second step, this sort representing the observer's description of the mother's behavior during the visit was correlated with the standard criterion sensitivity sort provided by Pederson et al. (2009). Correlation scores vary from −1.0 (least sensitive) to 1.0 (prototypically sensitive).

2.3.3 | Infant-mother attachment relationship

SSP coding and categorization into three-way distributions were performed according to the detailed criteria of the Ainsworth coding system by reliable coders (Ainsworth et al., 1978/2015). All recorded SSPs were rated by a graduate student trained by ZW (who was trained to reliability by MHvIJ). Ten SSPs were also coded by a second coder, with intercoder agreement *kappa* = 0.83. The child's pattern of attachment behavior was classified as insecure-avoidant (A; $n = 2$), secure (B; $n = 45$), or insecure-resistant (C; $n = 8$). All children were further categorized into one of the eight subcategories (Ainsworth et al., 1978/2015). Following previous transformations of subcategories, we computed a continuous variable of attachment security. The B3 classification received the highest score (5), A1 and C2 received the lowest score (1); and A2 and C1 received a score of (2); B4 received the score of (3), and B1 and B2 received a score of (4) (e.g., see Van der Mark et al., 2002). After we computed the continuous variable of attachment security, the intraclass correlation coefficient (ICC) between the two coders for the 10 SSPs was 0.89.

2.3.4 | Child's behavior problems

Two subscales (externalizing, 18 items; and internalizing, 26 items) of the Infant–Toddler Social and Emotional Assessment (ITSEA; Carter et al., 2003)-Chinese version (J. Zhang

et al., 2009) was used to assess children's behavior problems at 2 years of age. Mothers are asked to rate each item on a scale of 0 (not true/very rare), 1 (somewhat true/sometimes), and 2 (true/frequent) based on their children's behaviors during the past 30 days. High scores in these subscales indicate more behavior problems. The Cronbach's α were 0.81 and 0.83, respectively, which are similar to those in J. Zhang et al. (2009) translated version.

2.4 | Data analyses

First, descriptive statistics and bivariate correlations were computed. Then, the observed behaviors of coparents in the "*mother-paternal grandmother-baby*" and "*mother-maternal grandmother-baby*" conditions were contrasted using independent and paired *t*-tests at each visit. Effect sizes (Hedges' *g* for independent-samples *t*-test and Hedges's *g* for paired-samples *t*-test) were calculated on Uanboro's (2017) website. Finally, structural equation modeling was computed to separately analyze the proposed models for mother-grandmother coparenting behaviors, maternal sensitivity, infant-mother attachment, and children's behavior problems in the longitudinal study using Mplus 8.0 (Muthén & Muthén, 1998–2017). The significance of the indirect effects was determined via bootstrapping. We used the bootstrapping function to obtain 1, 000 random samples to derive estimates of the direct and indirect effects and their 95% confidence intervals (CIs). Missing data was handled using the full information maximus-likelihood (FIML) method. Maternal age and infant gender were not included as control variable, because no statistically significant differences were found with behavior problems. It should be noted that the structural equation models are exploratory as the number of participants to the number of parameters in the various models does not provide sufficient statistical power for definite conclusions. Our analyses may lead to grounded hypotheses for further work in larger samples.

3 | RESULTS

3.1 | Descriptive analysis

Descriptive statistics (means, standard deviations, sample sizes, skewness, and kurtosis) and zero-order correlations for all study variables are presented in Table 1. Most of the significant correlations were in the expected direction, but only one significant correlation was noted ($r = 0.46$) between mother's supportive and undermining coparenting behaviors at T1. On basis of the correlations of the three coparenting behaviors between mothers and grandmothers at T1 and T2, two latent variables at each time point, coparenting-supportive and coparenting-undermining, were estimated by mothers' coparenting behaviors and grandmothers' coparenting behaviors, respectively.

3.2 | Coparenting behaviors across mother-paternal grandmother-infant network and mother-maternal grandmother-infant network

Paternal and maternal grandmothers. Multiple independent *t*-tests contrasting grandmothers' coparenting behaviors during the interaction revealed no significant differences between paternal and maternal grandmothers' group in supportive, undermining, or neutral/watching behaviors at T1 and T2. Furthermore, in analyses of maternal coparenting

TABLE 1 Descriptive statistics and bivariate correlations for all study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
T1: Six months old																
1. M: Supportive coparenting	1															
2. M: Undermining coparenting	0.46**	1														
3. M: Neutral/watching coparenting	−0.10	0.02	1													
4. G: Supportive coparenting	0.34*	0.07	−0.39**	1												
5. G: Undermining coparenting	0.30*	0.45**	0.08	0.02	1											
6. G: Neutral/watching coparenting	−.061**	−0.63**	−0.20	−0.31*	−0.39**	1										
T2: One year old																
7. M: Supportive coparenting	0.35*	0.00	0.17	0.17	0.09	−0.23	1									
8. M: Undermining coparenting	0.28	0.35*	−0.19	0.23	0.03	−0.25	0.12	1								
9. M: Neutral/watching coparenting	0.04	0.18	0.07	−0.17	0.20	−0.09	−0.06	−0.15	1							

(Continues)

TABLE 1 (Continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
10. G: Supportive coparenting	0.12	−0.11	−0.08	0.48**	−0.12	−0.21	0.42**	0.33*	−0.41**	1						
11. G: Undermining coparenting	0.45*	0.24	0.01	0.08	0.25	−0.25	0.19	0.24	−0.19	0.09	1					
12. G: Neutral/watching coparenting	−0.26	0.07	0.12	−0.31	−0.14	0.18	−0.51**	−0.38*	−0.25	−0.37*	−0.28	1				
13. Maternal sensitivity	−0.14	−0.35*	0.33*	−0.19	0.05	0.25	−0.06	−0.08	0.34*	−0.16	−0.34*	0.08	1			
14. Infant-Mother attachment	−0.24	−0.16	−0.01	−0.14	−0.02	0.38*	0.01	−0.01	0.06	−0.27	−0.16	0.29	0.28*	1		
T3: Two years old																
15. Externalizing problems	−0.02	−0.25	0.03	0.05	0.07	−0.12	−0.11	−0.14	−0.02	0.15	0.02	−0.16	−0.33*	−0.22	1	
16. Internalizing problems	−0.37*	−0.30	0.38*	−0.10	−0.25	0.07	0.22	0.06	−0.13	0.25	−0.02	0.05	0.20	0.06	−0.01	1
Mean	22.89	15.84	52.22	37.59	18.92	175.58	22.69	12.16	114.68	28.47	13.11	183.44	0.70	3.69	48.26	48.94
SD	10.83	10.84	62.24	17.48	11.21	124.92	14.10	6.71	76.26	12.91	6.09	95.30	0.14	1.26	8.87	8.61
n	46	46	46	46	46	46	44	44	44	44	44	44	56	55	53	53
Skewness	0.13	1.30	1.86	0.59	0.40	0.55	1.32	0.35	1.15	0.49	0.35	0.72	−0.86	−1.00	0.44	0.09
Kurtosis	−0.79	1.72	4.16	0.03	−0.75	−0.68	3.12	−1.13	1.84	−0.48	0.15	−0.07	0.23	0.05	−0.29	−0.33

Note: M, mother; G, grandmother.
*$p < 0.05$.
**$p < 0.01$.

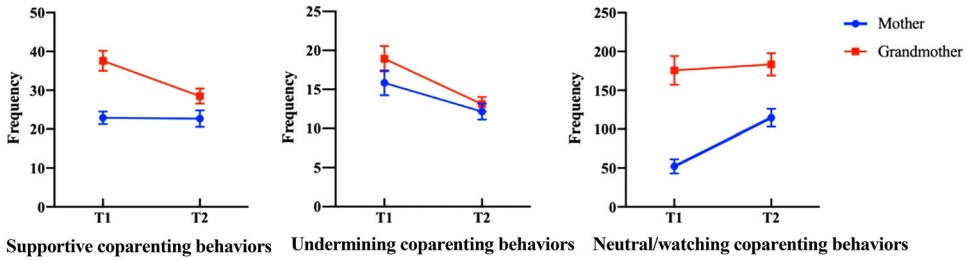

FIGURE 2 Frequency of different coparenting behaviors observed in the triadic family interaction tasks from 6 months to 1 year old. *Note*: At T1, $n = 47$ (paternal grandmother = 20, maternal grandmother = 27); At T2, $n = 43$ (paternal grandmother = 24, maternal grandmother = 19)

behaviors to paternal grandmothers and maternal grandmothers during the interaction at T1 and T2 revealed no significant differences either, except for maternal supportive coparenting behaviors to maternal grandmother that occurred significantly more often than to paternal grandmother at T1[t (45) = 2.27, $p < 0.05$, Hedges' $g = 0.73$]. Because of the small numbers of families involved in each of the networks we decided to merge the two sets, also because the comparisons between paternal and maternal grandmothers would not survive Bonferroni corrected tests.

3.3 | Differences in behavior among coparents

Grandmothers and mothers. Multiple paired t-tests contrasting coparenting behaviors during the interactions revealed significant differences between mothers and grandmothers as coparents in support and neutral/watching at both T1 and T2. Grandmothers as coparents when compared to mothers as coparents were more likely to support mothers' initiations [t_{T1} (45) = −6.13, $p < 0.01$, Hedges' $g = -1.10$, t_{T2} (43) = −2.63, $p < 0.05$, Hedges' $g = -0.42$, respectively]. In addition, grandmothers as coparents when compared to mothers as coparents were more likely to be neutral/watching [t_{T1} (45) = −5.58, $p < 0.01$, Hedges' $g = -1.23$, t_{T2} (43) = −3.35, $p < 0.01$, Hedges' $g = -0.78$, respectively]. There were no significant differences between mothers and grandmothers for undermining coparenting behaviors. See Figure 2 for the frequency of different coparenting behaviors during triad interactions across time.

3.4 | Direct and indirect effect analysis

The structural equation modeling for supportive coparenting is presented in Figure 3. The model fitted the data adequately [χ^2 (13) = 14.28, $p = 0.35$, CFI = 0.96, TLI = 0.91, RMSEA = 0.04, SRMR = 0.08]. The results did not support the hypothesis that supportive coparenting behavior at 6 months old would be associated with maternal sensitivity and infant-mother attachment at 1 year old; and supportive coparenting behavior at 1 year old was not associated with behavior problems at 2 years old. In addition, our expectation was not supported that the maternal sensitivity at 1 year old would mediate links between supportive coparenting behavior and children's attachment security with mothers and behavior problems. Table 2 presents the estimated values and 95% CIs of path coefficients for three indirect paths. Figure 3 presents the standardized point estimates and 95% CIs of path coefficients for direct paths.

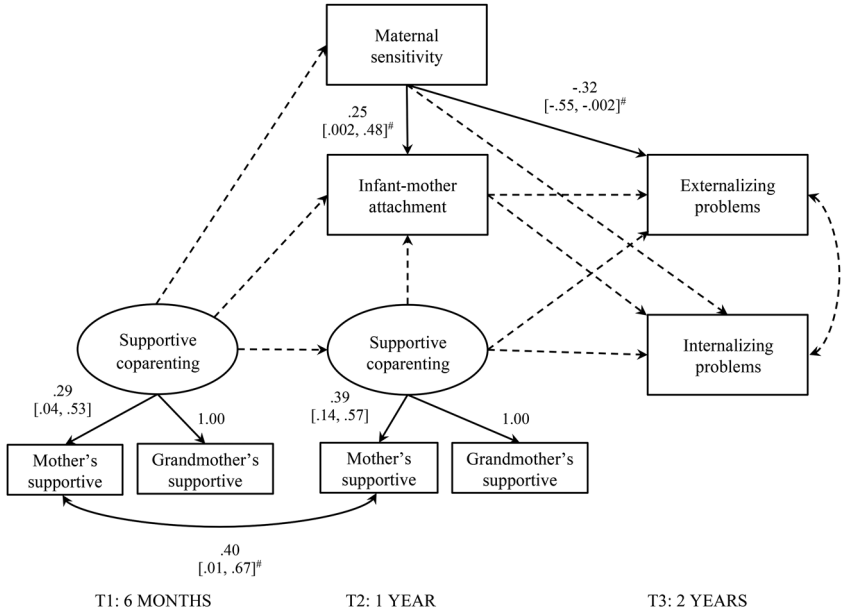

FIGURE 3 Structural model for mother-grandmother supportive coparenting behaviors, maternal sensitivity, infant-mother attachment, and child's behavior problems. *Note*: #90% CIs

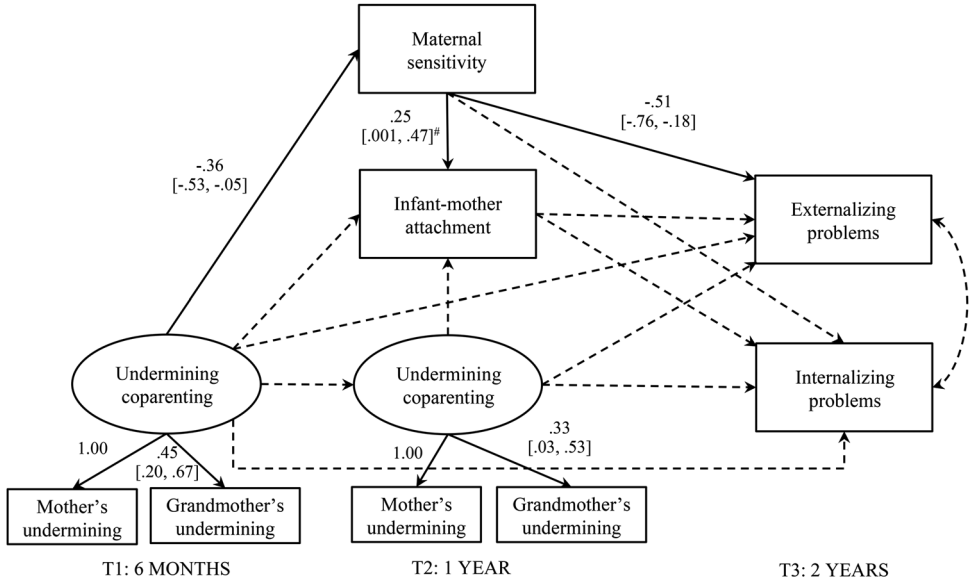

FIGURE 4 Structural model for mother-grandmother undermining coparenting behaviors, maternal sensitivity, infant-mother attachment, and child's behavior problems. *Note*: #90% CIs

The structural equation modeling for undermining coparenting is presented in Figure 4 and fitted the data adequately [$\chi^2(12) = 13.13$, $p = 0.36$, CFI = 0.97, TLI = 0.93, RMSEA = 0.04, SRMR = 0.07]. The results supported the hypothesis that higher undermining coparenting behavior at 6 months old was related to lower maternal sensitivity at 1 year of age ($\beta = -0.36$, $p < 0.01$). In addition, a total of 1, 000 bootstrap samples indicated that

TABLE 2 Indirect paths from coparenting behaviors (T1) to infant-mother attachment (T2) and behavior problems (T3) via maternal sensitivity (T2)

Indirect paths	Unstandardized estimate	95% CI
1. Supportive coparenting → Maternal sensitivity → Attachment	−0.00	[−0.01, 0.00]
2. Supportive coparenting → Maternal sensitivity → EPs	0.03	[−0.01, 0.11]
3. Supportive coparenting → Maternal sensitivity → IPs	−0.03	[−0.11, 0.01]
4. Undermining coparenting → Maternal sensitivity → Attachment	−0.01	[−0.03, 0.00]
5. Undermining coparenting → Maternal sensitivity → EPs	**0.15**	**[0.03, 0.34]**
6. Undermining coparenting → Maternal sensitivity → IPs	−0.06	[−0.22, 0.03]
7. M: Neutral/watching coparenting → Maternal sensitivity → Attachment	0.02	[−0.02, 0.07]
8. M: Neutral/watching coparenting → Maternal sensitivity → EPs	**−0.28**	**[−0.68, −0.02]**
9. M: Neutral/watching coparenting → Maternal sensitivity → IPs	0.24	[−0.02, 0.72]
10. G: Neutral/watching coparenting → Maternal sensitivity → Attachment	0.01	[−0.01, 0.04]
11. G: Neutral/watching coparenting → Maternal sensitivity → EPs	**−0.21**	**[−0.50, −0.01]**
12. G: Neutral/watching coparenting → Maternal sensitivity → IPs	0.18	[−0.01, 0.46]

Note: M, mother; G, grandmother; EPs, externalizing problems; IPs, internalizing problems. Bold indicates the significant indirect paths.

95% CI for the indirect effect of the maternal sensitivity at 1 year between the undermining coparenting behavior at 6 months old and children's externalizing problems at 2 years did not include zero (95% CI: 0.03, 0.34), thus indicating this indirect effect was statistically significant. These results showed that more undermining coparenting behaviors at 6 months were associated with children's higher levels of externalizing problems at 2 years old indirectly, via lower maternal sensitivity at 1 year old. Table 2 presents the estimated values and 95% CIs of path coefficients for three indirect paths. Figure 4 presents the standardized point estimates and 95% CIs of path coefficients for direct paths.

The path model for neutral/watching coparenting is presented in Figure 5 and fitted the data well [χ^2 (6) = 4.19, p = 0.65, CFI = 1.00, TLI = 1.00, RMSEA = 0.00, SRMR = 0.05]. The results supported the hypothesis that higher grandmothers' neutral/watch coparenting behavior at 6 months was associated with higher maternal sensitivity ($\beta = 0.33$, $p < 0.01$) and more secure infant-mother attachment ($\beta = 0.42$, $p < 0.01$) at 1 year old. In addition, a total of 1, 000 bootstrap samples indicated that 95% CI for the indirect effect of the maternal sensitivity at 1 year old between the neutral/watching coparenting behavior at 6 months old and children's externalizing problems at 2 years old did not include zero (95% CI_{mother} [−0.68, −0.02]; 95% $CI_{grandmother}$ [−0.50, −0.01]). Table 2 presents the estimated values and 95% CIs of path coefficients for three indirect paths. Figure 5 presents the standardized point estimates and 95% CIs of path coefficients for direct paths. Most of the significant

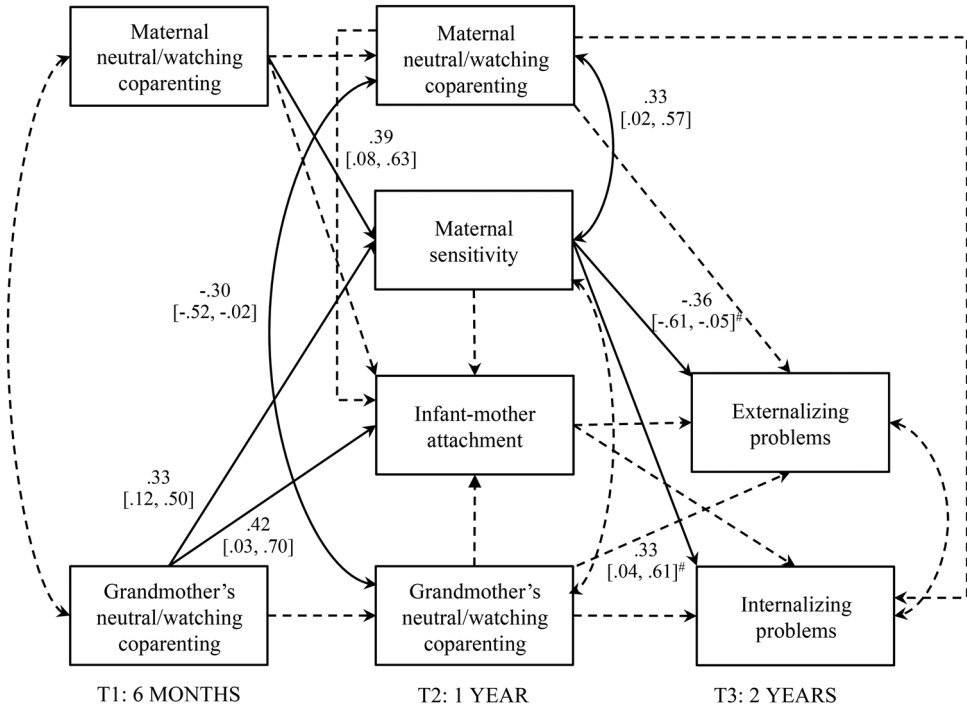

FIGURE 5 Path model for mother-grandmother neutral/watching coparenting behaviors, maternal sensitivity infant-mother attachment, and child's behavior problems. *Note*: #90% CIs

paths were in the expected direction, and only one path in an unexpected direction was noted ($\beta = 0.33$, $p < 0.1$) from maternal sensitivity at T2 to child's internalizing problems at T3 but this path was not significant at the conventional $p < 0.05$ level.

4 | DISCUSSION

The first aim of this study was to explore the differences between coparenting behaviors in mother-maternal grandmother-infant network and mother-paternal grandmother-infant network, and to examine the differences in how Chinese mothers and grandmothers engage in triangular interactions with each other. The second aim was to clarify the associations between mother-grandmother coparenting behaviors and children's socioemotional development, testing the mediating role of maternal sensitivity between coparenting and child development. To our knowledge this is the first longitudinal study to observe coparenting behaviors in parent-grandparent-child network in three-generational Chinese families in infancy.

Concerning the first question our study suggests that a bilateral pattern of grandmothers' childcare support instead of an exclusively patrilateral pattern was present in our participating families, with 57.45% and 44.19% of the observed families using maternal grandmother childcare at 6 months and 1 year old, respectively. A similar trend has been reported in other Chinese cities (Ma et al., 2011). In the comparison of coparenting behaviors across mother-paternal grandmother-infant network and mother-maternal grandmother-infant network, we only found that maternal supportive coparenting behaviors to maternal grandmother occurred more often than to paternal grandmother at six months.

Although both maternal and paternal grandmothers played with their grandchild in a cooperative way in the presence of the mothers suggesting family harmony, mothers may feel a somewhat greater degree of intimacy with their own mothers, especially during the early stage of coparenting relationship. These results are in line with previous research in Vietnamese and Turkish families (Hoang et al., 2020; Salman-Engin et al., 2018). A Chinese saying states that "everything will flourish if the family is in harmony" and this might influence mostly grandmothers who were born in the 1950s or 1960s. Thus, grandmothers seem likely to maintain family harmony by practicing tolerance and avoiding confrontation (Qi, 2018), and young mothers would consciously reduce conflict with grandmothers due to filial piety that is deeply rooted in Chinese society (Cheng & Chan, 2006).

It should be noted that when infants were six months old mothers who performed more supportive behaviors also tended to exhibit more undermining behaviors in the triadic interactions. However, a few months later this behavioral pattern disappeared, and it was not observed in grandmothers. Since parents may often experience the simultaneous presence of contradictory emotions regarding grandmother's involvement (Zartler et al., 2021), during the earlier stage of coparenting it might be difficult for mothers to develop effective strategies to deal with these ambivalent feelings. An alternative interpretation might be that in those families in which coparenting behaviors occur at high frequency both supportive and undermining interactions may be observed at elevated levels and consequently become positively correlated.

Examining the differences in how Chinese mothers and (maternal or paternal) grandmothers engaged in triangular interactions with each other, we found that grandmothers as compared with mothers were more likely to exhibit more supportive coparenting behaviors and more neutral/watching coparenting playing a third-party role. No significant differences between mothers and grandmothers were observed for undermining coparenting behaviors. These findings are partially in line with our expectation that despite considerable time-investment by the grandmothers still the Chinese mothers firmly took their role as principal caregivers in the mother-grandmother-infant network. Our study also highlighted that grandmother seems cautious not to rock the boat in the triadic network and leave the mother in the lead. They seemed to prefer harmony in the triad and abstained as much from undermining interactions as the mothers did.

Concerning the second question about the role of the coparenting network in shaping child socioemotional development we found that indeed coparenting behaviors in the mother-grandmother-infant network were associated with infant-mother attachment and child externalizing problems in both direct and indirect ways. Coparenting behaviors did relate to infant-mother attachment, but unexpectedly, only more grandmothers' neutral/watching coparenting behaviors related to a more secure attachment relationship to mothers. In other words, when mothers initiated an activity with infants, more quietly watching behaviors exhibited by grandmothers had a positive association with secure infant-mother attachment. One might speculate that grandmother's leaving more room for the mother in a coparenting relationship and not actively interfering with their dyadic interactions facilitates child's emergence of more secure attachments to his or her mother.

Counterintuitively however both supportive and undermining coparenting behaviors in the attachment network did not relate to infant-mother attachment. This might be explained in two ways. On the one hand, grandmother's active and potentially interfering coparenting behaviors can be considered a distraction or disruption of infant attention to mother's initiations, regardless of being supportive or undermining of the mother's initiatives. Consequently, the developing infant-mother attachment security might benefit more from grandmothers' neutral/watching coparenting behaviors. On the other hand, grandmothers who are frequently just quietly watching the dyadic interaction between

infants and mothers might give the mother the impression that she is doing an adequate job and would like to give mothers sufficient autonomy in childcare decisions. This may stimulate the mother's feelings of parenting efficacy conducive of a secure attachment relationship with her child. This seems consistent with family systems theory suggesting that subsystems have implicit boundaries and rules of interactions established and maintained by subsystem members (Cox & Paley, 1997; Minuchin, 1985). Mother-grandmother-infant network may have more established and less permeable boundaries when grandmothers exhibit more neutral/watching coparenting behaviors.

The role of maternal sensitivity as a mediator of coparenting and its impact on child development becomes clear when we trace the influence of coparenting on child externalizing behaviors. Early neutral/ watching coparenting by mothers as well as by grandmothers were associated with more maternal sensitive interactions with the infant later in the first year which in its turn related to lower levels of externalizing problems at age 2 years. Similarly, more early undermining coparenting was associated with less maternal sensitivity later in the first year which predicted more externalizing behavior problems by the end of the second year. The positive effect of neutral/watching coparenting and the negative effect of undermining coparenting behaviors on both maternal sensitivity and children's development is consistent with the emotional security theory stating that children are vulnerable to interparental conflict as it is acutely noticed by children and leads to chronic stress with far reaching neurobiological sequelae (Cummings & Miller-Graff, 2015). Neutral/watching coparenting shows the harmony between mothers and grandmothers in the presence of the child and the absence of intergenerational conflict.

Maternal sensitivity did not play a mediating role in the association between supportive coparenting and externalizing, and supportive coparenting did not predict externalizing problems, which is not consistent with a previous study (e.g., Barnett et al., 2011) and with our expectation. One of the reasons might be that supportive coparenting can be easily misunderstood as interference and overcontrolling. As Hoang and Kirby (2020) suggested, conflict and tension between two generations might not only simply stem from disagreements about child-rearing attitudes and practices. Controlling overinvolvement from the grandparents might be another important issue contributing to the discordant, conflicted, and competitive coparental relationships. Especially levels of psychological control among the older generations were found to be rather high (Hoang et al., 2020). Thus, it is possible that from the perspective of the mothers the meaning of supportive coparenting by grandmothers is ambiguous and that some mothers may interpret grandmother's supportive coparenting behavior as interference instead of helpful. Neutral/watching coparenting behaviors seem to point unequivocally in the direction of respect for mothers' parenting competence and thus may be less easily interpreted as corrective criticism.

It should be noted that internalizing behavior problems seemed more difficult to predict than externalizing problems. We only found one significant prediction from early neutral/watching coparenting by the grandmother to higher levels of maternal sensitive interactions with the child at 1 year. But unexpectedly, higher maternal sensitivity was in its turn related to more internalizing problems at 2 years of age. We offer three speculative interpretations. First, in a previous study a U-shaped relation was found in which the lower and higher extremes of sensitivity were associated with higher levels of internalizing problems (Liang et al., 2019). Due to lack of statistical power, we could not test this possibility. Another explanation is the presence of a bidirectional relation between maternal sensitivity and children's anxious or otherwise internalizing behaviors that might call for more sensitive investment, care, and protection by the parents. And last but not least, internalizing behavior problems in infants are by their nature much more difficult to observe and report by parents compared to externalizing issues that make themselves clearly visible in

oppositional or aggressive interactions (Kok et al., 2013). Further research is needed to examine these options in more detail.

As this is work in progress some limitations of the current study also should be mentioned. Generalization of the findings may be limited because of the small and selective sample that consisted of rather highly educated, middle- to high-income families from a large metropolitan area. Would equivalent results be expected if a similar study was applied to a different population? Two large-scale studies indicated that grandparental coresidence served different functions for families depending on children's age (Riem et al., 2021) and their specific circumstances, such as family income, parental education, *hukou* status, and subjective social status (Han et al., 2020). Specifically, children in economic vulnerable families tended to benefit more from living with grandparents compared to their more privileged peers in terms of lower levels of behavior problems (Han et al., 2020). Accordingly, we expect that mother-grandmother coparenting network may play a greater role in the families with fewer resources facing economic stress. It is recommended that observational longitudinal studies like ours should be performed in a more economically diverse population to assess the generalizability of our findings.

In addition, families were observed in a limited number of interaction settings and coded by only three global and restricted coparenting dimensions. Conceptually, coparenting is a complex multidimensional construct (Feinberg, 2003; Van Egeren & Hawkins, 2004). Empirically, we know that Chinese co-resident grandmothers actively engage in a multitude of children's activities such as eating, getting to sleep, bathing, feeding, and in household activities like cleaning and preparing food (H.-M. Chen & Lewis, 2015; Leung & Fung, 2014; Low & Goh, 2015; Sandel et al., 2006). Future research should try to capture a more comprehensive phenotyping of coparenting and further explore the dynamics of mother-grandmother network in more diverse coparenting contexts. Finally, a study of coparenting in attachment networks is not complete without more emphasis on the children's active role in shaping the network interactions and relationships, and in influencing the affiliative relationship between mother and grandmother. The child-grandmother attachment is of course also a potentially important component of the multigenerational network with substantial impact on the child's socioemotional development. And conspicuously absent in our study are the fathers who might spent less time in caregiving due to long working hours but nevertheless might have a major impact on the relationships between grandmother, mother, and grandchild, for the better or the worse (Wang & Schoppe-Sullivan, 2021).

Despite such limitations, the current exploratory study contributes to the emerging literature on the role of relational networks in children's socioemotional development from the perspective of attachment theory, and it demonstrates grandmothers' important role in a Chinese cultural context. In this cultural context mother-grandmother coparenting network predicted infant-mother attachment security and children's externalizing problems. In general, the search for precursors of attachment security may need to extend beyond dyadic sensitivity. It may well be the case that "sensitive coparenting goes beyond good parenting" (Margolin et al., 2001) and also relies on the quality of interactions between the various coparents in the network. That is, the degree to which the child becomes securely attached to his or her mother may at least partly depend on a harmonious attachment relationship between coparents, emerging from the grandmother's wisdom to be a patient companion rather than a threatening intruder. In order to unravel the mechanisms underlying the development of infant-mother attachment relationship in Chinese three generational families, an exclusive focus on maternal behavior clearly is insufficient. Instead, our research highlights the importance of going beyond the mother-child dyad and even beyond the infant's attachments to multiple caregivers toward the impact of attachment

relationships between all members of the multigenerational family system when examining precursors of Chinese children's socioemotional development.

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AUTHOR CONTRIBUTIONS

X. L. collected the data, performed the statistical analysis, interpreted the results, and drafted the manuscript. Y. L. prepared the data and drafted the manuscript. M. V. IJ. advised on the statistical analyses and helped to revise the full manuscript. Z. W. designed the study. All authors read and approved the final manuscript.

CONFLICT OF INTEREST

This was not an industry-supported study. None of the authors has any financial conflict of interest.

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