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Attachment development in children adopted from China: the role of pre-adoption care and sensitive adoptive parenting

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ABSTRACT

The current study examined the attachment development of 92 internationally adopted Chinese girls, focusing on the influence of type of pre-adoption care (institutional versus foster care) and sensitive adoptive parenting. Although the children were more often insecurely attached than non-adopted children 2 and 6 months after adoption (Times 1 and 2, $N = 92$), they had similar levels of secure base script knowledge (SBS knowledge) as a non-adopted comparison group at age 10 (Time 3, $N = 87$). Furthermore, concurrently observed sensitive parenting was positively associated with SBS knowledge. Finally, a significant interaction between type of pre-adoption care and early-childhood sensitive parenting indicated that the post-institutionalized children showed a stronger increase in security than the post-foster children when parents were more sensitive.

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According to attachment theory, the quality and consistency of children's early experiences with caregivers form the basis for the development of mental representations of attachment relationships, which are an important predictor of later adjustment (Bowlby, 1969; Thompson, 2016). Children who experience consistent, sensitive caregiving are likely to develop secure attachment representations, characterized by trust in the availability of the caregiver as a source of support. In contrast, children who experience inconsistent sensitive caregiving or insensitive caregiving may be prone to develop insecure attachment representations. Although these attachment representations are assumed to be relatively stable across time (e.g. Bowlby, 1969), attachment theory also posits that they might be open to revision in response to significant changes in the caregiving environment (i.e. lawful change; Bowlby, 1969; Vaughn et al., 1979; E. Waters et al., 2000).

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One frequently studied, drastic shift in care occurs in the case of international adoption, which is typically characterized by a transition from a depriving pre-adoption environment to a more supportive adoptive home (Juffer et al., 2011). Although the adverse pre-adoptive experiences of internationally adopted children (hereafter referred to as adopted children or adoptees) may put them at risk (e.g. loss of biological parents, lack of individualized care in institutional settings; Van IJzendoorn et al., in press), the placement in a stable and supportive adoptive home may ameliorate these risks. Meta-analytic and gradually emerging longitudinal research indeed indicates that despite an increased risk for insecure attachment among adopted children (Van den Dries et al., 2009), a substantial proportion of adoptees seem to be able to develop secure attachment relationships with their adoptive parents over time (Beijersbergen et al., 2012; Cohen & Farnia, 2011; Pace et al., 2012; Palacios et al., 2019; Vorria et al., 2015). Although more longitudinal research is needed to establish the robustness of these findings, they support the view that adoption does represent an opportunity for positive change in attachment expectations and raise questions regarding factors explaining why some adoptees are able to develop secure attachment relationships whereas others are not.

However, research on within-group variability in adopted children's attachment development is at present still scarce (Palacios & Brodzinsky, 2010; Raby & Dozier, 2019; Tang et al., 2018). To help address this gap, the present study examines attachment security in a prospective longitudinal sample, focusing on the influence of two factors, one in the pre-adoptive, and one in the adoptive caregiving environment – namely type of pre-adoption care and sensitive parenting – and their potential contributions to attachment security. This was investigated in a sample of children adopted from China – the main birth country of internationally adopted children (Selman, 2015) – to the Netherlands.

Type of pre-adoption care

Adopted children constitute a heterogeneous group that differs on several pre-adoption factors that may affect their later development, such as age at adoption and quality of pre-adoption care experiences. Studies focusing on the impact of age at adoption generally reveal that older age at adoption, especially adoption after the first birthday, increases the risk for insecure attachment (Van den Dries et al., 2009). Nonetheless, it has been argued that the *quality* of children's pre-adoption experiences might even be more important (Odenstad et al., 2008). Research on the effects of quality of pre-adoption care is, however, scarce because of a lack of information on adopted children's pre-adoption experiences.

Therefore, one aim of the current study was to focus on the effects of type of pre-adoption care – used as a proxy for quality of pre-adoption care (e.g. Wang et al., 2017; for a review see Xu et al., 2020) – on attachment development. Type of pre-adoption care refers to the living arrangements of children prior to adoption, namely pre-adoptive institutional or foster care. Although undoubtedly variation exists in the quality of care provided by institutions and foster families (Woodhouse et al., 2018), type of care may serve as a good proxy for pre-adoption care as research in various countries including China has revealed that children living in foster care generally have better developmental outcomes than their counterparts residing in institutional care (e.g. Xu et al., 2020). Moreover, an especially important difference between both types of care lies in the extent

to which children's needs for stable relationships with caregivers are met. Due to the typical features that are characteristic of institutional settings (labeled "structural neglect" in Van IJzendoorn et al., 2011), institutions have been shown to provide fewer opportunities to develop stable relationships with consistent caregivers than foster care. In line with theoretical predictions, numerous studies revealed that children in institutional care have an elevated risk for insecure and disorganized attachment, not only when compared to children reared by their biological family (e.g. Van IJzendoorn et al., 2011; Kumsta et al., 2015; Lionetti et al., 2015), but also when compared to children raised in foster care (e.g. Smyke et al., 2010; Zeanah et al., 2005).

What has not yet been investigated, is whether these differential effects of institutional versus foster care on attachment security persist once children are adopted (but see Román et al., 2012). This is, however, an important issue to investigate because the insecure attachment expectations of children with histories of institutional care may affect their capacity to develop secure attachment relationships with their adoptive parents. As such, type of pre-adoption care might account for part of the variability in adopted children's attachment outcomes after adoption. Nonetheless, adoption studies that explored the effects of pre-adoptive institutional versus foster care on other developmental domains – such as cognitive and behavioral adjustment – after adoption yielded inconsistent results, with some studies reporting significant effects of type of pre-adoption care after adoption (e.g. Miller et al., 2005; Van Londen et al., 2007), and others reporting no or diminishing effects over time (e.g. Bruce et al., 2009; Welsh & Viana, 2012). One possible explanation for these mixed findings is that the effects of type of care on adopted children's adjustment are modified by protective factors. Although many child and context-related protective factors could be at play, we focused on the role of sensitive parenting.

Sensitive parenting

According to attachment theory, sensitive parenting – defined as parents' ability to perceive their children's signals accurately and to respond to them in a timely and adequate manner – is of central importance for promoting the development of secure attachment (Ainsworth et al., 1978). Numerous cross-sectional as well as longitudinal studies in non-adopted children have provided support for a significant link between sensitive parenting and attachment security, not only in infancy and early childhood (for a meta-analysis, see De Wolff & Van IJzendoorn, 1997) but also in middle childhood (for a meta-analysis, see Koehn & Kerns, 2018) and adolescence (e.g. Booth-LaForce et al., 2014; Steele et al., 2014; T. E. A. Waters et al., 2017). These findings are further supported by intervention studies showing that parenting interventions that successfully enhance sensitive parenting also successfully promote children's attachment security (for a meta-analysis, see Bakermans-Kranenburg et al., 2003; see also Facompré et al., 2018). Moreover, there is emerging evidence in non-adopted children that sensitive parenting not only has direct effects on attachment security but that it may also buffer the association between risk factors and child outcomes. Barry et al. (2008), for instance, found that sensitive parenting buffered the negative effects of genetic risk on attachment security. Similar buffering effects of sensitive parenting have been found in studies on other risk factors (e.g. life stress, interparental violence, maternal psychosocial adjustment) and

outcomes, such as health outcomes (Farrell et al., 2017), and externalizing (e.g. Manning et al., 2014) and internalizing behavioral problems (e.g. Bouvette-Turcot et al., 2017).

Surprisingly few studies have examined whether the relation between sensitive parenting and attachment security operates in a similar way in adopted children (Juffer et al., 2011). In one study, unexpectedly no evidence was found for a link between sensitive parenting and attachment in a sample of 1-year-old children adopted from various countries to the Netherlands (Van Londen et al., 2007). Because the latter study took place in the first months (M = 8 months) after adoption, the authors speculated that a possible reason for the finding could be that it takes longer before significant associations between sensitive parenting and adoptees' attachment representations emerge as the attachment bond may still be developing (Van Londen et al., 2007). In keeping with this explanation, Schoenmaker et al. (2015) demonstrated, in a sample of international adoptees adopted from Sri Lanka, South Korea and Columbia to the Netherlands, that attachment assessed in infancy and in young adulthood was predicted by observations of early and middle childhood sensitive parenting. Similar findings concerning the beneficial effects of sensitive parenting for adoptees have been reported in a few other studies (e.g. McGoron et al., 2012). These studies provide first support for the importance of sensitive parenting for adopted children's attachment development. What, to the best of our knowledge, has not yet been investigated is whether sensitive parenting may buffer the effects of specific pre-adoption risk factors, such as type of pre-adoption care, on attachment development. Hence, in addition to trying to replicate the direct effects of sensitive parenting on adopted children's attachment security, the present study also aimed to extend these findings by investigating whether sensitive parenting buffers the association between type of pre-adoption care and middle childhood attachment.

The current study

These research questions were investigated in a sample of 10-year-old adoptees who participated in the Chinese Adoptees in the Netherlands (CAN) study – a longitudinal study reporting on the development of 92 girls adopted from institutional or foster care in China to the Netherlands at an average age of 13 months (SD = 1.35; range: 10.84–-16.53 months; see also Finet et al., 2020, 2019; Van den Dries et al., 2010, 2012). At the time of the start of the study (2005), mainly infant girls without special needs who were abandoned as a consequence of the strictly enforced one-child policy, were adopted from China (Ministry of Justice, 2009; Selman, 2015). To avoid a skewed gender/special needs distribution, only girls without special needs were selected to participate in the CAN study (see Van den Dries et al., 2010, 2012). Data were collected 2 months (Time 1, N = 92), 6 months (Time 2, N = 92) and 9 years after adoption (Time 3, N = 87). At the first two waves, attachment security was assessed with the Strange Situation Procedure (SSP; Ainsworth et al., 1978). Results of these first two assessments (see Van den Dries et al., 2012) indicated that the children were less often securely and more often disorganized attached compared to the normative attachment distribution of non-adopted children in nonclinical samples in North America (62% secure; Van IJzendoorn et al., 1999). There were no significant differences between the children who were adopted from institutional care (i.e. the post-institutionalized children) and the children who were adopted from foster care (i.e. the post-foster children) in terms of their attachment classification in the

sample. However, a comparison of each group separately with the normative distribution demonstrated that the post-institutionalized children but not the post-foster children were more often insecurely attached than non-adopted children. Furthermore, results revealed that the attachment classifications were weakly stable from Time 1 to Time 2 (Van den Dries et al., 2012).

The purpose of the present study was to examine the attachment representations of the children at age 10, and to identify possible predictors of variability in their attachment outcomes. Specifically, we investigated whether (1) the 10-year-old adoptees showed catch-up with non-adopted children in the domain of attachment, and whether (2) type of pre-adoption care and (3) sensitive adoptive parenting were associated with their attachment representations. In addition, (4) we tested whether sensitive adoptive parenting buffered against the hypothesized effects of type of pre-adoption care on attachment, such that the post-institutionalized children would show less secure attachment than the post-foster children when adoptive parents scored low on sensitive parenting but not when adoptive parents scored high on sensitive parenting. As from middle childhood onwards attachment is more often assessed using representational rather than behavioral measures, and as increasing evidence suggests that attachment representations take the form of a cognitive script concerning care called the secure base script (for an overview, see T. E. A. Waters & Roisman, 2019), we used the middle childhood Attachment Script Assessment (T. E. A. Waters et al., 2015) to assess children's knowledge of the secure base script (SBS knowledge) at Time 3. This script consists of a child's expectations that he can turn to the caregiver in times of need and that the caregiver will be available to provide support in such a way that the child will feel better again (T. E. A. Waters & Roisman, 2019). The validity of the ASA as a measure of attachment representations is supported by a growing body of research. More specifically, SBS knowledge assessed with the ASA has been found to be linked with early caregiving experiences and with the quality of early parent–child attachment (e.g. Steele et al., 2014), to be predictive of adaptive functioning and psychopathology (e.g. T. E. A. Waters et al., 2015), to have adequate test–retest reliability and to be relatively stable across time (e.g. Vaughn et al., 2006; Waters et al., 2019b). Moreover, the middle childhood ASA demonstrated convergent validity with the Child Attachment Interview (Target et al., 2003), a commonly used measure of middle childhood attachment (Waters et al., 2019b).

Method

Participants and procedure

Ninety-two girls, adopted from China to the Netherlands at a mean age of 13.03 months (range 10.84–16.53 months, *SD* = 1.35), participated in the CAN study. The girls were born between 2004 and 2007, and had stayed in institutional care (*n* = 50) or foster care (*n* = 42) in China before adoption. Together with their primary caregiver (90 mothers and 2 fathers at Times 1 and 2; 81 mothers, 3 fathers, and 3 girls who participated with their mother at one of the visits and with their father at the other visit at Time 3; hereafter referred to as parent), the girls participated in the three study waves that took place 2 months (*N* = 92, Time 1), 6 months (*N* = 92, Time 2), and 9 years (*N* = 87, Time 3) after adoption. The three Dutch adoption organizations mediating adoption from China to the Netherlands helped

recruiting the families to participate in the first two waves (for details on the recruitment, see Van den Dries et al., 2010, 2012). To inform the families about Time 3, we sent them a newsletter and an information letter, and we called them to ask whether they were willing to participate in the follow-up. At each wave the families were first visited at home and then they visited the lab of Leiden University. The girls were on average 15.24 (*SD* = 1.35) months old at the time of the Time 1 home visit and 15.66 (*SD* = 1.42) months old at the time of the Time 1 lab visit. At the time of the Time 2 home visit they were on average 19.33 (*SD* = 1.40) months old and at the time of the Time 2 lab visit they were on average 19.85 (*SD* = 1.48) months old. Their mean age at the time of the Time 3 home and lab visit was 119.72 (*SD* = 5.23) and 122.07 (*SD* = 5.57) months, respectively. The study was approved by the Ethics Review Board of the Faculty of Social Sciences of Leiden University (project name: The development of Chinese adoptees: A follow-up study, Time 3: ECPW-2014/067).

Measures

Type of pre-adoption care

At Time 1 parents indicated which type of care their child had received in China prior to adoption. Based on this information the children were classified into the post-institutionalized (*n* = 50) or the post-foster group (*n* = 42). The post-institutionalized children were reared in institutional care before adoption (*M* = 12.44 months, *SD* = 1.36) and had experienced other forms of care (such as foster care) for a maximum of 1 month. The post-foster children had lived in foster care before adoption (*n* = 16), sometimes in combination with a period in institutional care (*n* = 26). The post-foster children had on average lived 9.32 months (*SD* = 3.55, range 1.44–14.85) in foster care and 3.65 months (*SD* = 3.86, range = 0–14) in institutional care. To control for this variation, we performed additional sensitivity analyses in which we excluded the post-foster children who had spent more than half of their pre-adoption life in institutional care (*n* = 8).

Sensitive parenting: supportive presence and lack of intrusiveness

Parenting was observed at each wave during problem-solving tasks in which the parent and the child engaged. At Times 1 and 2, sensitive parenting was observed in the lab during two problem-solving tasks of 4 min each. At Time 3, sensitive parenting was observed at home during a 10-min tangram puzzle task. These tasks were videotaped and subsequently coded for two indicators of sensitivity, namely supportive presence and intrusiveness, using the seven-point Erickson scales (Egeland et al., 1990; Erickson et al., 1985). Supportive presence refers to the degree to which parents are emotionally supportive and let their child know that they are confident that the child will do well in the task. Intrusiveness refers to the extent to which parents lack respect for their child's autonomy, interfere with their child's exploration in the task, and exert their own expectations on the child. Because higher levels of intrusiveness are indicative of lower levels of sensitive parenting, intrusiveness was reverse scored such that higher scores reflect less intrusive and, hence, more sensitive parenting. Convergent with Stams et al. (2002), we slightly adjusted the Erickson rating scales at Time 3 to make them developmentally appropriate for middle childhood, by taking into account the more verbal nature of parent-child interactions at this developmental period. The three assessments of each

family were coded by different coders. The interrater reliability (intraclass correlation) of the coders with the expert coder (FJ) was >.70 for supportive presence and intrusiveness at Times 1 and 2. At Time 3, the interrater reliability of the coder with the expert coder (FJ) was .92 for supportive presence and .96 for intrusiveness (n = 15).

Attachment

Attachment behavior. At Times 1 and 2, the Strange Situation Procedure (SSP; Ainsworth et al., 1978) was administered to the children during the lab visits (for more details, see Van den Dries et al., 2012). This standardized laboratory procedure consists of eight 3-min episodes, including two brief separations from and reunions with the parent, during which the child's behavior is observed to assess the quality of the child's attachment. In the current analyses, we used the continuous scores for attachment security which were computed using Van IJzendoorn and Kroonenberg (1990) simplification of the algorithm of Richters et al. (1988). Scores ranged from −6.20 to 5.98 at Time 1 and from −5.40 to 4.52 at Time 2, with higher scores reflecting higher levels of attachment security. The interrater reliability of the two coders who coded the continuous security scores was .69.

Attachment representations. At Time 3, the Middle Childhood Attachment Script Assessment (MC ASA; T. E. A. Waters et al., 2015) was administered to the children during the home visit to assess their Secure Base Script knowledge (SBS knowledge). The MC ASA is a narrative-based assessment in which children are asked to tell stories using attachment-related prompt words presented to them on a sheet of paper (i.e. prompt word outlines). More specifically, the MC ASA consists of three attachment-related prompt word outlines. Each word outline consists of a story title and 12 words (grouped in four columns of three words) that contain an attachment-related theme (for the prompt word outlines, see the Appendix of Waters et al., 2019a). In each story outline, there is a stressor (e.g. a scary dog in the yard) which prompts the child to seek support from his or her secure base (parent) in the story. As such the prompt words aim to trigger children to generate stories which are organized around the secure base script. The three attachment-related prompt word outlines are presented one at a time to the children in a random order and are preceded by two neutral (i.e. not attachment-related) prompt word outlines used to familiarize children with the task. Children were instructed to tell the best story they could and to tell the story in the first person, as if it is really happening right now with them and their mother. The stories were recorded with a voice recorder and transcribed afterwards. The transcribed stories (excluding the practice stories) were scored for secure base script knowledge on a seven-point scale ranging from 1 (*atypical content inconsistent with the secure base script*) to 7 (*elaborated secure base knowledge*), and scores were averaged across the three stories. All stories were coded by two coders and the average of the coders' scores was used in the analyses. The interrater reliability of the two coders before discussion (two-way mixed model with absolute agreement for average measures) was .93. Disagreements between the coders were resolved by discussion.

Covariates

Age at adoption, maternal education at Time 3, and child verbal IQ at Time 3 were included as covariates in the analyses because previous research found associations between these variables and attachment (Bakermans-Kranenburg, 2006; Pace et al., 2015; Van den Dries et al., 2009). Age at adoption (M = 13.03, SD = 1.35) was computed

as the period between the date of the child's arrival in the Netherlands and the child's birth date. Time 3 maternal education ($M = 3.91$, $SD = 0.93$) was measured on 5-point scale ranging from 1 (primary school) to 5 (university). To get an indication of the children's verbal IQ, the information and vocabulary subtests of the Wechsler Intelligence Scale for Children-Third Edition (WISC-III-NL; Kort et al., 2005; Wechsler, 1991) were administered to the children during the Time 3 home visit. Raw scores on these subscales were converted to standardized scores which were used to estimate verbal IQ scores ($M = 110.95$, $SD = 12.19$; see Finet et al., 2019).

Missing data and data-analysis

The total amount of missing data on the study variables and the control variables was small (2.40%) and Little's MCAR test indicated that the data were missing completely at random, X^2 (84) = 93.71, $p = .22$. Therefore, missing data were imputed using expectation maximization (EM) and the imputed data were used in all subsequent analyses. In service of data reduction and to separate out the influence of early and concurrent caregiving, we created a mean composite for early-childhood sensitive parenting (average of Times 1 and 2 supportive presence and reversed intrusiveness) and for concurrent sensitive parenting (average of Time 3 supportive presence and reversed intrusiveness).

To test the research question concerning catch-up in attachment an independent samples t-test was performed to compare the mean SBS knowledge of the adopted children in the current sample with the mean SBS knowledge of a comparison group of non-adopted children. Because, currently, there are no normative data available for the MC ASA, a comparison group of 224 non-adopted, same-aged, Belgian girls was taken from a large-scale, taxometric study of Waters et al. (2019a) that comprised 639 non-adopted children from Belgium (Flanders) and the United States. We considered this group a proper comparison group as Belgium (Flanders) and the Netherlands are neighboring countries that share the same language and have a comparable culture. The American children were excluded from the comparison group to avoid potential cultural and language confounds. A sensitivity power-analyses for independent samples *t*-tests indicated that the minimum effect size (Cohen's *d*) that our study could detect with 80% power and a significance level of .05 was 0.31 (G*Power software; Faul et al., 2007). Furthermore, an independent samples *t*-test was conducted to investigate the research question concerning the association of type of pre-adoption care and SBS knowledge. Next, correlation analyses were performed to examine the associations between sensitive parenting and SBS knowledge. Finally, two hierarchical multiple regression analyses were conducted to test whether early-childhood and concurrent sensitive parenting moderated the association between type of pre-adoption care (dummy coded with 0 = post-institutionalized children and 1 = post-foster children) and SBS knowledge. In the first step, the covariates (age at adoption, Time 3 maternal education, and Time 3 child verbal IQ) were entered. In the second step, the main effects of type of pre-adoption care and (early-childhood or concurrent) sensitive parenting were added and in the third and final step, the interaction between type of care and (early-childhood or concurrent) sensitive parenting was included. To prevent multicollinearity, early childhood and concurrent sensitive parenting were mean centered prior to computing the interaction terms. Significant interaction effects were decomposed using the Johnson-Neyman technique

in the PROCESS macro for SPSS (Hayes, 2013) to identify the threshold value of sensitive parenting above or below which the effect of type of care becomes significant. In all analyses, except in the analyses for research question one, we controlled for child age at adoption, maternal education and child verbal IQ. Before the main analyses, we examined the data for outliers (defined as ± 2.58 SDs from the mean) and we found that there was one low outlier on SBS knowledge. We repeated all analyses excluding this outlier. As this did not change any of the results in terms of significance and direction of the effects, we retained the outlier in the final analyses. All analyses were conducted in SPSS version 25.

Results

Preliminary analyses

Descriptive statistics after EM are depicted in Table 1 for the post-institutionalized children, the post-foster children and the total sample (for descriptive statistics before EM, see supplementary Table 1). There were no significant differences between the post-institutionalized and the post-foster children on any of the variables, except on Time 1 supportive presence indicating that parents of the post-institutionalized children scored lower on Time 1 supportive presence than parents of the post-foster children, mean difference = −0.88, 95% CI [−1.41, −.36], $t(88.06) = -3.34$, $p = .001$, Cohen's $d = 0.69$. Bivariate correlations between the study and control variables are presented in Table 2, below the diagonal. Age at adoption was not significantly associated with any of the main study variables. Time 3 maternal education was significantly positively correlated with early childhood and concurrent sensitive parenting, indicating that more highly educated parents scored higher on observed sensitive parenting. In addition, Time 3 child verbal IQ correlated significantly with Time 3 SBS knowledge. All other correlations of the control variables with the study variables were non-significant. Furthermore, early childhood and concurrent sensitive parenting were significantly correlated. Finally, an inspection of the

Table 1. Descriptive statistics of main and control variables after expectation maximization.

	Type of pre-adoption care					
	Post-institutionalized ($N = 50$)		Post-foster ($N = 42$)		Total sample ($N = 92$)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Age at adoption (months)	13.08	1.23	12.96	1.49	13.03	1.35
T3 maternal education	3.84	0.91	4.00	0.94	3.91	0.92
T3 child verbal IQ	111.14	12.19	110.48	11.70	110.84	11.91
T1 supportive presence	4.66	1.47	5.54[a]	1.06	5.06	1.36
T1 intrusiveness[b]	3.07	1.35	2.66	1.25	2.88	1.32
T2 supportive presence	5.00	1.57	4.89	1.48	4.95	1.52
T2 intrusiveness[b]	2.84	1.43	3.33	1.45	3.06	1.46
T3 supportive presence	4.16	1.19	4.13	1.23	4.15	1.20
T3 intrusiveness[b]	4.22	1.44	4.76	1.22	4.47	1.37
Early childhood sensitive parenting	4.94	1.02	5.11	1.01	5.02	1.02
Concurrent sensitive parenting	3.97	1.12	3.69	1.04	3.84	1.09
T1 attachment security	1.47	2.33	1.59	2.70	1.52	2.49
T2 attachment security	1.02	2.48	0.89	2.47	0.96	2.46
T3 secure base script knowledge	3.74	0.61	3.61	0.62	3.68	0.61

[a]Significant difference between the post-institutionalized and the post-foster children at $p < .01$. [b]Original, non-reversed intrusiveness scores, with higher scores indicating higher intrusiveness. T1 and T2 attachment security = T1 and T2 continuous attachment security scores as assessed during the Strange Situation Procedure using Richters et al. (1988) algorithm.

Table 2. Bivariate Pearson correlations between main model variables and control variables (under diagonal) and partial correlations between main model variables and control variables after controlling for age at adoption, Time 3 maternal education and Time 3 child verbal IQ (above diagonal).

	1	2	3	4	5	6	7	8	9
1. Type of pre-adoption care	-	.06	−.17	.04	−.02	−.11	-	-	-
2. Early childhood sensitivity	.08	-	.32**	.08	.07	.19	-	-	-
3. Concurrent sensitivity	−.13	.37***	-	−.09	.06	.23*	-	-	-
4. T1 attachment security	.03	.04	−.13	-	.27**	−.10	-	-	-
5. T2 attachment security	−.03	.06	.05	.28**	-	.01	-	-	-
6. T3 SBS knowledge	−.11	.17	.22*	−.12	.00	-	-	-	-
7. Age at adoption	−.04	−.02	−.06	.05	.09	−.07	-	-	
8. T3 maternal education	.09	.24*	.32**	−.14	−.03	.06	−.05	-	-
9. T3 child verbal IQ	−.03	−.04	.00	−.10	−.01	.25*	−.04	.18	-

Note. T3 SBS knowledge = Time 3 Secure Base Script knowledge. * p <.05. ** p <.01. *** p <.001

longitudinal correlations between the attachment measures revealed that Times 1 and 2 attachment security were significantly correlated with each other, but were not significantly associated with Time 3 SBS knowledge (see Table 2).

Comparison with non-adopted children

Results of the independent samples *t*-test indicated that the mean SBS knowledge of the adopted children in the current sample (M = 3.68, SD = 0.61) did not differ from mean SBS knowledge of the comparison group of same-aged, non-adopted Belgian girls (M = 3.69, SD = 0.75), mean difference = 0.01, 95% CI = [−0.15, 0.17], $t(206.97) = 0.16$, $p = .88$, $d = 0.01$. Similar non-significant findings were obtained when the mean SBS knowledge of the post-institutionalized (M = 3.74, SD = 0.61), and the post-foster children (M = 3.61, SD = 0.62), were each compared separately with the mean SBS knowledge of the comparison group (post-institutionalized children vs comparison group: mean difference = −0.05, 95% CI = [−0.27, 0.18], $t(272) = -0.41$, $p = .68$, $d = 0.07$; post-foster children vs comparison group: mean difference = 0.08, 95% CI = [−0.16, 0.33], $t(264) = 0.67$, $p = .50$, $d = 0.12$).[1]

Associations between type of pre-adoption care, sensitive parenting and attachment

Results of the independent samples t-test, carried out to investigate the effects of type of pre-adoption care on Time 3 SBS knowledge, revealed that mean SBS knowledge did not differ significantly between the post-institutionalized and the post-foster children, mean difference = 0.13, 95% CI = [−0.13, 0.39], $t(90) = 1.01$, $p = .31$, $d = 0.21$. The sensitivity analyses in which the eight post-foster children who had spent more than half of their pre-adoption life in institutional care were excluded did not change the results, mean difference = 0.11, 95% CI = [−0.18, 0.39], $t(82) = 0.76$, $p = .45$, $d = 0.17$.

Furthermore, bivariate and partial correlations revealed that there was no significant association between early childhood sensitive parenting and SBS knowledge. Concurrent sensitive parenting, on the contrary, was significantly correlated with SBS knowledge, indicating that the adopted children scored higher on SBS knowledge if their parents were more sensitive at Time 3 (see Table 2). Similar results were obtained with (see

Table 2, above diagonal) or without (see Table 2, below diagonal) controlling for the three covariates.

Type of pre-adoption care X sensitive parenting interactions

Results of the hierarchical multiple regression analyses (see Table 3), controlling for the three covariates (step 1), revealed that there was a significant interaction between type of pre-adoption care and early-childhood sensitive parenting in the prediction of Time 3 SBS knowledge, F change (1, 85) = 4.83, p = .03, R^2 change = .05. In the sensitivity analyses in which the eight post-foster children who had spent more than half of their pre-adoption life in institutional care were excluded, this interaction was in the same direction but not significant, F(1, 77) = 3.06, p = .08, R^2 change = .03. The interaction between type of pre-adoption care and concurrent sensitive parenting, on the other hand, was not significant, both in the main analysis, F change (1, 85) = .004, p = .95, R^2 change = .00 (see Table 3), as well as in the additional, sensitivity analysis, F(1, 77) = 0.05, p = .83, R^2 change = .01.

Further inspection of the significant type of pre-adoption care X early-childhood sensitive parenting interaction with the Johnson-Neyman technique revealed that the post-institutionalized children scored significantly higher on SBS knowledge than the post-foster children if parents scored at least 0.49 on centered early childhood sensitive parenting (5.51 on non-centered early childhood sensitive parenting; 31.52% of the participants). If parents scored lower on early-childhood sensitive parenting, there was no significant difference between the post-institutionalized and post-foster children. In addition, probing of the interaction revealed that early-childhood sensitive parenting was positively associated with T3 SBS knowledge in the post-institutionalized children,

Table 3. Summary of the last step (step 3) of the hierarchical multiple regression analyses predicting Time 3 SBS knowledge by type of pre-adoption care and early childhood sensitive parenting or concurrent sensitive parenting (step 2), and their interaction (step 3), controlling for age at adoption, T3 maternal education at T3 child verbal IQ (step 1).

	ΔR^2	B	SE	β
Early childhood sensitive parenting				
Step 1	.06			
Age at adoption		−0.03	0.05	−0.06
T3 maternal education		−0.02	0.07	−0.03
T3 child verbal IQ		0.01	0.01	0.23*
Step 2	.05			
Type of pre-adoption care		−0.14	0.12	−0.11
Early childhood sensitivity		0.24	0.08	0.40**
Step 3	.05*			
Type of pre-adoption care*early childhood sensitivity		−0.27	0.12	−0.30*
Concurrent sensitive parenting				
Step 1	.06			
Age at adoption		−0.03	0.05	−0.06
T3 maternal education		−0.03	0.07	−0.05
T3 child verbal IQ		0.01	0.01	0.25*
Step 2	.06			
Type of pre-adoption care		−0.08	0.13	−0.07
Concurrent sensitivity		0.12	0.08	0.22
Step 3	.00			
Type of pre-adoption care*concurrent sensitivity		0.01	0.12	0.01

Note. Early childhood sensitive parenting and concurrent sensitive parenting were mean centered. All reported regression coefficients and associated standard errors (B, SE, β) are of step 3 of the analyses. * p <.05. ** p <.01.

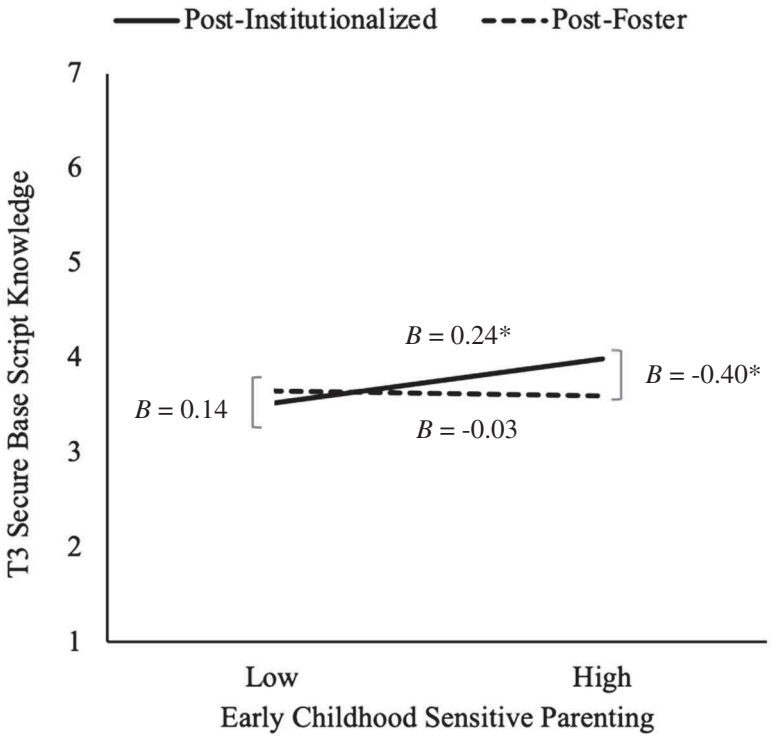

Figure 1. Interaction between type of pre-adoption care and early-childhood sensitive parenting in the prediction of T3 SBS knowledge.

$B = 0.24$, 95% CI = [0.07, 0.40], $t(85) = 2.87$, $p = .01$, but unrelated to T3 SBS knowledge in the post-foster children, $B = -0.03$, 95% CI = [−0.21, 0.15], $t(85) = -0.32$, $p = .75$ (see Figure 1).

Discussion

In the current study, we examined the attachment development of 92 children who were adopted from institutional or foster care in China to the Netherlands at an average age of 13 months. Specifically, we aimed to investigate (1) whether the children who were found to be more often insecurely attached in the first months after adoption compared to the normative attachment distribution of non-adopted children (Van den Dries et al., 2012) showed catch-up in attachment at age 10. Furthermore, we tested whether (2) type of pre-adoption care, and (3) sensitive adoptive parenting were associated with the children's attachment representations, and (4) whether sensitive adoptive parenting functioned as a protective factor in the association between type of pre-adoption care and attachment. Results indicated that the adopted children did not differ from the comparison group of non-adopted children in terms of SBS knowledge in middle childhood. Also, no significant differences in SBS knowledge were found between the post-institutionalized and the post-foster children. Furthermore,

concurrently assessed sensitive parenting, but not early-childhood sensitive parenting, was positively related to SBS knowledge. Finally, a significant interaction between type of pre-adoption care and early-childhood sensitive parenting was found, which indicated that early-childhood sensitive parenting was positively associated with SBS knowledge in the post-institutionalized children, but not in the post-foster children.

A first notable finding is that the differences in attachment compared to the norm that were found in the first months after adoption (Van den Dries et al., 2012) did not persist into middle childhood. At age 10, the adopted children did not differ from a comparison group of non-adopted children in terms of their SBS knowledge, which suggests that the increased time in the adoptive family contributed to positive revisions of the adopted children's attachment representations. This finding is consistent with a previous report on the same sample in which it was found that the children showed complete catch-up in cognitive functioning at age 10 despite their delayed intellectual functioning in the first months after adoption (Finet et al., 2019). The positive result concerning catch-up in attachment is especially noteworthy because the majority (73%) of the children in the current sample were adopted after their first birthday, which has been identified as a risk factor for insecure attachment in the meta-analysis on adopted children's attachment development (Van den Dries et al., 2009). However, as most studies that were included in the meta-analysis focused on infancy and early childhood, the meta-analysis does not allow to draw conclusions about how the children fared later in life. Nonetheless, first longitudinal studies that did follow adopted children throughout childhood and adolescence suggest that adopted children's attachment security increases towards more normative rates of attachment security over time (e.g. Beijersbergen et al., 2012; Pace et al., 2012; Vorria et al., 2015). Besides, the favorable attachment outcomes of the children in our study who were adopted after their first birthday, might also be explained by the possibly better pre-adoption conditions in China compared to many other countries (e.g. Miller, 2004; Tan & Marfo, 2006). However, the finding that the children in our sample showed elevated rates of insecure attachment in the first months after adoption as well as delays in their cognitive and physical development (Van den Dries et al., 2010, 2012) suggests that the quality of pre-adoption care was still far from optimal (e.g. Van IJzendoorn et al., 2011; Lionetti et al., 2015).

Another remarkable finding concerns the lack of significant effects of type of pre-adoption care nine years after adoption. Comparable to the attachment results at Times 1 and 2 (Van den Dries et al., 2012), there were no significant differences between the post-institutionalized and the post-foster children in terms of their SBS knowledge at Time 3. This finding is somewhat surprising because the negative effects of institutional care on various domains of child development have been widely documented (Dozier et al., 2014; Van IJzendoorn et al., 2011). Nonetheless, separate comparison of the post-institutionalized and the post-foster children with the normative attachment distribution at Times 1 and 2 (2 and 6 months after adoption) indicated that only the post-institutionalized, but not the post-foster children, were more often insecurely attached. Hence, it would be unjustified to conclude that the setting where the children lived prior to adoption did not matter at all for their attachment development. Therefore, the fact that at Time 3 both the post-foster children as well as the post-institutionalized children could not be differentiated from the non-adopted comparison group in terms of SBS knowledge suggests that the extra time in the adoptive family – on average 9 years after

adoption – might have compensated for the negative effects of pre-adoptive institutional care. Supporting this suggestion, a previous study of this sample reported that the initial effects of type of care on intellectual functioning – with the post-foster children outperforming the post-institutionalized children at Times 1 and 2 – had disappeared at Time 3 (Finet et al., 2019).

Furthermore, while early-childhood sensitive parenting was not related to attachment security across the study, a significant association between concurrent sensitive parenting and SBS knowledge was observed at age 10. The finding that sensitive parenting was not yet related to attachment security in the first months after adoption (Times 1 and 2) whereas it was related to attachment representations at age 10, might indicate that the relational dynamics were still under development just after adoption and that the adopted children needed more time to internalize their new parents' sensitivity. Besides, the result concerning the association between concurrently observed sensitive parenting and Time 3 SBS knowledge is interesting because it adds to the limited body of research showing that similar associations between sensitive parenting and attachment exist in adopted children as in non-adopted children (see also Schoenmaker et al., 2015), and that sensitive parenting might play a role in post-adoption recovery in attachment security. At the same time, however, it is also important to note that this result should be nuanced given that sensitive parenting only accounted for a small proportion of variance in attachment and only in our last wave. The fact that a substantial proportion of variance thus remains unexplained, converges with the results of studies in non-adopted children (e.g. Verhage et al., 2015), and urges for research on other factors that might account for individual differences in attachment or that might modify the impact of sensitive parenting.

Finally, we explored whether sensitive parenting buffered the presumed associations between type of pre-adoption care and SBS knowledge at age 10. Whereas no support for an interaction between type of care and concurrent sensitive parenting in the prediction of SBS knowledge was found, we found support for a significant interaction between type of care and early-childhood sensitive caregiving. Although this interaction effect should be interpreted cautiously as it was no longer significant in the sensitivity analysis, it indicated that the post-institutionalized children developed more SBS knowledge than the post-foster children when parents scored high on early-childhood sensitive parenting. Moreover, early-childhood sensitivity was positively associated with SBS knowledge in the post-institutionalized children, but unrelated to SBS knowledge in the post-foster children. This effect – not completely in line with wat we expected – is interesting because it seems to suggest that early-childhood sensitive parenting facilitated recovery in the attachment representations of the children who experienced institutional deprivation. One possible explanation for this interaction is that the parents of the post-institutionalized children might have behaved more sensitively in order to respond adequately to the heightened attachment needs of their children who showed insecure attachment behaviors soon after adoption. This, in turn, might have contributed to the development of more SBS knowledge at age 10. However, the fact that parents of the post-institutionalized and the post-foster children scored equally high on early-childhood sensitive parenting reduces the likelihood of this explanation. Another possible explanation, is that the drastic transition in caregiving environment that the post-institutionalized children experienced after adoption, might have resulted in a heightened susceptibility to

environmental influences in a for-better-and-for-worse manner (Belsky et al., 2007; Belsky & Pluess, 2009). Due to this heightened susceptibility, the post-institutionalized children might have benefited more from the positive effects of early-childhood sensitive parenting than the post-foster children, which might explain their higher SBS scores. Nonetheless, these post-hoc explanations are speculative and more research is needed to examine whether or not our findings replicate to other samples and to be able to interpret the results more meaningfully.

Limitations

Some limitations should be considered when interpreting the findings of the current study. A first limitation concerns the reliance on parent-report in the assessment of type of pre-adoption care, which might have affected the validity of this variable because adoptive parents often receive incomplete, sometimes inaccurate, information about their children's pre-adoption background (Juffer et al., 2011). Moreover, the fact that adopted children often have experienced multiple types of pre-adoption experiences further complicates studying the effects of pre-adoption deprivation. Also, the hypothesized effects of type of pre-adoption care might have been attenuated by variation in the quality of care provided in different institutions and foster families. Research on children in foster care in China indeed found that children's outcomes are influenced by family factors (such as foster parents' education) and various other factors such as the level of support provided to foster families (for a review see Xu et al., 2020). Second, some caution is needed in interpreting the lack of significant differences between the adopted and non-adopted children at Time 3, because our sample had only sufficient power to detect effect sizes of at least $d = 0.31$. Third, the time lag between the second and third assessment of the study was quite long and the statistical analyses that we performed did not allow for drawing causal inferences about the relation between sensitive parenting and attachment, nor for examining cross-lagged associations. Nevertheless, we consider it a strength of our study that we followed the children until age 10, because longitudinal studies on adopted children's attachment development are still scarce. Furthermore, as the primary caregivers who took part in the study were mainly mothers, it would be interesting to see whether the findings generalize to adoptive fathers. Fifth, because we did not control for multiple testing, our results, especially those concerning the direct and moderating effects of sensitive parenting, should be interpreted with care. Moreover, caution is warranted in generalizing the current findings to other groups of adoptees, because participants of the current study might represent a unique group of adoptees (e.g. Juffer et al., 2015; Van Ginkel et al., 2018) as they were probably mainly adopted because of the one-child policy and less because of maternal risk factors (e.g. maternal substance abuse; Miller, 2004; Selman, 2015).

Conclusion

As knowledge on factors that are related to variability in adopted children's attachment development is relatively rare, the current study sought to examine the role of type of pre-adoption care and sensitive, adoptive parenting. Findings indicated that the adopted children, despite their increased risk for insecure attachment in the first months after

adoption, did not differ from non-adopted children in terms of SBS knowledge at age 10. These positive findings were found irrespective of whether the children had lived in institutional or foster care in China prior to adoption. In line with the extant literature in non-adopted children, concurrently assessed sensitive parenting was related to the children's attachment representations at age 10. Moreover, in the group of post-institutionalized children, early-childhood sensitive parenting was also related to the children's attachment representations. Together these findings demonstrate that with sufficient time in the adoptive family catch-up in attachment is possible, and that sensitive adoptive parenting plays an important, though not exclusive, role in this catch-up. These findings are thus in keeping with research showing that adoption can be considered an effective intervention.

Note

1. We repeated these analyses using all 639 children from the taxometric study of T. E. A. Waters et al. (2019) as a comparison group. This did not change the results. More information can be obtained from the corresponding author.

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