KU LEUVEN

FACULTY OF PSYCHOLOGY
AND EDUCATIONAL SCIENCES

PARENTING AND SPECIAL EDUCATION RESEARCH UNIT

Cognitive functioning and behavioral adjustment of internationally adopted children

The role of pre-adoption experiences and adoptive parenting

Chloë Finet

Dissertation submitted to obtain the degree of
Doctor in Educational Sciences

Supervisor: Prof. dr. Guy Bosmans

Co-supervisors: Prof. dr. Patricia Bijttebier, Prof. dr. Femmie Juffer, Dr. Harriet Vermeer

2018

Cognitief functioneren en gedragsmatige ontwikkeling van internationaal geadopteerde kinderen: de rol van pre-adoptie ervaringen en van opvoeding in het adoptiegezin

Chloë Finet
Promotor: Prof. dr. Guy Bosmans, Co-promotoren: Prof. dr. Patricia Bijttebier, Prof. dr. Femmie Juffer, Dr. Harriet Vermeer

---

Uit adoptieonderzoek blijkt dat er grote variabiliteit bestaat in de ontwikkelingsuitkomsten van geadopteerde kinderen. Hoewel de meeste adoptiekinderen een goede ontwikkeling vertonen, vertoont een minderheid langdurige achterstanden of moeilijkheden op verschillende ontwikkelingsvlakken zoals cognitief functioneren en gedragsmatige ontwikkeling. Het doel van deze dissertatie was om onze kennis te verruimen over factoren in de pre-adoptie omgeving en in het adoptiegezin die een rol kunnen spelen in het verklaren van deze individuele verschillen. Meer bepaald, hebben we (1) de associaties onderzocht tussen enerzijds de cognitieve en gedragsmatige ontwikkeling van adoptiekinderen tijdens de basisschoolleeftijd en anderzijds het type zorg (tehuis versus pleeggezin) dat de kinderen voor de adoptie kregen en de mate van vroege deprivatie die ze voor de adoptie meegemaakt hebben. Daarnaast hebben we onderzocht of (2) de sensitiviteit van adoptieouders en hun gevoel van ouderschapscompetentie de associaties tussen deze pre-adoptie ervaringen en latere ontwikkeling bufferden.

We hebben twee studies uitgevoerd in een groep van 92 Chinese geadopteerde meisjes die meegedaan hebben aan de Chinese Adoptiekinderen in Nederland (CAN) studie, twee maanden, zes maanden en negen jaar na de adoptie. Daarnaast hebben we de onderzoeksvraag over het verband tussen pre-adoptie ervaringen en gedragsmatige ontwikkeling ook onderzocht in een groep van 891 meisjes die deelgenomen hebben aan de Leidse Vragenlijststudie naar de ontwikkeling van adoptiekinderen uit China. De resultaten van de studies kwamen in het algemeen niet overeen met onze verwachtingen. Terwijl de kinderen die in een pleeggezin gewoond hadden voor hun adoptie twee en zes maanden na hun adoptie betere intellectuele vaardigheden vertoonden dan de kinderen die in een tehuis gewoond hadden, was dit groepsverschil negen jaar na adoptie verdwenen. Daarenboven waren er ook geen effecten van type zorg, noch van vroege deprivatie op de andere onderzochte domeinen van cognitieve ontwikkeling (schoolprestaties, executief functioneren, en effortful control). Verder werden in beide studies ook geen effecten van type pre-adoptiezorg noch van vroege deprivatie op gedragsmatige ontwikkeling gevonden. Er was echter één uitzondering: in de Leidse Vragenlijststudie was er een klein, significant verband tussen vroege deprivatie en gedragsmatige ontwikkeling. Tot slot vonden we vrijwel geen evidentie voor het veronderstelde bufferende effect van sensitiviteit van de adoptieouders en hun gevoel van ouderschapscompetentie in het verband tussen pre-adoptie ervaringen en cognitieve en gedragsmatige ontwikkeling.

Deze studies toonden aan dat de effecten van negatieve pre-adoptie ervaringen afnamen over tijd en slechts weinig variantie verklaarden in de cognitieve en gedragsmatige ontwikkeling van de adoptiekinderen in de basisschoolleeftijd. Daarnaast leek opvoeding niet als een buffer te werken in het verband tussen pre-adoptie ervaringen en latere ontwikkeling. Desondanks vertoonden de kinderen negen jaar na hun adoptie een goede, leeftijdsadequate ontwikkeling op zowel cognitief als gedragsmatig vlak. Deze studies bieden aldus evidentie voor het belang van adoptie in de zorg voor kinderen die vroege deprivatie meegemaakt hebben.

Cognitive functioning and behavioral adjustment of internationally adopted children: the role of pre-adoption experiences and adoptive parenting

Chloë Finet
Supervisor: Prof. dr. Guy Bosmans, Co-supervisors: Prof. dr. Patricia Bijttebier, Prof. dr. Femmie Juffer, Dr. Harriet Vermeer

---

Adoption studies have demonstrated that there is a remarkable heterogeneity in adopted children's developmental outcomes. Whereas the majority of adopted children are well-adjusted, a minority shows persistent delays or difficulties in various developmental domains such as cognitive functioning and behavioral adjustment. In the current dissertation we aimed to broaden our understanding of factors in the pre-adoption and in the post-adoption environment that may play a role in explaining this heterogeneity. In specific, we studied (1) associations between adopted children's cognitive and behavioral adjustment in middle childhood and the type of care (institutional care versus foster care) and the extent of early deprivation they experienced prior to adoption. Furthermore, we tested whether (2) parental sensitivity and parental efficacy buffered the associations between adverse pre-adoption experiences and cognitive and behavioral adjustment.

Two studies were conducted in a sample of 92 Chinese adopted girls who took part in the Chinese Adoptees in the Netherlands (CAN) study, two months, six months and nine years after adoption. Besides, the research question concerning the association between pre-adoption experiences and behavioral adjustment was also studied in a sample of 891 girls who participated in the Leiden Questionnaire study on children adopted from China. Findings of our studies were generally not in line with our expectations. Although the post-foster children had higher intellectual abilities than the post-institutionalized children two and six months after adoption, this group difference had disappeared nine years after adoption. Moreover, there were also no effects of type of pre-adoption care, nor of early deprivation on the other assessed domains of cognitive development (school achievement, executive functioning, and effortful control). Similarly, no effects of type of pre-adoption care nor of early deprivation on behavioral adjustment were found, with the exception of a small, significant association between early deprivation and behavioral adjustment in the Leiden Questionnaire Study. Finally, we did not find strong support for the hypothesized effects of parental sensitivity and parental efficacy in the association between pre-adoption experiences and cognitive development and behavioral development.

These studies led to the conclusion that over time, effects of pre-adoption adversities declined and that they explained little variance in the adopted children's cognitive and behavioral functioning in middle childhood. Furthermore, there was little evidence for buffering effects of adoptive parenting on these associations. Nevertheless, nine years after their adoption the children were well-adjusted in terms of their cognitive and behavioral functioning. The current studies thus add evidence for the importance of adoption in the care of deprived children.

TABLE OF CONTENTS

CHAPTER 1
General Introduction

1. Introduction

Intercountry adoption refers to the permanent placement of abandoned or orphaned children in an adoptive family living in another country than the birth family (Van IJzendoorn & Juffer, 2006). Worldwide, about one million children who could not be raised by their birth family due to a variety of reasons have been adopted internationally since the 1940s (Selman, 2009). On the one hand, adopted children are often thought to be at risk for developmental delays as a result of the pre-adoption hardships they have been exposed to, such as loss of their birth parents, impersonal care of low quality in institutional settings, sub-nutrition, or even abuse and neglect. On the other hand, however, through adoption into a nurturing and stimulating adoptive family, adopted children generally experience a drastic change in rearing environment which may protect against the setbacks of early adverse experiences (Juffer & Van IJzendoorn, 2009).

In the past decades hundreds of adoption studies on thousands of adopted children have been performed to gain knowledge about the impact of adoption on children's developmental adjustment, and about adopted children's possibilities for recovery following adoption (Palacios & Brodzinsky, 2010). Although inconsistencies exist between these studies' results (Zamostny, O'Brien, Baden, & Wiley, 2003), they generally reveal that the majority of adopted children are able to overcome initial developmental delays following adoption (Van IJzendoorn & Juffer, 2006). At the same time, these studies also indicate large heterogeneity in adopted children's adjustment, with a minority of adopted children showing more persistent developmental difficulties. As a consequence, adoption researchers have started to study factors that might be related to these individual differences in adopted children's development (Palacios & Brodzinsky, 2010), but studies in which this is investigated are still scarce (Barroso, Barbosa-Ducharne, Coelho, Costa, & Silva, 2017). Hence, there is need for more research examining which factors might explain why some adopted children show better outcomes than others (Barroso et al., 2017). This is important, especially, because this knowledge may inform prevention and intervention programs aimed at further supporting adopted children's resilience (i.e., the capacity to do well despite exposure to risk or adversity; Zolkoski & Bullock, 2012).

Therefore, the overarching aim of this dissertation was to study factors that might be related to variability in adopted children's adjustment. We were specifically interested in

factors in the pre-adoption environment (type of pre-adoption care and early deprivation) as well as in the post-adoption environment (parental sensitivity and parental efficacy) of the child, and we decided to concentrate on two important developmental domains, namely cognitive and behavioral development. Specifically, the two primary research aims of the current dissertation were (1) to examine the associations between pre-adoption experiences and cognitive and behavioral adjustment, and (2) to examine whether parental sensitivity and parental efficacy act as a buffer in this association. These questions were investigated in adopted Chinese children living in the Netherlands.

In the following sections of this introductory chapter, the empirical framework that gave rise to these two research aims is discussed. We start with some background information on intercountry adoption from China. Second, we discuss research findings concerning adopted children's cognitive and behavioral development. Third, the link between pre-adoption experiences and adopted children's development is explained. Fourth, we provide some information about the potential role of parenting in adopted children's adjustment. Finally, we end this chapter with an overview of the studies that are included in the dissertation, with some information about the two samples in which the research questions were examined and with an overview of the main measures.

2. Adoption

2.1. Short historical note

Although adoption of children by families who are not biologically related to the child has existed across time and place, the contemporary practice of intercountry adoption as we know it today started in the aftermath of the Second World War as a humanitarian response to provide war orphans with a new home (Brumble & Kampfe, 2011; Selman, 2009). At that time, thousands of homeless European children, mainly from Germany and Greece, were adopted to other European countries or to the United States (Selman, 2009). As the political situation in Europe improved, the adoption of children from war-torn European countries ended (Brumble & Kampfe, 2011). Since then the practice of intercountry adoption has been characterized by many (interrelated) changes, for example in couples' main motivation for adoption (from humanitarian reasons to the desire of infertile, childless couples to have a child), in the annual number of intercountry adoptions (generally increasing until 2004,

followed by a steady decline in the past years) and in the countries sending children for adoption. Changes in the countries involved in international adoption stem mainly from changes in the political, economic and social conditions in adopted children's birth countries (Davis, 2011). For example, after the Korean war high numbers of Korean orphans and Korean mixed-race children were adopted abroad, and in the early 1990s following the fall of the Ceausescu regime many institutionalized Romanian children were adopted (Selman, 2009). In the past two decades, China has dominated intercountry adoption. In the next section we explain why so many Chinese children were adopted abroad, and which unique features of adoption from China make it particularly interesting to study this group.

2.2. Intercountry adoption from China

As mentioned above, China has been the main birth country of international adoptees since 1998. It has been estimated that more than 130,000 children, especially girls, were adopted from China to various countries between 1992 and 2015 (Selman, 2015). In what follows, we explain why so many Chinese children, especially girls, were abandoned, and why so many of these children were adopted abroad instead of within China.

An important aspect in understanding intercountry adoption from China, is China's birth planning policy. In 1979 China implemented a one-child-policy - prohibiting families from having more than one child (Bongaarts & Greenhalgh, 1985). This policy aimed to reduce the rapid population growth (which had increased from approximately 540 million people in 1949 to more than 800 million people in 1979), to foster China's economic growth, and to prevent social problems. To ensure the success of the policy, one-child families were given incentives (e.g., improved housing, job security, free public education for the child), whereas families who had more than one child were penalized (e.g., through removal of incentives, compensation fines, forced sterilization; Bongaarts & Greenhalgh, 1985; Dowling & Brown, 2009). Over time many local variations and modifications were made in the way the policy was enforced (Baochang, Feng, Zhigang, & Erli, 2007; Ebenstein, 2010; Miller, Chan, Comfort, & Tirella, 2005). One important example of these modifications was the implementation of a one-son-or-two-child policy in rural areas in China (Baochang et al., 2007). This policy stated that families were allowed to have two children if their first child was a girl but not if their first child was a boy.

Although the Chinese birth control policies have led to the intended drop in fertility rate, the policy also had many unintended consequences such as a surge in child abandonment, especially of infant girls. The reason why especially girls were at increased risk of being abandoned, can be understood by considering Chinese parents' historical preference for boys (Johnson, Banghan, & Liyao, 1998) who continue the family name, are economically favored (have property rights), and are responsible for taking care of their aging parents who are dependent on their children. Girls, on the other hand, do not have property rights, join their husband's family after marriage, and take care of their parents-in-law (Johnson et al., 1998; Luo & Berquist, 2005). For these reasons it was really important for families to have a son, and as a result of the strictly enforced birth planning policies many infant girls were abandoned, so that the family could have the chance to try again for a boy (Johnson et al., 1998). In rural areas where the one-son-or-two-child policy was implemented, girls who already had one or more sisters but no brothers, especially, were at increased risk of being abandoned. This is because parents could not afford to pay the fines associated with an "over-quota child" and because there was no legal avenue by which parents could place their child for adoption. As such the birth planning polices left them "no choice" (Johnson et al., 1998, p. 477). It should be noted that many parents who abandoned their child tried to ensure that their child would be discovered easily. Parents took their child to a crowded public place, or left their child on the doorstep of a potential adoptive parent, or at the entrance of an orphanage (Johnson et al., 1998; Zhang, 2006).

The first Chinese adoption law – which came into force in 1991 (Johnson et al., 1998) - can help to understand why many of these abandoned girls were adopted abroad instead of within China. According to this law, in China only childless couples who were older than 35 years were allowed to adopt healthy children. This way, the adoption law reinforced the one-child policy and intended to prevent birthparents from arranging adoptions for their "over-quota" daughters (Johnson et al., 1998). Consequently, the law reduced the number of potential adoptive parents in China and made legal domestic adoption in China very difficult. The adoption law tried to compensate for the reduced pool of potential Chinese adoptive parents by legally allowing international adoption to different foreign countries (Johnson et al., 1998). This resulted in a sharp increase in the number of Chinese children adopted abroad. By 1998, China had become the main country of origin for adoption to Canada, Denmark, the Netherlands, and the United Kingdom (Selman, 2009), and in 2005 the number of

internationally adopted Chinese children peaked with 14,493 Chinese children (95% girls) adopted abroad (Selman, 2015). This sharp increase, however, was followed by a rapid fall in international adoption of infant girls from China, which can be explained by a move towards domestic adoption in China and stricter guidelines for international adoption (e.g., restrictions on the number of children available for intercountry adoption, and restrictions on adoption by singles; Dowling & Brown, 2009; Selman, 2009, 2015). Moreover, in October 2015 the one-child policy came to an end and was replaced by a universal two-children policy (Hesketh, Zhou, & Wang, 2015). Although in the past years Chinese children are still being adopted abroad (though with a clear shift to adoption of children with special needs instead of healthy infant girls), the number of adoptions from China is still decreasing and it is unclear whether in the future Chinese children will be still adopted abroad or whether international adoption from China will end (Selman, 2015).

Nonetheless, given the large number of adopted Chinese children living around the world and given the relative lack of long-term longitudinal studies on these children's adjustment (Selman, 2015), it is important to study their development longitudinally, especially because outcomes of studies on children adopted from other countries are not necessarily generalizable to Chinese adopted children. Besides, two features of adoption from China make it particularly interesting for adoption scholars. First, because the main reason leading to child abandonment in China were the birth-planning policies, few adopted Chinese children experienced prenatal adversities (such as alcohol or drug exposure) compared to children adopted from many other countries (e.g., Romania; Landgren, Svensson, Strömland, & Andersson Grönlund, 2010). This reduces the risk that results of studies with children adopted from China are confounded with the effects of negative prenatal experiences. Second, although the majority of abandoned Chinese children were raised in institutional care (Child Welfare Institutions) prior to adoption, a minority of them lived in a temporary foster family (Johnson, 2004) which allowed to study the potential differential effects of these two types of pre-adoption care on later adjustment.

3. First two trends of adoption research

The first psychological research on adoption dates back to the late 1950s (Palacios & Brodzinsky, 2010). At that time - as a result of John Bowlby's WHO report on the far-reaching, detrimental effects of deprivation of parental care on children's mental health (Bowlby, 1951)

– concern about the well-being of adopted children was raised among scholars (Juffer & Van IJzendoorn, 2009). In addition to this concern about adopted children's well-being, research interest in adoption stemmed from the view of adoption as a "natural experiment" offering opportunities to study important theoretical questions concerning the effects of early adverse experiences on developmental adjustment and concerning children's possibilities for recovery after transition to an adoptive family (Juffer & Van IJzendoorn, 2009).

The conceptualization of adoption as a natural experiment refers to the naturally occurring (i.e., not randomized-controlled) change in caregiving environment that takes place when children are placed for adoption. More specifically, prior to adoption, many children are deprived of positive experiences that are necessary for optimal adjustment (Van IJzendoorn et al., 2011). Adopted children, for example, lack opportunities to develop stable relationship with a sensitive caregiver, often lack cognitive stimulation and may even experience neglect and maltreatment. These early adverse experiences might impact children's stress response system and brain development and as such produce delays in various developmental domains (Grotevant & McDermott, 2014; McCall, 2011). Through adoption by a stimulating and nurturing adoptive family, children generally experience a massive improvement in caregiving environment which may provide opportunities for catch-up. This radical improvement in caregiving conditions provides researchers with a unique opportunity to study whether (1) adopted children, as a result of early adverse experiences, are at increased risk for developmental difficulties compared to non-adopted children raised by their biological parents, and (2) whether adopted children can recover from early adversities. These two research questions were the focus of what have been called the first two trends in adoption research (Palacios & Brodzinsky, 2010), and have dominated the adoption field for years. In what follows we present some results of studies on the cognitive and behavioral adjustment of adopted children in general and Chinese adopted children specifically.

3.1. Cognitive adjustment

Numerous adoption studies have studied the cognitive development of adopted children, which is important given the influence of various aspects of cognitive development on well-being and success in later life (e.g., Moffitt, Poulton, & Caspi, 2013; Strenze, 2007). The main aim of these studies was to examine whether adopted children show better

cognitive development than their past peers (i.e., orphaned or abandoned peers in their birth country who were not adopted), and to examine whether adopted children lag behind or catch up in cognitive development compared to their current peers (i.e., peers living in the adoptive country with their birth parents). These studies have yielded somewhat inconsistent findings, with some studies finding delays in cognitive development (e.g., Rutter & the ERA study team, 1998) and other studies finding average (e.g., Canzi, Rosnati, Palacios, & Román, 2017; Loman et al., 2009; van Londen, Juffer, & Van IJzendoorn, 2007), or even above average (e.g., Frydman & Lynn, 1989; Stams, Juffer, Rispens, & Hoksbergen, 2000) cognitive development. In order to systematically synthesize the results of all available adoption studies on cognitive development (62 studies on 17,767 adopted children), Van IJzendoorn, Juffer, and Klein Poelhuis (2005) performed a set of meta-analyses. Four different indicators of cognitive development were included in the meta-analyses, namely intellectual functioning (IQ scores), school achievement, language abilities and learning problems. Results revealed that, in comparison with their past peers, adopted children had higher IQ scores and performed better at school. Comparisons with their current peers showed that the adopted children on average had similar IQ scores, suggesting that there is a complete catch-up for IQ scores. Catch-up for school achievement, in contrast, was not complete. Adopted children showed small but significant delays in school achievement, albeit only when they were adopted after their first birthday or when they had experienced pre-adoption adversity (such as malnutrition, abuse and neglect). Similarly, catch-up in language abilities was not complete, as adopted children showed small delays in language abilities compared to their current peers. Furthermore, adopted children showed significantly more learning problems, and were twice as often referred to special education services as their current peers (Van IJzendoorn et al., 2005).

Although it is an important strength of the meta-analyses that they summarized all available studies on adopted children's cognitive development, two limitations should be pointed out. First, based on the meta-analyses no conclusions can be drawn about how adopted children's cognitive functioning evolves over time, because only the first time point was used of the longitudinal studies that were included in the meta-analysis. Nonetheless, findings of longitudinal adoption studies largely converge with the meta-analytical findings (Juffer et al., 2011). Specifically, longitudinal studies generally reveal that even though adopted children show delays in cognitive development at adoptive placement, most children

show remarkable catch-up following adoption (e.g., Beckett, Castle, Rutter, & Sonuga-Barke, 2010; Rutter & the ERA study team, 1998; Vorria et al., 2003, 2006). Second, it is unclear whether the meta-analytical results are generalizable to Chinese adopted children, because no adoption studies on cognitive development of this group of children were available at the time the meta-analysis was performed (Juffer, Van den Dries, Finet, & Vermeer, 2015). However, more recent studies with children adopted from China have revealed as good or even better outcomes. It has been reported that adopted Chinese children - despite moderate delays in intellectual abilities at arrival in the adoptive family - showed remarkable (albeit incomplete) catch-up six months later (for an overview see, Juffer et al., 2015) and complete catch-up two years later (Cohen, Lojkasek, Zadeh, Pugliese, & Kiefer, 2008; Delcenserie, Genesee, & Gauthier, 2013). Furthermore, it has been demonstrated that Chinese adopted children do not perform worse at school than non-adopted children (Dalen & Rygvold, 2006), and generally score within the normal range on language tests (Delcenserie et al., 2013; Roberts et al., 2005).

A more recent line of research on cognitive development, which was not included in the meta-analysis, focusses on adopted children's self-regulatory capacities. Self-regulation refers to internal processes that are necessary to perform goal-directed actions across different contexts (Karoly, 1993). Self-regulation has traditionally been studied from two different theoretical frameworks, namely from a cognitive neuroscience framework primarily focusing on measures of executive functions, and from a temperament-based framework primarily focusing on measures of effortful control (Zhou, Chen, & Main, 2012). Within the adoption literature, most studies on adopted children's self-regulatory capacities have adopted the executive functioning framework. Executive functions refer to higher order, self-regulatory, cognitive skills that are necessary to exert control over cognition, attention and behavior (Zhou et al., 2012). Although executive functions have been less frequently studied by adoption researchers than general cognitive abilities, empirical evidence generally suggests that deficits in executive functions might be more difficult to overcome. Both studies in which executive functions were assessed with laboratory tasks (Beckett et al., 2010; Behen, Helder, Rothermel, Solomon, & Chagani, 2008; Delcenserie & Genesee, 2014; Hostinar, Stellern, Schaefer, Carlson, & Gunnar, 2012) and studies in which executive functions were assessed using parent-report questionnaires (Merz & McCall, 2011; Merz, McCall, & Groza, 2013), revealed that adopted children show increased levels of executive functioning

difficulties compared to the studies' comparison group of non-adopted or within-country adopted children (lab task studies) or compared to the normative sample of non-adopted children (questionnaire studies).

In short, the evidence discussed above indicates that adopted children generally show remarkable catch-up in cognitive functioning following adoption, although results are not consistent and differ depending on which aspect of cognitive development is studied. In Chapter 2 of the current dissertation we provide a broader overview of important adoption studies on cognitive development.

3.2. Behavioral adjustment

Another developmental domain that has received considerable attention in the adoption literature is behavioral adjustment. The majority of adoption studies have studied adopted children's behavioral adjustment from a deficit perspective, focusing on maladaptive behavioral adjustment (Grotevant & McDermott, 2014). Two primary outcome measures of interest that are studied are internalizing (e.g., inward-directed symptoms of depression, anxiety and withdrawal, or somatic complaints) and externalizing behavioral problems (e.g., outward directed behavior, such as aggressive behavior, hyperactivity, or conduct problems), although other indicators of maladaptive behavioral adjustment (e.g., attention problems and sleep problems) are studied as well. More recently, some adoption studies have started to focus on indicators of adaptive behavioral adjustment (e.g., prosocial behavior, responsive behavior), which is important to gain a broader understanding of adopted children's behavioral adjustment (Kriebel & Wentzel, 2011; Pearlmutter, Ryan, Johnson, & Groza, 2008).

In line with research findings on cognitive development, research findings on behavioral adjustment are rather mixed. Some adoption studies have shown that adopted children show more behavioral problems, for example internalizing or externalizing problems (e.g., Hoksbergen, 1997; Hoksbergen, Rijk, Van Dijkum, & Ter Laak, 2004; Rosnati, Montirosso, & Barni, 2008; Tieman, van der Ende, & Verhulst, 2005), attention problems (e.g., Merz & McCall, 2010), and sleep problems (e.g., Radcliff, Baylor, & Rybarczyk, 2016) than non-adopted children. In contrast, other studies did not report differences between adopted and non-adopted children on measures of maladaptive (e.g., Escobar, Pereira, & Santelices, 2014) or adaptive behavioral adjustment (e.g., Palacios, Moreno, & Román, 2012; Pearlmutter et al., 2008; Vorria, Ntouma, & Rutter, 2014), or even found that adopted children were better

adjusted than non-adopted children (e.g., Sharma, McGue, & Benson, 1996; Tan & Marfo, 2006). The meta-analyses of Juffer and Van IJzendoorn (2005), in which all available studies on internalizing, externalizing and total behavioral problems and on mental health referrals of adopted children have been systematically summarized, revealed that adopted children generally had a small, but significant higher risk to develop internalizing and externalizing and total behavioral problems than non-adopted children. Moreover, adopted children were significantly more often referred to mental health services, although it has been argued that these higher referral rates may be partly explained by the finding that adoptive parents have a lower threshold for seeking professional help (Juffer & Van IJzendoorn, 2005; Warren, 1992). Besides, adopted children showed more total behavioral problems in early and middle childhood than in adolescence, and adopted children who experienced pre-adoption adversity showed more total and externalizing problems than adopted children who did not experience pre-adoption adversity. These meta-analytical findings led to the conclusion that the majority of adopted children are well adjusted, and that difficulties emerge in only a minority of them.

However, like the meta-analysis on cognitive development, the meta-analysis on behavioral problems (Juffer & Van IJzendoorn, 2005) does not allow to draw conclusions about the development of behavioral problems over time, or to generalize findings to Chinese adopted children. In line with the meta-analysis, most, but not all, longitudinal studies also report slightly higher rates of behavioral problems among adopted children, and report that behavioral problems are especially observed during early and middle childhood and decrease in adolescence (Jaffari-Bimmel, Juffer, Van IJzendoorn, & Bakermans-Kranenburg, 2004). In contrast, other longitudinal studies found that behavioral problems increase rather than decrease in adolescence (e.g., Verhulst, 2000; Verhulst & Versluis-Den Bieman, 1995). Next, concerning the behavioral adjustment of Chinese adopted children, studies have generally yielded more positive outcomes than the outcomes reported in the meta-analysis of Juffer and Van IJzendoorn (2005). Specifically, it has been found that Chinese adopted children show similar (Rojewski, Shapiro, & Shapiro, 2000; Tan, 2011) or lower (Tan & Marfo, 2006) levels of internalizing and externalizing behavioral problems than the norm group of non-adopted children, and score as well or even better on measures of adaptive behavioral adjustment such as social skills (Tan, Camras, Deng, Zhang, & Lu, 2012). Despite this, Rojewski et al. (2000) reported that the large variability of scores on some behavioral problems subscales (namely

hyperactivity, aggressive behavior, conduct problems and attention problems) indicated that at least some adopted Chinese children had a greater risk of problems in these domains. Furthermore, in contrast to these positive outcomes, slightly higher levels of sleep problems have been reported in some adoption studies with Chinese adopted children (e.g., Rettig & McCarthy-Rettig, 2006; Tan, Dedrick, & Marfo, 2007), but not in all adoption studies with these children (e.g., Tan, Marfo, & Dedrick, 2009).

3.3. Conclusion

In sum, the studies discussed above on adopted children's cognitive and behavioral adjustment revealed that adopted children are generally well adjusted, which led to the conclusion that adoption can be seen as a successful intervention in the life of children who cannot be raised by their birth families (Juffer & Van IJzendoorn, 2009; Van IJzendoorn & Juffer, 2006). At the same time, however, the studies also indicated that there is large heterogeneity in adopted children's developmental adjustment. This raises the question why some adopted children are better adjusted than others.

4. Third trend of adoption research

In order to improve understanding of these individual differences in adopted children's development, research focus shifted from merely comparing adopted and non-adopted children to studying factors that might account for this heterogeneity. The study of factors underlying individual differences in adopted children's adjustment mainly emerged after 2000 and refers to the third trend in adoption research (Palacios & Brodzinsky, 2010). However**,** as there is still a lack of research in this area, more research is urged to get a better understanding of factors that may predict individual differences in adopted children's adjustment (Barroso et al., 2017; Palacios & Brodzinsky, 2010). Information resulting from such research may help in the development of prevention and intervention programs aimed at enhancing adopted children's developmental adjustment. Therefore, the main aim of the current dissertation was to broaden our knowledge about factors that may explain variability in adopted children's development. We focused on factors in the pre-adoption environment (namely type of pre-adoption care and early deprivation; Chapters 3-5), as well as on factors in the post-adoption environment (namely adoptive parenting; Chapters 3 and 5).

4.1. Pre-adoption experiences

One factor that may play a role in explaining individual differences in adopted children's development is heterogeneity in adopted children's pre-adoption experiences. Adopted children differ, for example, with respect to their country of origin, with respect to the reasons why they were placed for adoption, and with respect to the extent to which they have been exposed to adverse pre-adoption experiences. In the current dissertation we are specifically interested in the role of adverse pre-adoption experiences. In the adoption literature sometimes age at adoption is used as a proxy indicator for pre-adoption adversities (Tan, Marfo, & Dedrick, 2010). Many, but not all, studies have shown that later age at adoption is associated with less optimal functioning (e.g., Hawk et al., 2012). However, given that not all children who are adopted at the same age, have experienced similar degrees of deprivation, the use of age at adoption as proxy for pre-adoption adversities is not without limitations (Grotevant & McDermott, 2014; Tan et al., 2010). Therefore, in the current dissertation we focus on two other, more proximal indicators of pre-adoption experiences, namely type of pre-adoption care and extent of early deprivation. The first main research aim of the current dissertation was to examine the association between these two indicators of adverse pre-adoption experiences and later cognitive and behavioral adjustment (Chapters 3-5).

4.1.1. Type of pre-adoption care

Adopted children differ with respect to the type of care they have received prior to adoption. Whereas in many countries the majority of relinquished or orphaned children are reared in institutional care prior to adoption (post-institutionalized children), other children are reared in temporary foster care (post-foster children) (Gunnar, Bruce, & Grotevant, 2000). When studying adopted children's development it is important to take into account these different types of living arrangements, because they may differentially affect adopted children's development. It can be expected that pre-adoption institutional care will be more detrimental than pre-adoption foster care, because institutional care drastically differs from family care and is at odds with children's developmental needs (Rice, Jackson, Mahoney, & Tan, 2016). More specifically, institutions are often characterized by deprivation of children's health, nutrition, stimulation and relationships needs (Gunnar et al., 2000; Van IJzendoorn et al., 2011) which may have negative effects on children's adjustment. Especially a child's need

for stable relationships with a consistent caregiver is difficult to meet in institutional settings as institutions are often characterized by large groups, high child-to-caregiver ratios, rotating shifts of caregivers, high staff turnover, and regimented non-individualized care (Rice et al., 2016). Not surprisingly, ample research has indeed shown that children living in institutions have a substantial increased risk for developmental delays (e.g., Van IJzendoorn et al., 2011; Van IJzendoorn, Luijk, & Juffer, 2008).

In contrast to institutional care, foster care is a type of family care and thus provides children with opportunities to develop stable relationships with consistent caregivers. Moreover – although it is important to acknowledge that there is variability in the quality of care between different foster families – it is more likely that children's health, nutrition and stimulation needs will be met in foster care than in institutional care. Thus, it can be expected that pre-adoption foster care will be less harmful for children's developmental adjustment than pre-adoption institutional care. The Bucharest Early Intervention Project (BEIP; Zeanah et al., 2003) – the first randomized controlled trial in which institutionalized children in Bucharest were randomly assigned to continued institutional care (care as usual) or to a foster care intervention – indeed revealed that children in foster care showed better cognitive (Bick, Zeanah, Fox, & Nelson, 2017; Fox, Almas, Degnan, Nelson, & Zeanah, 2011; Nelson et al., 2007) and behavioral adjustment (Humphreys et al., 2015; Zeanah et al., 2009) than the children who remained in institutional care. However, the BEIP study did not investigate how institutional care and foster care affect children's development *after* adoption.

So far, relatively few adoption studies have examined the effects of pre-adoption institutional versus foster care on adopted children's development and results of these studies are inconclusive. With respect to behavioral adjustment, Wiik et al. (2011) and Gunnar and van Dulmen (2007) found that whereas post-institutionalized children had more attention problems than post-foster children, both groups did not differ from each other on externalizing and internalizing problems. With respect to cognitive adjustment, some studies revealed that post-institutionalized children had lower intellectual abilities than post-foster children (Miller et al., 2005; van Londen et al., 2007; Wilson, Weaver, Cradock, & Kuebli, 2008), did less well at school (Loman et al., 2009), and performed worse on inhibitory control tasks (i.e., an aspect of executive functioning; Bruce, Tarullo, & Gunnar, 2009), whereas other studies did not find evidence for type of pre-adoption care effects on intellectual abilities (Bruce et al., 2009; Katzenstein, LeJeune, & Johnson, 2016; Welsh & Viana, 2012) or on

executive functioning (e.g., planning abilities; Pollak et al., 2010). The contrasting findings of these studies suggest that the effects of type of pre-adoption care are not deterministic, but probabilistic (Sroufe, Coffino, & Carlson, 2010). As an aside, it is important to mention that the studies reported above were somewhat limited because the post-institutionalized and post-foster children differed with respect to their main birth country and with respect to their mean age at adoption (but see Miller et al., 2005). In the current dissertation, we were able to address this limitation because both the post-institutionalized and the post-foster children were born in China and had on average the same age at adoptive placement.

4.1.2. Early deprivation

Besides type of pre-adoption care, another pre-adoption factor that may be partly responsible for individual differences in adopted children's developmental outcomes is the extent to which children have been exposed to early depriving experiences such as malnutrition, neglect or abuse. Although the level of early deprivation will generally be higher in institutional care than in foster care (Bruce et al., 2009), it is important to acknowledge that the level of early deprivation can vary between different institutions as well as between different foster families. Not all children adopted from institutional care have been exposed to equally high levels of early deprivation. In the same way, not all children adopted from foster care have been spared from experiencing high levels of early deprivation. These early depriving experiences may impact developmental adjustment through their impact on the stress-response system and on brain development (e.g., Loman & Gunnar, 2010).

In many studies on intercountry adopted children, no information about early experiences is available. Studies in which some information was available provided mixed evidence for the detrimental effects of early deprivation. More specifically, the meta-analyses of Van IJzendoorn et al. (2005) on adopted children's cognitive development revealed that studies in which participants had experienced early deprivation (coded as presence of malnutrition, neglect or abuse or a combination) reported lower school achievement than studies in which participants did not experience early deprivation. No significant differences for intellectual functioning (IQ scores) were found. Besides, the meta-analyses of Juffer and Van IJzendoorn (2005) on behavioral problems indicated that studies in which children had been exposed to early deprivation, reported higher levels of total and externalizing behavioral problems. With respect to internalizing problems no differences were found between studies

in which participant did or did not have experienced early deprivation. In addition to these effects of between-study differences in early deprivation, also within-study effects of early deprivation have been found in some, but not in all, studies. Several studies reported that children who were exposed to more early deprivation, showed less optimal cognitive development (Harwood, Feng, & Yu, 2013; Hostinar et al., 2012; Pechtel & Pizzagalli, 2011; Tan, 2006, 2009) and more behavioral problems (Gagnon-Oosterwaal et al., 2012; Groza & Ryan, 2002; Kriebel & Wentzel, 2011; Merz & McCall, 2010; Simmel, Brooks, Barth, & Hinshaw, 2001; Tan & Marfo, 2006; Van Der Vegt, Van Der Ende, Ferdinand, Verhulst, & Tiemeier, 2009; Verhulst, Althaus, & Versluis-Den Bieman, 1992) than children who were exposed to less deprivation. In contrast, other studies did not find evidence for negative effects of early deprivation (Gleitman & Savaya, 2011; Grotevant, Ross, Marchel, & Mcroy, 1999). Although these inconsistent findings might be partially due to differences in the operationalization of early deprivation among studies, these findings also suggest that the effects of pre-adoption deprivation are not deterministic. This is in line with studies in non-adopted samples, showing that children can thrive despite exposure to negative life experiences (e.g., Bonanno, 2004).

4.1.3. Conclusion

The mixed findings discussed above concerning the association between pre-adoption experiences and developmental adjustment indicate that there are individual differences in the association between pre-adoption experiences and post-adoption adjustment. This implies that not all children are equally affected by negative experiences (Van IJzendoorn et al., 2011), which raises the question why some children fare better than others despite having been exposed to adverse pre-adoption experiences, in other words, why some children are more resilient than others. One possible explanation comes from risk and resilience theories. From a risk and resilience perspective it can be predicted that protective factors may account for this diversity, by moderating (buffering) the association between pre-adoption adversities (i.e., the risk factors) and developmental outcomes (Masten, 2001). Stated differently, risk and resilience models predict that adverse pre-adoption experiences especially will have harmful effects on adjustment when children are low on the protective variable, but fewer or no harmful effects when children are high on the protective variable. Many protective factors at different levels (e.g., individual child level, family level, community level) may play a role

(Benzies & Mychasiuk, 2009). Although all these factors deserve investigation, in the current dissertation (Chapters 3 and 5) we focus on one specific understudied candidate factor in the adoptive family that may improve children's resilience, namely parenting (specifically, parental sensitivity and parental efficacy) (Masten, 2001). Currently, there is a dearth of adoption research investigating whether adoptive parenting buffers the association between adverse pre-adoption experiences and cognitive and behavioral adjustment. However, based on numerous studies in non-adopted children and gradually emerging evidence in adopted children on the direct effects of parenting on development (see below), it can be expected that parental sensitivity and parental efficacy may buffer the association between pre-adoption experiences and developmental adjustment.

4.2. Adoptive parenting

One plausible protective factor in the adoptive family is parenting, which is a chief environmental influence in a child's life. No consensual definition of parenting exists, but it has been stated that parenting is a complex, multi-level construct that includes behavioral aspects as well as cognitive aspects (O'Connor, 2002). Definitions of parenting behavior often incorporate elements as child-rearing practices, providing one's children with a stimulating caregiving environment, or elements that refer to the positive and negative affective aspects of parent-child interactions (Smith, 2011). Besides behavioral aspects, parenting also includes cognitive aspects, such as the beliefs parents hold about their ability to raise their child successfully (i.e., parental efficacy). Given that both parenting behavior as well as parental efficacy can have an impact on children's development (see below), we studied both aspects of parenting in the current dissertation (Chapters 3 and 5).

4.2.1. Parenting behavior: parental sensitivity

Researchers often adopt a dimensional approach in the study of parenting behavior (O'Connor, 2002) and study parenting dimensions that allow to differentiate between parents, such as parental support, psychological control and different forms of behavioral control (Janssens et al., 2015). Several theoretical models have been proposed on the associations between specific parenting dimensions and child development (O'Connor, 2002). One of these theories is attachment theory. According to attachment theory especially sensitive parenting is of importance for promoting secure attachment relationships and other

positive outcomes (Ainsworth, Blehar, Waters, & Wall, 1978; Van der Voort, Juffer, & Bakermans-kranenburg, 2014). Sensitive parenting is an expression of the support dimension and refers to picking up children's signals, correctly interpreting these signals, and timely and adequately responding to them (Ainsworth et al., 1978).

In line with theoretical expectations, numerous studies in non-adopted children have revealed that parental sensitivity is associated with positive child outcomes. It has for example been shown that children whose parents are more sensitive show better adjustment in the cognitive (e.g., Bernier, Carlson, & Whipple, 2010; Fay-Stammbach, Hawes, & Meredith, 2014; Mackintosh, 1998; Roisman & Fraley, 2012; Spinrad et al., 2012), and behavioral (Bell & Belsky, 2008; Belsky, Fearon, & Bell, 2007; Pinquart, 2017a, 2017b; Teti, Kim, Mayer, & Countermine, 2010) domain than children whose parents are less sensitive. Currently, the association between parenting and developmental adjustment has been studied less frequently in adopted children (Juffer et al., 2011) and only some studies focused on parental sensitivity. Adoption studies in which other parenting dimensions or other aspects of the parent-child relationship were examined (e.g., parent-child relationship quality, child-centered parenting, communicative openness) have generally lent support for an association between these variables and cognitive (Groza, Ryan, & Thomas, 2008; Whitten & Weaver, 2010) and behavioral (Groza & Ryan, 2002; Kriebel & Wentzel, 2011; Le Mare & Audet, 2014; Pearlmutter et al., 2008) development. Similarly, adoption studies that did study parental sensitivity, have provided support for the hypothesized importance of parental sensitivity for adopted children's cognitive (Stams, Juffer, & Van IJzendoorn, 2002; van Londen et al., 2007) and behavioral adjustment (Van der Voort, Linting, et al., 2014; Van der Voort, Linting, Juffer, Bakermans-kranenburg, & Van IJzendoorn, 2013). These findings suggest that parental sensitivity matters for the development of adopted children.

4.2.2. Parental efficacy

Besides parenting behavior, cognitive aspects of parenting – such as parental attributions and beliefs – may also play a role in child adjustment. One important parental belief is parental efficacy, which refers to parents' cognitions about their ability to raise their child successfully (Coleman & Karraker, 1997). Although fewer studies in non-adopted children have focused on parental efficacy than on parenting behavior, there is emerging evidence in non-adopted children pointing to the importance of parental efficacy for child

development. Jones and Prinz (2005) reviewed all studies on parental efficacy (conducted after 1995) and concluded that parental efficacy is related to several aspects of child functioning, either directly or indirectly via parenting behaviors. Although most of the studies reviewed by Jones and Prinz had a cross-sectional design precluding causal inferences, some recent intervention studies have shown that intervention-based changes in parental efficacy led to increases in positive parenting behaviors (Roskam, Brassart, Loop, Mouton, & Schelstraete, 2016) and in positive child behavior (Mouton & Roskam, 2015), suggesting that parental efficacy may be an important target for interventions. Despite the importance of parental efficacy for child adjustment, research on the associations between parental efficacy and adjustment in adopted children is lacking. Nonetheless, based on studies in non-adopted children, it is reasonable to predict that parental efficacy may also play a role in adopted children's adjustment.

4.2.3. Interaction between pre-adoption experiences and adoptive parenting

The studies discussed above generally provide support for the theoretically expected associations of parental sensitivity and parental efficacy with child adjustment. Moreover, some studies in non-adopted children have shown that parenting can buffer against the negative effects of risk factors (e.g., maternal depression) on child adjustment (e.g., Brennan, Le Brocque, & Hammen, 2003; Garai et al., 2009). These findings together with the heterogeneity in adopted children's cognitive and behavioral adjustment following early adverse experiences, suggest that parental sensitivity and parental efficacy may also serve as a buffer in the association between adverse pre-adoption experiences and cognitive and behavioral adjustment in adopted children. Surprisingly, to the best of our knowledge, no adoption studies to date have examined this hypothesized buffering effect of parental sensitivity and parental efficacy. However, a few other adoption studies have been conducted to test whether other parenting variables or other aspects of the parent-child relationship act as a buffer in the association between pre-adoption adversities and later adjustment. Although in the study of Whitten and Weaver (2010) no evidence for a buffering effect of parent-child relationship quality on the association between pre-adoption abuse and behavioral problems or school achievement was found, in the studies of Kriebel and Wentzel (2011) and of Ji, Brooks, Barth, and Kim (2010) support was found for the buffering hypothesis. Kriebel and Wentzel (2011) demonstrated that child-centered parenting (i.e.,

warm and involved parenting) buffered the association between cumulative risk factors and adaptive child behavior at home. Besides, Ji et al. (2010) demonstrated that family sense of coherence (i.e., a family's capacity to cope with stress) buffered the association between pre-adoption maltreatment and risk for the development of depressive symptoms after adoption. Although the study of Kriebel and Wentzel (2011) was cross-sectional and the study of Ji et al. (2010) was partially cross-sectional (as family sense of coherence and child depressive symptoms were assessed at the same moment), they provide first support for the hypothesis that the negative effects of pre-adoption risks can be buffered by parenting-related variables. In Chapters 3 and 5 of the current dissertation we aim to add to this literature by examining longitudinally whether parental sensitivity and parental efficacy moderate the hypothesized association between adverse pre-adoption experiences and cognitive and behavioral adjustment.

5. Current studies

The overarching aim of the current dissertation was to improve insight in factors that may explain heterogeneity in adopted children's cognitive and behavioral development. Specifically, we aimed (1) to examine the effects of adverse pre-adoption experiences, namely type of pre-adoption care and early deprivation, on cognitive and behavioral adjustment (research question 1), and (2) to test whether adoptive parenting, namely parental sensitivity and parental efficacy, buffers against the hypothesized association between pre-adoption experiences and cognitive and behavioral adjustment (research question 2). We hypothesized that children who were adopted from institutional care or who had experienced higher levels of early deprivation would show worse cognitive and behavioral adjustment than children who were adopted from foster care or who had experienced less early deprivation. In addition, we hypothesized that these negative effects of adverse pre-adoption experiences would be counteracted by parental sensitivity and parental efficacy, so that adverse pre-adoption experiences would have less strong or no detrimental effects when parents score high on parental sensitivity or parental efficacy. In Chapters 2 and 3 of the current dissertation we focus on cognitive development, and in Chapters 4 and 5 we focus on behavioral adjustment.

Before addressing these research questions we start with an overview of some important studies on the cognitive development (including intellectual functioning, school

achievement and executive functioning) of adopted and fostered children in Chapter 2. In this chapter we present results of several longitudinal studies investigating the cognitive development (intellectual functioning and school achievement) of adopted children. Besides, we discuss the main findings of the BEIP study concerning cognitive development of post-institutionalized children who were randomized to a foster care intervention, and the main findings of the meta-analysis of Van IJzendoorn et al. (2005) on adopted children's cognitive development. Finally, we present findings of adoption studies in which the executive functioning of adopted or fostered children was assessed.

In Chapter 3, we investigated our two main research questions with respect to cognitive development. These questions were examined in a sample of Chinese girls who were adopted to the Netherlands and who participated in the Chinese Adoptees in the Netherlands (CAN) study 2 months (Time 1, *N* = 92), 6 months (Time 2, *N* = 92; see Van den Dries, Juffer, Van IJzendoorn, & Bakermans-Kranenburg, 2010; Van den Dries, Juffer, Van IJzendoorn, Bakermans-Kranenburg, & Alink, 2012) and 9 years (Time 3, *N* = 87) after adoption (see Section 5.1. Participants for some more information about the sample and measures). Given the importance to scrutinize the broad domain of cognitive development (Juffer et al., 2011), we focused on different domains of cognitive development, namely intellectual functioning, school achievement and self-regulation (executive functioning and effortful control).

Chapters 4 and 5 focus on behavioral adjustment. In Chapter 4, we investigated whether type of pre-adoption care and early deprivation play a role in explaining individual differences in adopted children's adaptive (prosocial behavior) and maladaptive behavioral adjustment (attention problems, internalizing problems, and externalizing problems). In addition to the main research question, we were interested in examining whether the effects of pre-adoption experiences depended on age at adoption. We predicted that the harmful effects of adverse pre-adoption experiences would be stronger when children were older at the time of adoption. To answer these questions data was used from a large-scale, cross-sectional questionnaire study on the development of adopted Chinese children in the Netherlands (the Leiden Questionnaire Study on children adopted from China, which we will here refer to as the Leiden Questionnaire Study). In Chapter 5, we examined whether parental sensitivity and parental efficacy buffered the association between pre-adoption experiences and maladaptive (internalizing problems, externalizing problems, attention problems and

sleep problems) and adaptive (responsiveness) behavioral adjustment. Similarly as in Chapter 3, data of the CAN study were used to answer the research question. Finally in Chapter 6, we summarize the main findings of the dissertation (Chapters 2-5), we address the limitations of our studies and reflect on directions for future research and on clinical implications.

In the final part of this introductory chapter, we provide some general information about the two samples that were used to address our research questions, and about the assessment of our main variables.

5.1. Participants

5.1.1. CAN study (sample 1)

To investigate our two research questions in Chapters 3 and 5, we used data from the CAN study – which was set up by Leiden University in 2005 (see Van den Dries et al., 2010, 2012). Coincidentally, the start of the data collection of the CAN study concurred with the fall in intercountry adoptions from China which had reached a peak the year before. The CAN study is a longitudinal adoption study in which the development of 92 girls who were adopted from institutional care (*n* = 50) or foster care (*n* = 42 of which 16 children exclusively received foster care and 26 girls a combination of foster care and institutional care) in China to the Netherlands is studied. The girls were born between 2004 and 2007, and were on average 13 months old when they were adopted (*SD* = 1, range 11-17 months). The girls participated in the study together with their primary caregiver (mainly their adoptive mother) 2 months after adoption (Time 1, *N* = 92), 6 months after adoption (Time 2, *N* = 92) and 9 years after adoption (Time 3, *N* = 87). The three adoption agencies arranging adoptions from China to the Netherlands (Meiling, Stichting Kind en Toekomst, and Wereldkinderen) helped recruiting the participants for the first two time points (for details on recruitment of the first two time points, see Van den Dries et al., 2010, 2012). To inform the families about the third time point, we sent a newsletter and an information folder. Afterwards the families were called to ask whether they were willing to take part in the third follow-up of the study. Eighty-seven of the 92 families agreed to participate at Time 3. The main reason for non-participation were time constraints. Each of the three time-points consisted of a home visit and a lab visit at Leiden University. The data collection of Time 1 took place from February 2006 to September 2008, of Time 2 from June 2006 to January 2009, and of Time 3 from March 2015 to October 2016.

At each time point the visits were scheduled as much as possible according to the age of the children. The girls were on average 15 months old at Time 2, 19 months old at Time 2 and 10 years old at Time 3.

The primary aim of the first two time-points of the study was to compare the development of the post-institutionalized and post-foster children in the first months after adoption. Results indicated that the post-foster children outperformed the post-institutionalized children on some developmental domains (e.g., cognitive and motor development, increase in responsiveness over time), but not on other domains (e.g., physical growth, attachment, indiscriminate friendliness, child responsiveness and maternal sensitivity; Van den Dries et al., 2010, 2012). The data of the third-time point were collected for the purpose of investigating the two main research questions of the current dissertation. The main findings concerning cognitive development are presented in Chapter 3 and concerning behavioral adjustment in Chapter 5.

5.1.2. Leiden Questionnaire Study on children adopted from China (sample 2)

Our research questions in Chapter 4 were investigated in a subsample of participants that took part in a large-scale, cross-sectional questionnaire study on the development of children adopted from China. The study was initiated in 2005 by Prof. dr. Femmie Juffer and Dr. Wendy Tieman of Leiden University. Similarly to the recruitment procedure of the CAN study, all three Dutch adoption organizations involved in intercountry adoptions from China helped recruiting the families. Specifically, they contacted all families who had adopted one or more Chinese children who were between 4 and 16 years old at the time of the study. The total sample consisted of 1233 children (response rate 55.4%) who were on average 19 months old at adoptive placement and on average 7 years old at the time of the study (see Juffer & Tieman, 2009). Because the majority of the children were girls (1130 girls, 103 boys) as a consequence of the Chinese birth planning policies, and because early and middle childhood are considered a vulnerable period for the development of behavioral problems in adopted children, only girls aged between 4 and 12 were included and older girls or boys were excluded from the subsample of the current study. Moreover, to avoid nesting effects only the oldest girl of a family was included if two or more girls were living in the same family. As such the final sample that was used in Chapter 4 consisted of 891 Chinese girls. The mean age of the children at the time of study was 87 months (*SD* = 24 months, range 48-143) and the

girls were adopted at a mean age of 17 months (*SD* = 11, range 3-62). The majority of the girls received institutional care (*n* = 593, 67%), prior to adoption or a combination of institutional and foster care (*n* = 228, 26%), a minority of children exclusively experienced foster care (*n* = 66, 7%). Although we are aware that the sample size of the exclusively foster care group was small, we see the inclusion of this group as a strength of our study because in previous adoption studies on the effects of type of pre-adoption care (e.g., Bruce et al., 2009; Gunnar & van Dulmen, 2007; van Londen et al., 2007; Wiik et al., 2011), the post-foster children often have lived in institutional care for a short period (but see Katzenstein et al., 2016; Miller et al., 2005).

5.2. Assessment of the main variables of the current studies

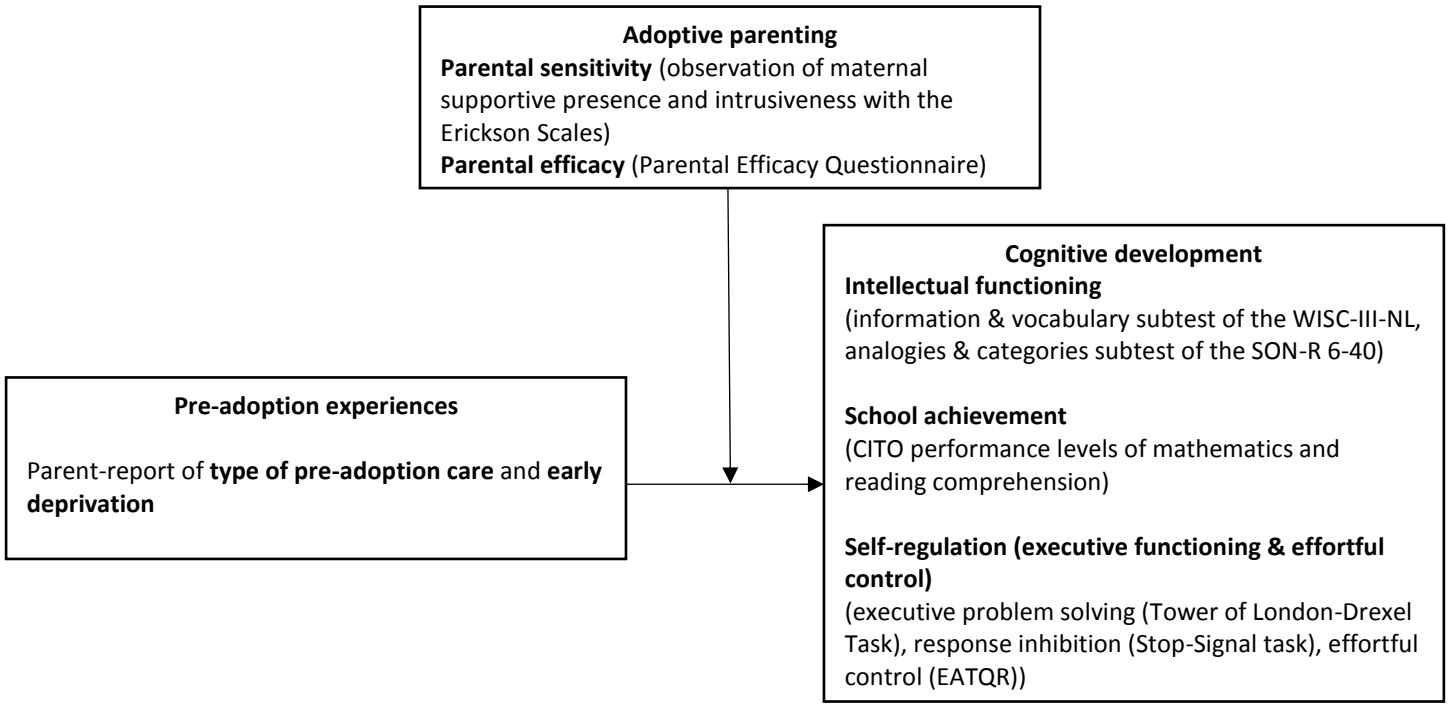
The main variables of the empirical studies reported in the current dissertation can be categorized into three groups, namely (1) pre-adoption experiences, (2) adoptive parenting variables, and (3) cognitive and behavioral outcome measures. Some variables were assessed using parent-report questionnaires, other variables through observation of mother-child interactions or through standardized tests or (computerized) tasks. In Figure 1 an overview is provided of our main measures. In the CAN study (Chapters 3 and 5) and in the Leiden Questionnaire Study (Chapter 4) information on children's pre-adoption experiences was obtained through parent-report questionnaires in which parents reported the type of care their child had received prior to adoption and the extent of early deprivation their child had been exposed to. Furthermore, in the CAN study (Chapters 3 and 5) parental sensitivity was observed using the Erickson Scales (Egeland, Erickson, Clemenhagen-Moon, Hiester, & Korfmacher, 1990; Erickson, Sroufe, & Egeland, 1985) (see below), and parental efficacy was assessed through the parent-report Parental Efficacy Questionnaire (Van IJzendoorn, Bakermans-Kranenburg, & Juffer, 1999). In the assessment of the cognitive outcome variables (Chapters 3), we made use of four subtests of standardized intelligence tests to assess intellectual functioning, of CITO scores to assess school achievement (mathematics and reading comprehension), of a Tower of London task (Culbertson & Zillmer, 1998) and a stop-signal task (Verbruggen, Logan, & Stevens, 2008) to assess executive functioning (executive problem solving and response inhibition), and of the Early Adolescent Temperament Questionnaire Revised (EATQ-R; Capaldi & Rothbart, 1992; Hartman, 2000) to measure effortful control. Finally, adaptive behavioral adjustment was measured with the prosocial

behavior subscale of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997; Van Widenfelt, Goedhart, Treffers, & Goodman, 2003) in the Leiden Questionnaire study (Chapter 4), and through observation of child responsiveness using the Emotional Availability Scales (EAS; Biringen, Robinson, & Emde, 2000) in the CAN study (Chapter 5). Maladaptive behavioral adjustment was assessed using subscales of the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001; Verhulst, Van Der Ende, & Koot, 1996) in the Leiden Questionnaire Study (Chapter 4: internalizing problems, externalizing problems, attention problems) and in the CAN study (Chapter 5: internalizing problems, externalizing problems, attention problems, and sleep problems).

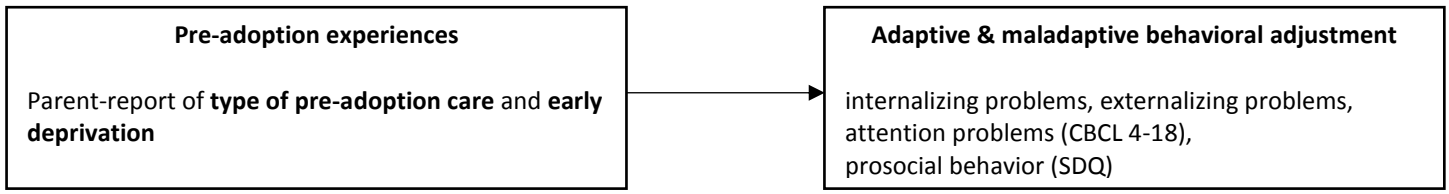
Besides, we want to provide some additional information about our assessment of sensitive parenting. At the three time points sensitive parenting was assessed through observation of video-recorded mother-child interactions using the Erickson scales (Egeland et al., 1990; Erickson et al., 1985). The video recordings were made during problem-solving tasks in which mother and child engaged during the lab visit at Time 1 and Time 2, or during the home visit at Time 3. Although the Erickson scales do not include a scale labelled *sensitivity* (Mesman & Emmen, 2013), previous studies have successfully made use of a selection of the Erickson scales to assess parental sensitivity (Alink et al., 2009; Stams, Juffer, Van IJzendoorn, & Hoksbergen, 2001). Like in the study of Alink et al. (2009), we used two of the five Erickson scales in the current dissertation (Chapters 3 and 5) - namely supportive presence and intrusiveness - as indicators of maternal sensitivity, with higher levels of supportive presence and lower levels of intrusiveness indicative of sensitive parenting. Supportive presence refers to the extent to which mother expresses emotional support and positive regard to her child and lets her child know that she is confident of her child's efforts and competence. Intrusiveness refers to the degree to which mother interferes with her child's autonomy and exploration during the task, and to which she exerts her own expectations on her child without cues from the child. Highly intrusive mothers seem to base their actions on their own needs instead of on the needs of their child. In our analyses we did not compute a composite variable of both Erickson scales, but instead performed separate analyses for both scales. Although the Erickson scales have been initially developed for use with toddlers and preschoolers, they have been used with older ages as well in several studies (e.g., Alink et al., 2009; Stams et al., 2002). In line with the study of Stams et al. (2002), in the current study we

took the more verbal nature of mother-child interactions in middle childhood into account in the coding of supportive presence and intrusiveness at Time 3.

CHAPTER 3 (CAN STUDY)



CHAPTER 4 (LEIDEN QUESTIONNAIRE STUDY)



CHAPTER 5 (CAN STUDY)

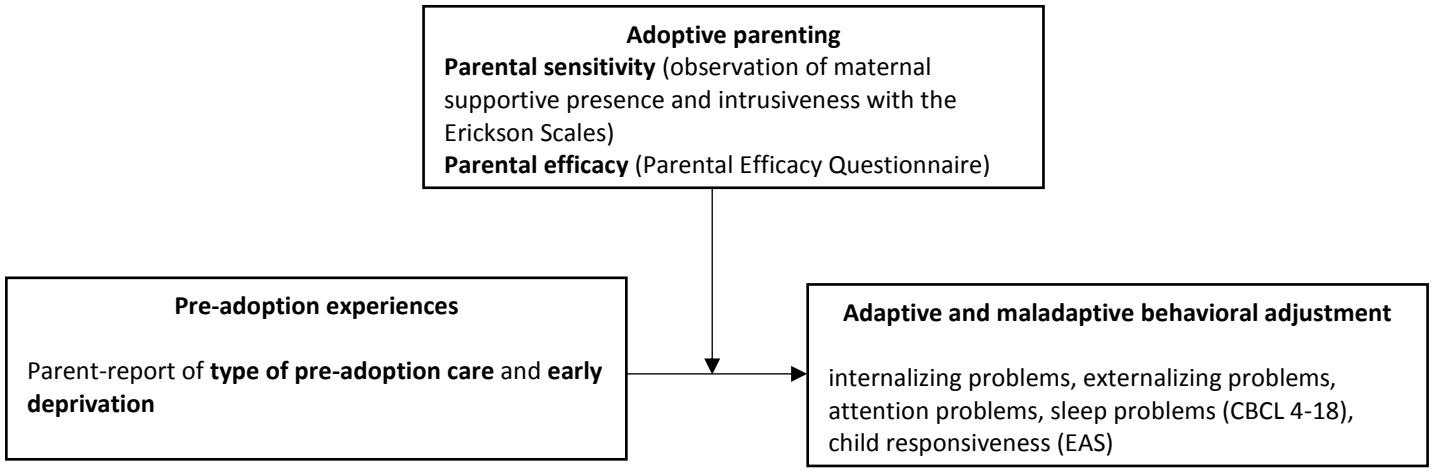


Figure 1. Overview of main measures and objectives of the current dissertation.

CHAPTER 2
Children's Cognitive Development After Adoption

This chapter has been published as:

Finet, C., Vermeer, H. J., Juffer, F., Bosmans, G., & Bijttebier, P. (2016). Children's catch-up in cognitive competence after adoption. In F. Genesee & A. Delcenserie (Eds.), *[TiLAR 18] Starting Over – The Language Development in Internationally Adopted Children* (pp. 39–64). Amsterdam: John Benjamins Publishing Company

Abstract

This chapter provides an overview of research on the cognitive development of adopted children, focusing on IQ scores, school achievement and executive functioning. Because of the deprivation many adoptees experience prior to adoption, it might be expected that their cognitive development is at higher risk compared to non-adopted children. However, the question arises whether children who experience a more nurturing and more stimulating environment after early deprivation show a catch-up in development. In this chapter, research on three different types of "atypical" rearing conditions is discussed, that is institutional care, foster care and adoptive families. We first present the results of longitudinal studies, or "natural experiments", in which the development of internationally adopted children is studied over several years. Second, we discuss outcomes of an experimental study (the Bucharest Early Intervention Project), that studied the effects of placement in foster care on children's development. Finally, a series of meta-analyses (comparing adoptees with their environmental peers and with peers who were left behind) is presented in which the effects of adoption on cognitive development are examined. In sum, the studies reported in this chapter provide support for the notion that adoption is a positive intervention fostering the cognitive development of adoptees.

1. Introduction

There are many reasons why children are placed for adoption, such as poverty in the birth family, unwed motherhood, death of the biological parents, or abandonment (Grotevant & McDermott, 2014). After separation from their birthparents, children can differ in pre-adoptive experiences: some children live in an institution prior to adoption, whereas other children stay in a temporary foster family in their country of origin. These different types of pre-adoption rearing conditions vary in quality of care and may therefore result in differential developmental outcomes after adoption. In this chapter, we focus on the cognitive development of internationally-adopted (IA) children, taking into account their backgrounds of foster care or institutional care before adoption.

Foster care provides children with a more normal family life and a more stimulating environment than institutional care. Although there is a lack of systematic research on the quality of institutions, many institutions (e.g., in Romania and India) are typified by "structural neglect" (Van IJzendoorn et al., 2011, p. 12). Consequently, children in institutions are deprived of experiences necessary for normal brain and behavioral development (Charles A. Nelson, Bos, Gunnar, & Sonuga-Barke, 2011). In other words, institutionalized children often do not have the experiences that are expected to take place to foster optimal development. As such, institutional care can be seen as a risk factor for child development, and different developmental domains (such as physical, emotional, and cognitive development) may be differentially affected (Zeanah et al., 2003). Likewise, these developmental domains may have a different potential for recovery after transition to family care. The catch-up after placement in a family can be conceptualized as an intervention effect resulting from the drastic change to more optimal caregiving conditions (Van IJzendoorn & Juffer, 2006; Zeanah et al., 2003). Adoption is, thus, characterized by both risk factors (including prenatal and pre-adoption experiences) and protective factors (associated with usually better environmental conditions in the adoptive family) for development.

The focus of this chapter is on adopted children's cognitive development and cognitive processes. Research on cognitive competence (intelligence or developmental quotient), cognitive achievement (school performance) and executive functioning is presented. In the pertinent studies, adoptees are compared with non-adopted children raised in their birth families (current peers) or with children who remained in institutions (past peers). This

corresponds with two important research trends in the adoption literature, examining (1) developmental differences between adopted children and children raised by their biological parents, and (2) the possibilities for developmental recovery and catch-up after adoptive placement (Palacios & Brodzinsky, 2010). These comparisons allow us to draw conclusions about both the risk (adoptees versus non-adoptees) and protective factors (adoptees versus institutionalized children) associated with adoption.

We start with an overview of outcomes on cognitive functioning (cognitive development and school achievement). First, several longitudinal studies of adopted children are discussed. Next, we present the results from a randomized controlled experiment (the Bucharest Early Intervention Project, BEIP; Zeanah et al., 2003) in which the effects of family foster care were investigated. Finally, we provide the main findings from a meta-analysis on adopted children's cognitive functioning (Van IJzendoorn, Juffer, & Klein Poelhuis, 2005). In the second section, we focus on a more recent line of research on cognitive development, that is, executive functioning. Finally, we draw conclusions about the consequences of institutional care and the remediating effects of adoption on cognitive development.

2. Natural experiments of adoption

In this section we describe four longitudinal studies in which the development of IA children is examined: the English and Romanian Adoptee study, the Greek Metera study, the Leiden Longitudinal Adoption Study, and our study on Chinese Adoptees in the Netherlands. These longitudinal studies can be conceptualized as "natural experiments" (Bronfenbrenner, 1979; Rutter, 2007; Van IJzendoorn & Juffer, 2006) in which the effects of adoption on development after early (institutional) deprivation can be examined.

2.1. The English and Romanian Adoptee study

The English and Romanian Adoptee study (ERA; Rutter & the ERA study team, 1998) is a longitudinal investigation of Romanian children who were adopted into UK families between 1990 and 1992. The ERA study compared the development of Romanian adoptees (n = 165) who experienced profound institutional deprivation prior to adoption (ranging from a few weeks to 42 months) with the development of within-UK adoptees (n = 52) who did not experience institutional deprivation and who were adopted before 6 months of age. Within-UK adoptees were chosen as a comparison group because this allowed the researchers to determine the

effects of early deprivation while controlling for possible effects of adoption per se (Rutter, Sonuga-Barke, & Castle, 2010). To examine the effects of prolonged deprivation, the Romanian sample was divided into three age categories: placed from the institution in an adoptive family before 6 months of age (*n* = 58), between 6 and 24 months (*n* = 59), and between 24 and 42 months of age (*n* = 48). The developmental assessments of the Romanian and the within-UK samples were undertaken at 4, 6, 11, and 15 years of age. During the follow-up assessments, different domains of development were investigated. Here, we discuss the main findings on the Romanian adoptees' cognitive development and school achievement.

2.1.1. Cognitive development

To examine the effects of prolonged deprivation, the cognitive development of the two groups of early-placed adoptees (children adopted before 6 months or between 6 and 24 months of age) was compared with the development of the late-placed adoptees (children adopted between 24 and 42 months of age). In addition, the ERA study investigated whether the early- and late-placed adoptees displayed catch-up after adoptive placement and to what extent this catch-up was maintained in the long run. Retrospective parent reports, using the Denver Developmental Scales (Frankenburg, van Doornick, Liddell, & Dick, 1986), were used for measuring general cognitive functioning of the children at entry into the UK and at age 4 years. Intellectual functioning at ages 6, 11, and 15 years was assessed with standardized tests of intelligence. It should be noted that the Romanian children who were adopted between 24 and 42 months had not yet participated in the age 4 years assessment because at that time they had just joined the adoptive family (Rutter & the ERA study team, 1998).

Effects of short versus prolonged deprivation. The retrospective Denver scores as reported by the parents – at age 4 for the children who were adopted before their second birthday and at age 6 for the children who were adopted after their second birthday – indicated that the Romanian adoptees displayed severely delayed development when they entered the UK. The average developmental quotient (DQ) of the Romanian children who were adopted before their second birthday was 62.89 (*SD* = 41.24; Rutter & the ERA study team, 1998), whereas the Romanian children who were adopted after their second birthday had an average DQ of 45.7 (*SD* = 25.4; O'Connor et al., 2000). These DQs, which can be seen as a rough index of level of functioning (Rutter & the ERA study team, 1998), suggest that the majority of the Romanian adoptees were developmentally delayed relative to UK standards

when they arrived in the UK. The cognitive development of the within-UK adoptees and the early- and late-placed Romanian adoptees were compared at the follow-up assessments. Results pointed to the importance of duration of deprivation for later development. More specifically, the assessments at 4 and 6 years suggested that there was a dose-response relation between duration of deprivation and cognitive development (O'Connor et al., 2000; Rutter & the ERA study team, 1998). While the cognitive development of the Romanian children adopted before 6 months of age was comparable to the cognitive development of the within-UK adoptees, both groups outperformed the Romanian children adopted between 6 and 24 months of age who in turn outperformed the Romanian children placed after their second birthday. However, the follow-up studies at 11 and 15 years did not provide support for the dose-response relation found at ages 4 and 6 years. In contrast, results revealed a 6-month threshold effect (Beckett et al., 2006; Beckett, Castle, Rutter, & Sonuga-Barke, 2010), indicating that less than 6 months of institutionalization did not negatively affect cognitive abilities, whereas institutionalization for more than 6 months was associated with persisting cognitive delays, irrespective of the exact duration of institutionalization (6 to 42 months).

Catch-up over time. Despite these cognitive impairments, the adoptees showed improvement in their cognitive functioning after adoptive placement. More specifically, the children already showed remarkable catch-up between adoptive placement and their fourth birthday (Rutter & the ERA study team, 1998). Further catch-up was found between the fourth and sixth birthday (O'Connor et al., 2000) and between the sixth and eleventh birthday (Beckett et al., 2006). However, catch-up between ages 6 and 11 years was only found for the Romanian children who were adopted after their second birthday (Beckett et al., 2006). Finally, at 15 years of age, further catch-up was found, but only for the Romanian children who were adopted after 6 months of age (Rutter et al., 2010). Catch-up over time was not associated with age at adoption, but with the degree of impairment at the prior assessment wave (Beckett et al., 2006, 2010; O'Connor et al., 2000). For example, the larger the cognitive impairment at 4 years, the larger the cognitive improvement between 4 and 6 years (O'Connor et al., 2000). The same positive association between cognitive impairment and cognitive improvement was found at 6 years (Beckett et al., 2006) and during the assessment at age 11 (Beckett et al., 2010).

Taken together these findings suggest that institutional care characterized by severe deprivation and lasting for 6 months or more has long-lasting negative consequences for

children's cognitive functioning and that these detrimental effects are largely found in a subgroup of late-adoptees who experience severe cognitive impairments (Beckett et al., 2006). At the same time, improvement in the caregiving environment after adoption led to remarkable catch-up, and moderate gains in cognitive development were still possible even after many years since the children left the institution (Beckett et al., 2010).

2.1.2. School achievement

School achievement was studied when the children were 11 and 15 years old. Converging with findings with respect to cognitive development, a 6-month threshold effect was found for school achievement (Beckett et al., 2007, 2010). Romanian children who were institutionalized for less than 6 months performed as well at school as the within-UK adoptees, and both groups significantly outperformed the Romanian adoptees who were adopted at older ages. These differences in school achievement at age 11 years were primarily mediated by the intelligence quotient (IQ) scores of the children at the same age and to a smaller degree by symptoms of inattention /overactivity, the term used by the authors (Beckett et al., 2007). Psychopathology symptoms, such as emotional disturbance and conduct problems, had no additional effect on school achievement after the influence of IQ scores and inattention/overactivity was taken into account. Thus, the negative effects of institutional deprivation on school achievement could be explained largely by the detrimental effects of institutionalization on IQ (Beckett et al., 2007). In line with this, Beckett et al. (2010) found that the differences in school achievement at 15 years were mainly a function of IQ at age 6. This indicates that, within this sample, general cognitive development is a good predictor of school achievement. Although the ERA study found that school achievement was mainly influenced by cognitive competence, it has been hypothesized that school achievement can be hampered by the effect of early adverse experiences on socio-emotional development (Van IJzendoorn et al., 2005).

2.2. The Greek Metera study

Another longitudinal study on the development of post-institutionalized adopted children was conducted at the Metera Baby Centre (Vorria et al., 2003). Metera is a large institution in Athens (Greece) where about 100 children were reared prior to placement with an adoptive family, a foster family or were reunited with the birth family (Vorria et al., 2003).

Caregivers at the center were encouraged to form an attachment relationship with one of the children (Vorria et al., 2003), and the infant-caregiver ratio (4:1 to 6:1) was more favorable than in Romanian institutions (30:1; Croft et al., 2007). Most of the children were admitted shortly after birth (approximately 5 days after birth) and the main reasons for placement were socioeconomic and health problems of the parents (Vorria et al., 2003). The study followed a sample of institutionalized children who were adopted after staying for almost two years in Metera (Vorria et al., 2006).

The development of these children was studied at three different time points. The children (*n* = 86) first participated in the study around their first birthday (mean age = 13 months). At that time, they were still living in Metera. Next, after adoptive placement, a follow-up study was performed when the children (*n* = 61) were approximately 4 years old (Vorria et al., 2006) and again when the children (*n* = 52) were 13 years old (Vorria, Ntouma, & Rutter, 2015). Children who were placed in a foster family or who were reunited with their birth families were excluded from the follow-up assessments (Vorria et al., 2006). In addition, a comparison group of 41 Greek children (21 boys, mean age at first assessment = 13.6 months, and 20 girls, mean age at first assessment = 14.1 months) who were raised by their biological families and attended full-time day care in infancy participated (Vorria et al., 2003). The fact that the development of the children was investigated during their stay in Metera is an important strength of this study insofar as it provided a baseline for the follow-up assessments. Moreover, because the infants were admitted to Metera shortly after birth, there was less risk of a confounding effect of poor family circumstances prior to placement (Vorria et al., 2003). Furthermore, the development of the institutionalized children and their subsequent catch-up after adoptive placement could be assessed and compared with the development of the family-reared children receiving day care. Thus, this study is noteworthy because the design makes it possible to investigate the remediating effects of adoption after institutionalization and reduces the risk of a confounding effect of less than optimal rearing conditions in the biological family. Here we discuss the outcomes of the Metera Study regarding cognitive functioning and school achievement.

2.2.1. Cognitive development

The cognitive development of the institutionalized children was compared with the cognitive development of the family-reared children prior to adoption and after adoptive

placement. Standardized intelligence tests were used to assess cognitive functioning of the children in infancy and at ages 4 and 13 years.

Vorria et al. (2003) found that the cognitive development of the one-year-old (*M* = 13 months) institutionalized children lagged behind the cognitive development of the family-reared comparison group. Prior to adoption (*M* = 20 months at adoptive placement), the one-year-old institutionalized children had a mean IQ score of 92.8 (*SD* = 10.3), whereas the comparison group had an average score of 102.1 (*SD* = 8.5). Although there was a between-group difference of 10 points, the cognitive functioning of the institutionalized children was in the normal range. A follow-up study revealed that the comparison group of family-reared children (mean IQ score = 110.9, *SD* = 11.9) still outperformed the adopted children (mean IQ score = 100.1, *SD* = 13.0) at age 4 (Vorria et al., 2006). At this assessment, the adopted children had been living in an adoptive family for 2 years and 4 months, on average. It is possible that some extra time in a stimulating adoptive family is needed to facilitate complete cognitive catch-up. In early adolescence, the between-group differences in cognitive functioning were still present. The comparison children had a higher IQ (*M* = 112.44, *SD* = 9.98) compared to the adoptees (*M* = 105.62, *SD* = 14.17; Vorria et al., 2015). However, according to the authors, this between-group difference should be interpreted cautiously because the comparison families were quite highly educated which may explain the comparison children's above average intellectual functioning (Vorria et al., 2015).

In sum, the cognitive functioning of the Greek adoptees was in the normal range. In addition, the slight decrease in the difference with the comparison group that was found over time (from almost 10 points in infancy to 7 points at age 13 years) provides additional evidence for cognitive recovery of institutionalized children after placement in an adoptive family.

2.2.2. School achievement

When the children were 13 years old, school achievement (school grades) was investigated (Vorria et al., 2015). The adopted children exhibited somewhat lower school performance than the family-reared children. In addition, the adoptees' school achievement was positively associated with their IQ scores and with their social class (Vorria et al., 2015).

2.3. Leiden Longitudinal Adoption Study

The Leiden Longitudinal Adoption Study (LLAS; Juffer, 1993; Rosenboom, 1994) started in 1986 to investigate the development of early-adopted children. The initial sample consisted of 160 children who were adopted before 6 months of age from Sri Lanka (*n* = 86), South Korea (*n* = 49), and Colombia (*n* = 25) into the Netherlands. The children from South Korea and Colombia received institutional care prior to their adoption, and the children from Sri Lanka were reared by their birth mothers before they were adopted (Stams, Juffer, Rispens, & Hoksbergen, 2000). The early placement of the children (*M* = 10.28 weeks at adoptive placement) who probably experienced minimal serious pre-adoption adversity is an important feature of this study. It makes it possible to examine the effects of adoption per se (Juffer & Van IJzendoorn, 2009) while controlling for the effects of impoverished pre-adoptive experiences. Thus, whereas the ERA study was mainly interested in studying the effects of duration of deprivation (Rutter & the ERA study team, 1998), the LLAS aimed to examine the effects of adoptive parenting from infancy into young adulthood (Schoenmaker et al., 2015). There was minimal drop-out during the study, and analyses confirmed that there was no selective attrition (Schoenmaker et al., 2015). We present results from the LLAS concerning cognitive development and school achievement.

2.3.1. Cognitive development

Cognitive functioning was examined at the ages of 7, 14, and 23 years (Schoenmaker et al., 2015; Stams et al., 2000) using standardized measures. Results revealed that the adopted children's mean intelligence score at 7 years (*M* = 107, *SD* = 14) was above the general population average of 100 (Stams et al., 2000). It was also found that country of origin and sex of the children had significant effects on cognitive functioning. Boys scored higher than girls and the Korean children had higher IQ scores than the children from Sri Lanka (Stams et al., 2000). The cognitive adjustment of the children over time was influenced by the early parent-child relationship. More specifically, observed sensitivity of adoptive mothers in infancy was significantly related to cognitive development at age 7 (Stams, Juffer, & Van IJzendoorn, 2002). The follow-up assessments at ages 14 and 23 years indicated that IQ was quite stable between adolescence and young adulthood (Schoenmaker et al., 2015).

2.3.2. School achievement

At age 7 years, teachers were asked to report on the academic performance and adaptive functioning of the children at school. The adopted children performed as well at school as children from the general, normative population, and they obtained similar scores for adaptive functioning. However, a larger percentage of the adopted children had repeated grades compared to the general population – 20% versus 5–10%, respectively (Stams et al., 2000). At age 23 years, socioeconomic success was assessed based on employment (or years of education for students) of the young adults. Analyses showed that intellectual functioning predicted socioeconomic success. More specifically, IQ at ages 7 and 14 years was an indirect predictor of socioeconomic success at age 23, and IQ at 23 years showed a direct, concurrent association with socioeconomic success (Schoenmaker et al., 2015).

2.4. Chinese Adoptees in the Netherlands (CAN)

A more recent longitudinal adoption study, the CAN study, started in 2005 and aimed to study the development of Chinese adoptees from institutional or foster care (Van den Dries, Juffer, Van IJzendoorn, & Bakermans-Kranenburg, 2010; Van den Dries, Juffer, Van IJzendoorn, Bakermans-Kranenburg, & Alink, 2012). China has been the main country of origin for adoption to the Netherlands since 1998, and also worldwide China has dominated international adoption for many years (Selman, 2009). Despite the large number of children adopted from China, only a few studies on the general development of Chinese adoptees have been performed (Van den Dries et al., 2010). The initial CAN sample consisted of 92 Chinese girls who were adopted between 11 and 16 months of age by Dutch parents (Van den Dries et al., 2010, 2012). Chinese boys were excluded from the study because the majority of Chinese children who were placed for adoption at that time were girls – due to the "one son/two child" policy (Selman, 2009). About half of the children (n = 50) resided in an institution in China prior to adoption and the other children (n = 42) received temporary family foster care (Van den Dries et al., 2010, 2012). A major aim of this study was to investigate the effects of these two types of pre-adoptive rearing conditions. The post-institutionalized children were compared with the post-foster children on different developmental domains. It was expected that the post-foster children would exhibit somewhat more favorable adjustment compared to the post-institutionalized children because they probably experienced more optimal rearing conditions prior to adoption (Van den Dries et al., 2010). Unfortunately, aside from information on type

of pre-adoptive condition, no systematic, detailed information about the quality of the rearing environment was available (Van den Dries et al., 2012). To date, the development of these Chinese girls has been investigated at 2 and 6 months after adoption. Results of their cognitive development are presented here.

2.4.1. Cognitive development

The post-foster children and the post-institutionalized children had below average cognitive development 2 and 6 months after adoptive placement (Van den Dries et al., 2010). As expected, repeated measures analysis of variance showed that the post-foster children significantly outperformed the post-institutionalized children at the 2-month post-adoption assessment (post-foster: *M* = 84.40, *SD* = 17.62, post-institutionalized: *M* = 74.04, *SD* = 18.41) and at the 6-month post-adoption assessment (post-foster: *M* = 92.96, *SD* = 17.83, post-institutionalized: *M* = 84.38, *SD* = 20.1). In addition, both groups showed similar catch-up in their cognitive development between the first and second post-adoption assessments. However, the catch-up in cognitive development left room for improvement insofar as their cognitive development was still slightly below average at the second assessment (Van den Dries et al., 2010). The outcomes of this study suggest that type of pre- adoption care has differential effects on cognitive development, with pre-adoption foster care being less detrimental for later development than pre-adoption institutional care.

2.5. Conclusions of the natural experiments

The radical changes in environment that take place when institutionalized children are placed in adoptive families provide interesting natural experiments. The longitudinal studies discussed in the previous sections made use of such natural experiments to investigate the effects of institutional deprivation on developmental catch-up after adoptive placement. On the one hand, these studies indicate that institutional deprivation exerted enduring negative effects on cognitive development – the institutionalized children exhibited delayed cognitive development during their stay in institutional care (Vorria et al., 2003) and when they had just joined their adoptive families (O'Connor et al., 2000; Rutter & the ERA study team, 1998; Van den Dries et al., 2010). On the other hand, the post-institutionalized children showed remarkable catch-up in their cognitive functioning after placement in an adoptive family (O'Connor et al., 2000; Rutter & the ERA study team, 1998; Stams et al., 2000; Van den

Dries et al., 2010; Vorria et al., 2006), and this was maintained over the long run (Beckett et al., 2006, 2010; Schoenmaker et al., 2015; Vorria et al., 2015). Age at adoption was found to be important and, more specifically, children adopted at younger ages in general displayed more favorable cognitive development compared with children adopted at older ages. These studies, thus, provide support for the protective influence of adoption on the cognitive functioning of post-institutionalized children, especially if placement in an adoptive family occurs early in development (Juffer & Van IJzendoorn, 2009).

The validity of these conclusions is strengthened by the fact that these findings are found in different longitudinal studies that have unique strengths. More specifically, whereas the ERA study design was especially suited for studying the effects of prolonged deprivation while controlling for the effects of adoption (Rutter & the ERA study team, 1998), the LLAS study was able to examine the effects of early adoptive placement (Stams et al., 2000). In the Metera Study, the results of a baseline pre-adoption assessment were available against which cognitive development after adoptive placement could be compared (Vorria et al., 2003). Finally, the CAN study made it possible to compare the development of post-institutionalized children with that of post-foster children (Van den Dries et al., 2010). It is important to note that the results of these studies also point to the differential effects of severe versus moderate or minimal deprivation (see also Gunnar, 2001). The Romanian post-institutionalized children, who experienced severe early institutional deprivation, exhibited more cognitive delays than post- institutionalized children who experienced (probably) less severe early deprivation (e.g., the Greek Metera study) or who were adopted at very young age (e.g., the LLAS study). Although the quality of the rearing environment in these natural experiments was not examined in detail, it is important to note that the Romanian institutions were profoundly depriving. Children had hardly any opportunities to interact with caregivers due to strict daily schedules and were cared for by many different caregivers (up to 17 caregivers a week) (Zeanah et al., 2003). The conditions in the Romanian institutions were probably more severely depriving than conditions in other institutions (Dalen, 2012) and, thus, are not representative of the institutional care offered by orphanages in other countries, for example, Greece (e.g., Vorria et al., 2003) and Ukraine (e.g., Dobrova-krol, Van IJzendoorn, Bakermans-kranenburg, & Juffer, 2010). In the latter cases, institutions provide adequate health and nutrition support, but fail to meet stimulation and relationship needs (Gunnar, 2001).

Taken together, these studies confirm the positive influence of adoption on children's cognitive functioning. It should be noted, however, that natural experiments may suffer from the risk of selection bias (Zeanah et al., 2003). The (institutionalized) children were not randomly assigned to adoptive care and we cannot exclude the possibility that some children, for example the most competent ones, were selected for adoption. To address such a possible selection bias, a randomized controlled study of family care for institutionalized children, the Bucharest Early Intervention Project (BEIP; Zeanah et al., 2003), may add important information.

3. The Bucharest Early Intervention Study

The BEIP is the first randomized controlled study to examine the effects of an alternative form of care, in this case family foster care, for institutionalized children (Zeanah et al., 2003). The study started in 2002 in Bucharest (Romania) where only limited alternative options for institutional care were available. Participants were 136 institutionalized children, between 5 and 31 months of age at the time of recruitment, who were randomly assigned to foster care (n = 67) or continued institutional care (n = 69). Prior to randomization, a baseline assessment was conducted to ascertain that the two groups of children were comparable. In addition, a control group of 72 never-institutionalized Romanian children was included. The aim of the BEIP was to investigate the impact of institutional care on the development of children and to examine to what degree recovery is possible after a transition to foster care controlling for other factors. The use of a randomized design, preventing selection bias, and a baseline assessment are two major strengths of the BEIP study. These strengths make it possible to attribute observed differences between the institutionalized and foster children to their different rearing environments. As such, the true effect of the foster care intervention after early deprivation can be determined (Zeanah et al., 2003).

It is important to note that the BEIP study followed an *intent-to-treat approach*, which means that the BEIP did not interfere with the placement of children in alternative caregiving settings (for example government-sponsored foster care) when these became available (Zeanah et al., 2003)(Zeanah et al., 2003). In the intent-to-treat analyses, however, the original group assignments (foster care versus continued institutional care) are maintained.

3.1. Cognitive development

Nelson et al. (2007) examined the cognitive development of the children at 42 months and at 54 months of age. Comparison of the cognitive development of the foster care and the institutionalized groups showed that the foster children significantly outperformed the institutionalized children, both at 42 months and at 54 months of age. At 42 months, the mean developmental quotient (DQ) of the institutionalized children was 77.1 (*SD* = 13.3), whereas the foster children had a mean DQ of 85.7 (*SD* = 14.2). At 54 months of age, the institutionalized children and foster children had an average IQ of 73.3 (*SD* = 13.1) and 81.0 (*SD* = 18.5), respectively. The group of never-institutionalized Romanian children had the most favorable cognitive development, both at 42 months (*M* = 103.4, *SD* = 11.8) and at 54 months (*M* = 109.3, *SD* = 21.2).

3.1.1. Timing of foster care placement

As well, the assessment at 54 months showed that children who were placed in foster care before 24 months of age had higher IQs than children placed in foster care at an older age. Each additional month of institutionalization appeared to be associated with a loss of 0.85 DQ points at 42 months of age and with a loss of 0.59 IQ points at 54 months. In sum, age of entry into foster care was critical for the cognitive development of the children. The younger an institutionalized child was when entering foster care, the better their cognitive outcomes (Charles A. Nelson et al., 2007).

3.1.2. Follow-up

Although the BEIP intervention study formally ended at 54 months of age, a follow-up study was conducted when the children were 8 years of age (Fox, Almas, Degnan, Nelson, & Zeanah, 2011). The goal of the follow-up was to reveal whether the foster care intervention continued to exert positive influence on the children's cognitive abilities. Comparisons between the foster children and the institutionalized children revealed that the foster children had marginally significantly higher full-scale IQ scores (*M* = 81.46, *SD* = 15.32) than the institutionalized children (*M* = 76.16, *SD* = 14.11). The foster care intervention, thus, had continued to exert a positive influence on cognitive development. In contrast, however, the foster care children (*M* = 81.46, *SD* = 15.32) had not yet caught up completely to their non-institutionalized peers (*M* = 107.00, *SD* = 16.54). Consistent with the findings of Nelson et al.

(2007), age at placement into foster care was found to be important for the long-term cognitive development of the children (Fox et al., 2011).

A change in IQ score was computed which served as an indication of the degree of change between the assessments at 54 months and 8 years of age. The institutionalized children showed greater increases in their full-scale IQ scores (*M* = 4.77, *SD* = 9.64) between 54 months and 8 years than the foster children (*M* = .04, *SD* = 14.45). It should be noted, however, that this difference was only marginally statistically significant. The lower the baseline IQ scores of the institutionalized children, the greater the gains in their IQ scores (Fox et al., 2011).

In conclusion, the results of this 8-year follow-up were largely in line with the findings of Nelson et al. (2007) at 42 and 54 months. However, at 8 years, the difference in cognitive abilities between the foster care and institutional care groups (Fox et al., 2011) were smaller than the group differences found at 42 and 54 months (Nelson et al., 2007). This may be explained by greater IQ gains over time for the institutionalized children (Fox et al., 2011) who had scored lower initially. The greater increase in IQ scores of the institutionalized group might also be due to the fact that many of the institutionalized children were no longer living in an institution at 8 years because they were placed in government foster care. Nevertheless, it is noteworthy that despite the conservative intent-to-treat approach, the foster care children displayed higher full-scale IQ scores than the institutionalized children (Fox et al., 2011). These findings point to the importance of early placement into family care in order to improve the cognitive outcomes of previously institutionalized children.

4. Meta-analysis

The natural experiments of adoption along with the BEIP randomized controlled study of foster care discussed above indicate that institutional deprivation is a risk factor for cognitive development but that remarkable recovery in cognitive functioning is possible after family placement. The question arises: Are these results representative of the many studies on adoption and cognitive development, or are they exceptional? To address this issue, Van IJzendoorn et al. (2005) performed a series of meta-analyses of cross-sectional studies on the cognitive development of adopted children. In these meta-analyses, the results of all available studies on the cognitive development of adoptees were combined and systematically analyzed. The meta-analyses included 62 studies in which the cognitive development of

17,767 adoptees was assessed. Four different indicators of cognitive development were examined: IQ scores, school achievement, language abilities, and learning problems. For each indicator, a separate meta-analysis was conducted. The goal of the meta-analyses was two-fold. First, the meta-analyses aimed to examine whether adoptees exhibit better cognitive development than their past peers who were not adopted and continued to live in institutions. Second, they aimed to investigate whether adoptees lag behind or catch up with their current peers who are living with their biological families. Addressing these questions is crucial because it sheds light on the possibilities and limits of children's ability to recover from early adversity (Van IJzendoorn & Juffer, 2006). Results of the meta-analyses are reported here in terms of Cohen's *d*. This is the standardized difference between the mean of the adopted group and the comparison group. A negative Cohen's *d* can be interpreted as more advanced cognitive development on the part of the adopted children compared with their past peers. A positive Cohen's *d* indicates less favorable cognitive development by the adoptees compared with their non- adopted, current peers (Van IJzendoorn et al., 2005).

The meta-analysis of IQ results indicated that the adopted children not only had significantly higher IQ scores compared to their past peers (large effect size of d = -1.17, p <.01), but also IQ scores that were similar to their current peers (d = 0.13, p =.19; Van IJzendoorn & Juffer, 2005; Van IJzendoorn et al., 2005). This suggests that adoption is a successful intervention for enhancing the IQ scores of children who have experienced deprivation prior to adoption. The results of the meta-analysis of school achievement showed a slightly different picture. Although the adoptees had better school achievement than their past peers (moderate effect size of d = -0.55, p <.05), they did not completely catch- up with their current peers (small effect size of d = 0.19, p <.01). It should be noted, however, that age at adoption and severe pre-adoption adversity (abuse, neglect, malnourishment) had a significant impact on school achievement. Delays in school performance were only found for children who were adopted after their first birthday. In addition, adoptees who were exposed to severe adversity prior to adoption displayed more delays in school achievement than adoptees who were not exposed to severe adversity (Van IJzendoorn et al., 2005). In other words, although the adopted children showed complete catch-up with respect to IQ scores, catch-up for school achievement was, at least for some children, incomplete.

In line with the results on school achievement, the meta-analysis on learning problems indicated that the adopted children showed significantly more learning problems compared

to their current peers (moderate effect size of d = 0.55, p <.01). More specifically, adoptees were referred to special education services twice as often as their current peers (Van IJzendoorn & Juffer, 2005; Van IJzendoorn et al., 2005). This overrepresentation of adoptees in special education may be explained by the fact that adoptive parents are more readily inclined to seek help and advice compared to non-adoptive parents (Warren, 1992). Unfortunately, it was not possible in this meta-analysis to compare adopted children's learning problems with their past peers' learning problems because there was a lack of studies that compared these two groups of children on learning problems. Finally, the meta-analysis on language development indicated that the adoptees' language abilities lagged somewhat behind their current peers (d = 0.09, p <.05), but the effect size was small indicating that most adopted children performed within age- appropriate norms (Van IJzendoorn & Juffer, 2005; Van IJzendoorn et al., 2005). Again, adoptees could not be compared with their peers left behind because of a lack of studies.

Consistent with the studies previously described, this series of meta-analyses revealed that adopted children significantly outperformed their past peers who were not adopted. More specifically, adoptees displayed higher IQ scores and better school achievement compared to their past peers. In addition, the adoptees showed complete catch-up in IQ with their current non-adopted peers. However, with regard to school achievement, learning problems, and language abilities, complete catch-up was not found. Adoptees showed small delays in these outcomes compared to non-adopted children. These meta-analyses provide evidence for children's resilience to recover substantially from early adversity. Adoptees not only have better cognitive outcomes than institutionalized children, but also show catch-up in their cognitive development after pre-adoptive institutional care. In short, it can be concluded that adoption is a successful intervention, not only instead of institutional care, but also after institutional care (Juffer & Van IJzendoorn, 2009 p. 185).

5. Executive functioning

When children encounter a new, unknown situation, they will need executive functions to be able to exhibit non-habitual, goal-directed and adaptive behavior. Executive functions is an umbrella term that comprises several higher order processes, such as working memory, inhibitory control and cognitive flexibility (Fay-Stammbach, Hawes, & Meredith, 2014). Research on children raised in their birth families shows that executive functions in

childhood are associated with several positive developmental outcomes (Diamond, 2013), for example academic outcomes (e.g., Biederman et al., 2004), and that parenting practices can influence the development of executive functions (Bernier, Carlson, & Whipple, 2010; Fay-Stammbach et al., 2014). The study of executive functioning in post-institutionalized adopted children is a relatively recent research topic. In this section, we describe studies in which the effects of institutional deprivation on executive functions are investigated. First, we present research in which (computerized) lab tasks were used to assess executive functioning and, then, two studies are described in which executive function difficulties were assessed using parent- report questionnaires.

5.1. Laboratory tasks

Two of the studies discussed previously, namely the ERA study and the BEIP study, used lab tasks to assess executive functioning. The ERA study aimed to investigate whether severe early institutional deprivation exerted the same negative effects on executive functioning as on general cognitive functioning (Beckett et al., 2010; Colvert et al., 2008). The Stroop Color-Word Interference Task (Stroop, 1935) was administered to the Romanian and within-U.K adoptees at 11 years of age to assess their inhibition ability (Colvert et al., 2008). Results revealed that the Romanian adoptees performed less well on the Stroop Task than the comparison group of within-UK adoptees and that their performance on the Stroop Task was correlated with duration of deprivation. More specifically and in line with the results on cognitive functioning (Beckett et al., 2006, 2010), a 6-month threshold effect was found; specifically, Romanian adoptees who were 6 months or older at the time of adoption scored lower on the Stroop Task compared to the within-UK adoptees. The difference between the group of late-placed Romanian adoptees (adopted after 6 months of age) and the within-UK adoptees was still significant after controlling for IQ, indicating that this between-group difference was not just a function of differences in IQ (Colvert et al., 2008). Comparable results were found for planning ability – assessed using the Tower of London task at 11 years of age (Beckett et al., 2010). Thus, it can be concluded that profound institutional deprivation exerted a negative influence on the executive functioning (inhibition ability and planning ability) of the Romanian adoptees, similar to that reported for general cognitive functioning (IQ).

The effects of institutional deprivation on executive functioning were also studied in the BEIP study. The design of this study made it possible to compare the executive functions

of children who were placed in a foster family with those of their peers who remained institutionalized. As such, the effects of timing of the foster care intervention on executive functioning could also be examined (Bos, Fox, Zeanah, & Nelson, 2009). A computerized task, the Cambridge Neuropsychological Test and Automated Battery (CANTAB; Cambridge Cognition, Cambridge, UK), was used to assess executive functions (namely, spatial planning and spatial working memory) of the children when they were 8 years old (Bos et al., 2009). In addition, a flanker task, which assesses resistance to interference, was used to measure conflict inhibitory control (McDermott et al., 2013). It was found that the combined institutional care and foster care group scored significantly lower on the spatial working memory task and the inhibitory control task, but not on the spatial planning task, than the never-institutionalized children. Comparisons between the institutionalized group and the foster care group yielded no significant differences in performance on the executive functioning tasks. In contrast to the 6-month threshold effect found in the ERA study (Colvert et al., 2008), age at placement in the foster family was not significantly correlated with executive function abilities. However, the children in the BEIP study were placed in foster families when they were between 9 and 33 months of age and, consequently, the effects of early foster placement (e.g., foster placement before versus after 6 months of age) could not be investigated (Bos et al., 2009). Findings from the BEIP study, thus, provide additional evidence for the detrimental effects of institutional deprivation on executive functions (Bos et al., 2009; McDermott et al., 2013). Other research studying the effects of institutional care on executive functions using lab tasks have yielded similar results in a sample of 9-year old adopted children (Behen, Helder, Rothermel, Solomon, & Chagani, 2008), and in a sample of 3-year old adoptees who took part in the study one year after their adoption (Hostinar, Stellern, Schaefer, Carlson, & Gunnar, 2012).

5.2. Questionnaires

Although lab tasks are the standard method for evaluating executive functions and have several advantages, it has been argued that they lack ecological validity (Hughes, 2011). To address this issue, questionnaires have been developed that measure executive functions (Hughes, 2011). One of these questionnaires is the Behavioral Rating Inventory of Executive Function (BRIEF; Gioia, Isquith, Retzlaff, & Espy, 2002). This is a questionnaire in which parents report on their child's executive function difficulties in everyday life (Hughes, 2011), such as

difficulties with working memory, emotional control or planning and organization. Merz and McCall (2011) examined whether post-institutionalized adopted children (pre-school and school-aged children) are seen by their parents to have executive function difficulties. The sample consisted of children who, prior to adoption, resided in Russian institutions that provided adequate material resources, but were psychosocially depriving (Merz & McCall, 2011). In general, the findings converged with research outcomes in which lab tasks were used to index executive functions. More specifically, parents reported that their post-institutionalized school-aged children displayed more executive function problems than did the parents of never-institutionalized children in the normative sample. Again, age at adoption was an important factor insofar as post-institutionalized adoptees placed for adoption before 18 months of age did not show more executive function problems compared to never-institutionalized children, whereas post-institutionalized children who were adopted at older ages were reported to have more executive function difficulties. Contrary to the results found for school-aged children, pre-school children did not display more executive function difficulties than the norm group according to their parents (Merz & McCall, 2011). A follow-up study was conducted two years later by Merz, McCall, and Groza (2013) to investigate persistence in executive function difficulties in school-aged children. The longitudinal investigation showed that executive function difficulties were quite stable over time, suggesting that institutional deprivation can have persistent negative effects on executive functions.

Merz et al. (2013) also compared children adopted from psychosocially depriving institutions with children adopted from globally depriving institutions. Whereas globally depriving institutions are characterized by global deprivation of children's health, nutrition, stimulation and relationship needs, psychosocially depriving institutions are characterized by deprivation of the need for long-term relationships with consistent, responsive caregivers (Gunnar, 2001; Van IJzendoorn et al., 2011). Children who lived in a globally depriving institution had more parent-reported executive function problems compared to children who had resided in a psychosocially depriving institution. For both groups, age at adoption played an important role insofar as adoption after 18 months of age was associated with more executive function difficulties (Merz et al., 2013). These results suggest that institutional deprivation can exert negative influences on executive functions, especially in children who are adopted when they are older than 18 months. This appears to be true for children who

have lived in both a psychosocially and globally depriving institution prior to adoption. Severity of deprivation was a critical factor; children who were raised in a globally depriving institution had more parent-reported executive function difficulties compared to children who lived in a psychosocially depriving institution.

5.3. Conclusions

A relatively recent research trend in the adoption literature concerns the effects of pre-adoptive institutional experiences on executive functions. Research using lab tasks or parent-report questionnaires both reveal an association between institutional deprivation, especially prolonged deprivation, and executive function difficulties in children. To the best of our knowledge, there is a lack of studies in which executive functions of post-institutionalized children are assessed at multiple points in time. This makes it difficult to evaluate the effects of adoptive placement on the impaired executive functions of the post-institutionalized children over the long term. However, the longitudinal study of Merz et al. (2013) revealed persistent parental reports of executive function problems, suggesting that institutional deprivation may have long-lasting influences on executive functions. While longitudinal research shows that adoption can be a protective factor for the general cognitive development of post-institutionalized children (Juffer & Van IJzendoorn, 2009), the study by Merz et al. (2013) suggests that impairments in executive function might be more difficult to overcome. In order to further clarify and confirm the effects of institutional deprivation and, in particular, its long term effects on executive functions, additional longitudinal research, using both lab tasks and questionnaires, is needed.

6. Discussion

In this chapter we discussed the main findings of several natural experiments, a randomized experiment (BEIP) and a series of meta-analyses on cognitive development in IA children. A number of conclusions emerge from the natural experiments described in this chapter. First, institutional deprivation can threaten the development of cognitive competence, school achievement and executive functioning in IA children. At the same time, substantial catch-up in cognitive competence and achievement is possible after placement into an adoptive family. Problems in executive functioning, on the other hand, might be more difficult to overcome. These findings are based on results of several longitudinal studies

focusing on children from different countries of origin (e.g., Romania, Greece, China) who were adopted by families in different receiving countries (e.g., the UK, the Netherlands, USA), adding strength to their generalizability.

However, it is important to keep in mind that these natural experiments may suffer from the risk of selection bias with regard to which children are chosen for adoption. The BEIP study (Zeanah et al., 2003), in which children were randomly assigned to foster care versus continued institutional care, addresses this problem. The findings of this randomized assignment study largely support the results of the natural experiments – children who were randomly assigned to foster care displayed more favorable cognitive competence than children who remained institutionalized. In contrast, even many years post-adoption, no significant differences in executive functioning were found between foster children and institutionalized children, who both performed worse on the executive functioning tasks than the non-adopted comparison group. Furthermore, even the foster care children's cognitive competence had failed to catch up completely with comparison children who were born and reared in their biological families in the same country. The finding that the Romanian foster children did not catch up completely with the comparison group might be explained by the profoundly depriving conditions in the Romanian institutions. As noted earlier in this chapter, the Romanian institutions were probably more depriving than institutions in other countries.

Furthermore, the findings of the meta-analyses of Van IJzendoorn et al. (2005) were also largely in line with the results of the longitudinal studies and the BEIP. On the one hand, the meta-analyses confirmed that adopted children show significant improvement in their cognitive development. More specifically, the meta-analyses revealed that adopted children performed better on intelligence tests than children who remained institutionalized and that adopted children showed complete catch-up with their current peers. On the other hand, however, complete catch-up with respect to school performance, learning problems and language abilities was not found. Moreover, the discrepancy between the meta-analytic findings regarding cognitive competence (IQ) and school achievement has been described as the *adoption decalage* (Van IJzendoorn et al., 2005); that is, adopted children performed worse at school than would be expected based on their general intellectual functioning. It should be noted, however, that this discrepancy is not consistently found in research. For example, the ERA study found no discrepancy between the intellectual competence and school performance of adopted children from Romania (Beckett et al., 2007; 2010). Instead, they

found that intellectual performance was a good predictor of scholastic achievement, which does not support the idea of an adoption decalage. Other research has even found results in the opposite direction; namely, that adopted children have better school performance than one would expect from their scores on tests of intelligence (Lindblad, Dalen, Rasmussen, Vinnerljung, & Hjern, 2009). More research is needed to clarify whether adopted children show a discrepancy between their cognitive potential and their school performance and to investigate possible underlying processes.

In sum, taken together, the studies reported in this chapter indicate that family foster care and adoptive care can be seen as a protective intervention in the life of children who are raised outside their biological family under conditions of deprivation and that the cognitive catch-up found after placement in a family does not merely reflect selection bias, but is achieved due to the transition from a relatively depriving environment to a usually more nurturing and stimulating caregiving environment in the adoptive or foster family.

It might be argued that these results are limited insofar as many studies have examined the development of IA children in comparison to that of non-adopted children in the country of their adoptive families and not to that of non-adopted children in their country of origin. The former comparison may not be an entirely appropriate comparison because IA children have not only experienced different early rearing environments compared to children in the receiving country, but they also have different cultural backgrounds; thus, these differences should be considered when interpreting the results of these studies. Notwithstanding these limitations, two noteworthy exceptions are the Greek Metera study and the BEIP study, both of which examined within-country adoption or foster care children and also included comparison groups of never-institutionalized children reared in the country of origin. These studies corroborate the results of studies without these control groups, adding credibility to these general conclusions.

The studies reviewed in this chapter also found that age at adoption appears to be a critical determinant of cognitive functioning post-adoption. More specifically, children adopted at younger ages, perhaps as young as 6 months of age, have been found to have higher IQ scores, perform better in school and have less executive functioning difficulties than children who were older at the time of adoptive placement. This is in line with the theory of risk and protective factors proposed by Rutter (1990) according to which adoption at a later age (implying longer deprivation) can be seen as a risk factor for less optimal development.

However, some research indicates that the quality of the pre-adoptive experience is more important than age at adoption itself (Dalen, 2012; Van den Dries et al., 2010, 2012). For example, Odenstad et al. (2008) found that age at adoption was not a crucial factor in the cognitive functioning of Korean adoptees who probably experienced "good enough" pre-adoptive conditions, whereas it was crucial for non-Korean adoptees who experienced more pre-adoptive adversity. The CAN study, described earlier, also found that pre-adoptive rearing type makes a difference – Chinese children adopted from temporary foster care have been found to exhibit more favorable cognitive development compared to children who were institutionalized prior to adoption (Van den Dries et al., 2010). These findings point to the importance of both the quality of pre-adoptive rearing circumstances (foster care preferred above institutional care) and early adoption for later cognitive functioning of children who are not raised in their birth families.

The remarkable catch-up in cognitive functioning that children display after adoptive placement points to the resilience of children to recover from early adversity. Some adopted children, however, show persisting problems with cognitive and executive functioning, pointing to the importance of post-adoption support. The influence of age at adoption and pre-adoption rearing conditions indicates the importance of early adoption and pre-adoptive family foster care instead of pre-adoptive institutional care for fostering the cognitive development and executive functioning of children who cannot grow up in their birth family. Pre-adoptive foster care and adoptive placement at a young age should thus be encouraged for children without parental care.

CHAPTER 3

Nine Years After Adoption:

Remarkable Catch-Up In Intellectual Functioning In Children Adopted From Institutional Care Or Foster Care In China

Abstract

In the current study, we investigated (1) whether Chinese adopted children showed complete catch-up in intellectual functioning and normative school achievement at the age of 10 years, (2) whether the type of pre-adoption care (institutional care versus foster care) and the extent of early deprivation children have experienced were associated with different domains of cognitive development (intellectual functioning, school achievement, and self-regulation (executive functioning, effortful control)), and (3) whether parental sensitivity and parental efficacy buffered against the effects of these adverse pre-adoption experiences on cognitive development. These research questions were studied in a sample of 92 girls who were adopted from institutional care (*n* = 50) or foster care (*n* = 42) in China to the Netherlands, and who participated in the study 2 months (Time 1, *N* = 92), 6 months (Time 2, *N* = 92) and 9 years after adoption (Time 3, *N* = 87). Although the children had below average intellectual abilities at Time 1 and Time 2, results revealed that the children showed complete catch-up in intellectual functioning at Time 3 (crystallized intelligence: *M* = 110.95, *SD* = 12.19; fluid intelligence: *M* = 109.11, *SD* = 16.06) and even scored higher than the standardized population average (*M* = 100, *SD* = 15). Moreover, they showed normative school achievement in mathematics and above-average achievement in reading comprehension. Contrary to expectations, the post-institutionalized and the post-foster children did not differ significantly from each other on any of the domains of cognitive development, and higher levels of early deprivation were not associated with worse cognitive functioning. Also, in general, no support was found for the hypothesized interactions between pre-adoption experiences and parental sensitivity and efficacy. Despite this, it is noteworthy that the children showed complete and massive catch-up in intellectual functioning irrespective of their pre-adoption background.

Keywords. International adoption, institutional care, foster care, early deprivation, intellectual functioning, executive functioning, effortful control, school performance, parenting

1. Introduction

Prior to adoption, adopted children are often deprived of positive experiences (e.g., stable relationships with a sensitive caregiver, cognitive stimulation, good nutrition) that are necessary for optimal brain development (Nelson, Bos, Gunnar, & Sonuga-Barke, 2011). This may increase their risk for deficits in a broad range of outcomes, such as physical growth, attachment security, behavioral adjustment and cognitive development (Juffer & Van IJzendoorn, 2009). In the current study we focus on various domains of cognitive development, namely intellectual functioning, school achievement and self-regulation (executive functioning and effortful control). After adoption, however, adopted children generally experience a drastic, positive change in living circumstances, which may provide opportunities to recover from early adverse experiences. Indeed, it has been found that adopted children generally show catch-up in their cognitive development following adoption, with complete catch-up in some domains of cognitive development such as intellectual functioning, and remarkable but incomplete catch-up in other domains such as school achievement (for a meta-analysis, see Van IJzendoorn, Juffer, & Klein Poelhuis, 2005) and executive functioning (i.e., higher order, self-regulatory, cognitive processes that exert control over cognition, attention and behavior; Zhou, Chen, & Main, 2012) (for overviews, see Finet, Vermeer, Juffer, Bosmans, & Bijttebier, 2016; Merz, Harlé, Noble, & McCall, 2016).

Nonetheless, research also shows substantial variability in adopted children's cognitive development (e.g., Cohen, Lojkasek, Zadeh, Pugliese, & Kiefer, 2008; Juffer, Van den Dries, Finet, & Vermeer, 2015), making it interesting to study factors that may be associated with these individual differences. Candidate factors that may explain variability in adopted children's development are differences in children's pre-adoption experiences, such as the type of care children have received prior to adoption (e.g., institutional or foster care) and the extent of early deprivation (e.g., sub-nutrition and neglect) children have been exposed to (e.g., Finet, Vermeer, Juffer, & Bosmans, 2018). There is some empirical evidence showing that children adopted from institutional care have worse cognitive skills than children adopted from foster care (e.g., Miller, Chan, Comfort, & Tirella, 2005; van Londen, Juffer, & Van IJzendoorn, 2007), and that children who experienced higher levels of adverse pre-adoption experiences display less optimal cognitive development (Pechtel & Pizzagalli, 2011; Pollak et al., 2010; Tan, 2009; Van IJzendoorn et al., 2005). However, not all studies find

effects of type of pre-adoption care or early deprivation (e.g., Katzenstein, LeJeune, & Johnson, 2016; Welsh & Viana, 2012), suggesting that not all adopted children are equally affected by adverse pre-adoption experiences (e.g., Smyke et al., 2007). Based on risk and resilience models (Masten, 2001; Rutter, 1987), it can be predicted that certain protective factors can counteract the negative effects of adverse pre-adoption experiences, and hence explain which children benefit most from adoption. One possible, but understudied protective factor that may modify the negative effects of pre-adoption experiences on adopted children's cognitive development is parenting in the adoptive family (Juffer et al., 2011).

Support for the possible protective role of parenting, comes from studies with non-adopted children showing that different dimensions of parenting behaviors have beneficial effects on various domains of cognitive development such as intellectual functioning (Mackintosh, 1998), school achievement (Spera, 2005), executive functioning (Bernier, Carlson, & Whipple, 2010; Fay-Stammbach, Hawes, & Meredith, 2014), and effortful control (i.e., the self-regulatory ability to inhibit a dominant response in order to perform a subdominant response; Rothbart, Ellis, Rueda, & Posner, 2003) (Eisenberg et al., 2005; Graziano, Keane, & Calkins, 2010). Moreover, studies with non-adopted children have found that not only actual parenting behaviors but also cognitive aspects of parenting, such as parents' belief in their ability to parent their child successfully (i.e., parental efficacy), are associated with domains of cognitive development such as school achievement (Jones & Prinz, 2005).

Limited research, however, has examined the associations between parenting behavior and cognitive functioning in adopted children and, as far as we know, no studies have examined the links between parental efficacy and cognitive functioning in adopted children. Despite this, adoption studies in which the association between other aspects of the parent-child relationship, such as parent-child relationship quality, and cognitive development have been studied, generally found evidence for such associations (e.g., Groza, Ryan, & Thomas, 2008; Whitten & Weaver, 2010). Moreover, with respect to parenting behavior, one adoption study found that higher levels of parental sensitivity (i.e., parents' ability to perceive their child's signals and to timely and adequately respond to these signals) were associated with better cognitive development in 7-year-old adopted children (Stams, Juffer, & Van IJzendoorn, 2002). Although this points to the importance of parenting for

adopted children's cognitive functioning, as far as we know, no studies have examined the role of behavioral (e.g., parental sensitivity) and cognitive aspects of parenting (e.g., parental efficacy) in the association between pre-adoption experiences and cognitive development. Guided by a risk and resilience framework, we explored whether parental sensitivity and parental efficacy moderated the association between adverse pre-adoption experiences and adopted children's cognitive functioning, so that high parental sensitivity and parental efficacy reduce the adverse effects of pre-adoption experiences.

1.1. The current study

In the current study we aimed to investigate the associations between pre-adoption experiences and cognitive development, and to investigate whether parental sensitivity and parental efficacy buffered these associations (see Figure 1). Two indicators of pre-adoption experiences were used, namely type of pre-adoption care (institutional care versus foster care) and early deprivation. To obtain a broad understanding of children's current cognitive functioning, we assessed multiple domains of cognitive development, namely intellectual functioning, school achievement (in mathematics and in reading comprehension) and self-regulation (performance based measures of two executive functions, namely executive problem-solving and response inhibition, and parent-reported effortful control).

Theses research questions were examined in a sample of 10-year-old Chinese girls who were adopted from institutional or foster care to the Netherlands, and who participated in the third time point of the longitudinal Chinese Adoptees in the Netherlands (CAN) study (see also Finet, Vermeer, Juffer, Bijttebier, & Bosmans, 2018; Van den Dries, Juffer, Van IJzendoorn, & Bakermans-Kranenburg, 2010; Van den Dries, Juffer, Van IJzendoorn, Bakermans-Kranenburg, & Alink, 2012). Results of the first two time points of the study, which took place two and six months after adoption, revealed that type of pre-adoption care had an effect on intellectual abilities. The children who were adopted from foster care (post-foster children; Time 1: M = 84.40, SD = 17.62, Time 2: M = 92.26, SD = 17.83) outperformed the children who were adopted from institutional care (post-institutionalized children; Time 1: M = 74.04, SD = 18.41, Time 2: M = 84.38, SD = 20.01). Moreover, both groups of children had below average intellectual abilities, although there was some catch-up between the first and second time point (Van den Dries et al., 2010). Therefore, an additional aim of the current

study was to investigate whether the adopted children showed complete catch-up in cognitive development (intellectual functioning and school achievement) nine years later.

Thus, the aims of the present study were threefold: (1) to examine whether the Chinese adopted children showed complete catch-up in their intellectual functioning and showed normative school achievement nine years after adoption, (2) to study the associations between adverse pre-adoption experiences and the different assessed domains of cognitive development , and (3) to examine whether parental sensitivity and parental efficacy buffered against the effects of pre-adoption experiences. Based on previous studies with children adopted from China (Cohen et al., 2008; Dalen & Rygvold, 2006; Delcenserie, Genesee, & Gauthier, 2013), we hypothesized that the children on average would show complete catch-up in intellectual functioning and would do as well at school as the general population. Furthermore, we expected that pre-adoption experiences would be associated with the children's cognitive development, with the post-foster children outperforming the post-institutionalized children and with higher levels of early deprivation being associated with worse cognitive functioning. Moreover, we hypothesized that the effects of pre-adoption experiences on cognitive functioning would depend upon the quality of adoptive parenting, with parental sensitivity and parental efficacy buffering against the negative effects of adverse pre-adoption experiences.

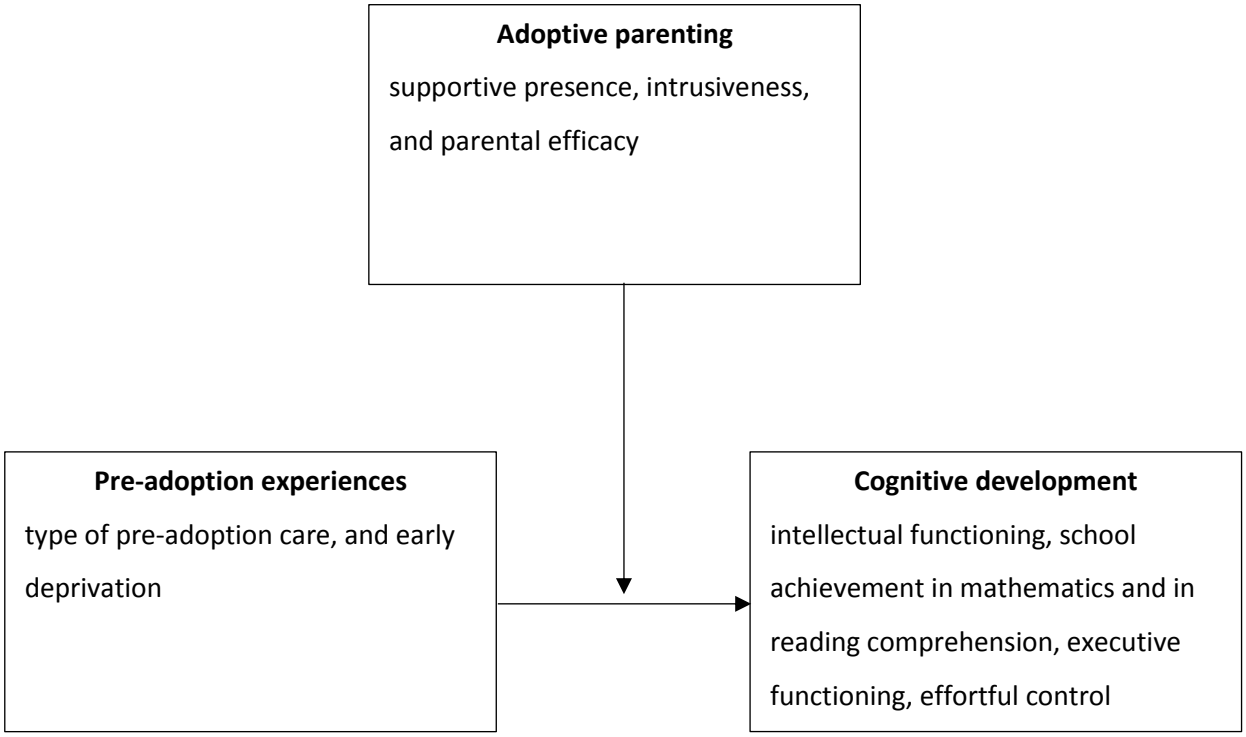


Figure 1. Conceptual model of the interactions tested between pre-adoption experiences and parenting in the prediction of cognitive development at age 10.

2. Method

2.1. Participants and procedure

Participants of the CAN study were 92 girls who were adopted from China to the Netherlands at a mean age of 13.03 months (*SD* = 1.35, range = 10.84-16.53). The three Dutch adoption organizations mediating adoption from China to the Netherlands helped recruiting the families (for details on the recruitment, see Van den Dries et al., 2010, 2012). The 92 families took part in the first two time points of the study, two months (Time 1) and six months (Time 2) after adoption, and 87 families participated in the third time point of the study nine years after adoption (Time 3; see also Finet, Vermeer, Juffer, Bijttebier, et al., 2018). The major reason for non-participation at Time 3 were time constraints. However, four of the five families who dropped out at Time 3 were willing to complete an online background questionnaire (*n* = 91), and to provide information on the school performance (CITO scores) of their daughter (*n* = 89). CITO scores of two children who participated in the third time point

were missing, because one family did not give their informed consent to provide their child's CITO scores, and because one family migrated to New Zealand where CITO scores are not being used. Each time point consisted of a home visit and a laboratory visit at Leiden university. The girls took part in the study together with their primary caregiver (90 mothers and 2 fathers at Time 1 and Time 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), whom we will refer to as mother. Mean education at Time 3 of the primary caregiver on a scale from 1 (primary school) to 5 (university) was 3.92 (*SD* = 0.93) and mean education of the second caregiver was 4.10 (*SD* = 0.88). The girls were on average 15.24 (*SD* = 1.35) and 15.66 (*SD* = 1.42) months old at the Time 1 home and university visit, 19.33 (*SD* = 1.40) and 19.85 (*SD* = 1.48) months old at the Time 2 home and university visit, and 119.72 (*SD* = 5.23) and 122.07 (*SD* = 5.57) months old at the Time 3 home and university visit. In infancy (Time 1 and Time 2) parents gave their informed consent for participation in the study, and at Time 3 both the parents and the girls gave their informed consent. The Ethics Review Board of the Faculty of Social Sciences of Leiden University approved the follow-up study (ECPW-2014/067).

2.2. Measures

2.2.1. Pre-adoption experiences: type of pre-adoption care and early deprivation

At Time 1 mothers reported whether their child had lived in pre-adoption institutional care or pre-adoption foster care in China. This information was used to classify the children in the post-institutionalized or in the post-foster group (see Van den Dries et al., 2010, 2012). Children in the post-institutionalized group (*n* = 50) had mainly experienced institutional care before adoption (*M* = 12.44 months, *SD* = 1.36) and a maximum of one month of other forms of care such as foster care (*M* = 0.65 months, *SD* = 0.59). The post-foster group consisted of children who had exclusively lived in foster care prior to adoption (*n* = 16) and children who had lived in both foster care as well as institutional care (*n* = 26). The post-foster children (*n* = 42) 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.

In addition, at Time 1 mothers indicated on a four point response scale (no, somewhat, a lot, unknown) whether and to what extent their daughter had experienced each of the following adversities before adoption: (1) sub-nutrition, (2) other physical neglect, (3) socio-

emotional neglect, and (4) maltreatment (physical or sexual). For the current analyses the response scales were dichotomized (i.e., a score of 0 was assigned if parents indicated that their child had not experienced the adversity or if parents answered unknown, and a score of 1 was assigned if parents reported that their child had experienced the adversity somewhat or a lot) and summed. Scores could range between 0 and 4 with higher scores indicating more early deprivation. The internal consistency (Cronbach's alpha) of early deprivation was .63.

2.2.2. Parental sensitivity: supportive presence and lack of intrusiveness

At each time point video recordings of problem-solving tasks in which mother and child engaged were coded for supportive presence and intrusiveness with the Erickson scales (Egeland, Erickson, Clemenhagen-Moon, Hiester, & Korfmacher, 1990; Erickson, Sroufe, & Egeland, 1985). We used these two Erickson scales as indicators of parental sensitivity, with higher levels of supportive presence and lower levels of intrusiveness indicative of higher sensitivity. Supportive presence refers to the extent to which mother expresses emotional support and positive regard to her child and lets her child know that she has confidence in her child's competence. Intrusiveness refers to the degree to which mother interferes with her child's autonomy and exploration in the task, and to which she exerts her own expectations on her child. Both scales were rated on a seven-point scale ranging from 1 (*very low*) to 7 (*very high*). At Time 1 and Time 2 supportive presence and intrusiveness were observed at the university during two problem-solving tasks of 4 min each, and at Time 3 supportive presence and intrusiveness were assessed at home during a 10 min tangram puzzle solving task. The more verbal nature of mother-child interactions in middle childhood, compared to the more physical interactions in infancy, was taken into account in the coding of supportive presence and intrusiveness at Time 3 (convergent with Stams et al., 2002). Different coders, who were blind to children's pre-adoption experiences, coded the Time 1, Time 2 and Time 3 assessments of the same family. The intraclass interrater reliability (intraclass correlation) with the expert coder (FJ) was >.70 at Time 1 and Time 2 for supportive presence and for intrusiveness. At Time 3 the intraclass correlation (two-way mixed, single measure) of the single rater with the expert coder (FJ) was .92 for supportive presence, and .96 for intrusiveness (n = 15).

2.2.3. Parental efficacy

To assess parents' sense of parental efficacy, parents filled out the Parental Efficacy Questionnaire (Van IJzendoorn, Bakermans-Kranenburg, & Juffer, 1999) at each time point. The Parental Efficacy Questionnaire consists of 22 items that measure how competent parents feel in rearing their child, particularly under stressful circumstances (e.g., "I can understand my daughter's feelings when she is sad, even if I am angry"). At Time 3, two items that were not considered developmentally appropriate were omitted from the questionnaire prior to administration. Parents had to rate the items on a 5-point scale ranging from -2 (*no self-efficacy*) to 2 (*very high self-efficacy*). All items were summed to compute total parental efficacy (possible scores range from -44 to 44 at Time 1 and 2 and from -40 to 40 at Time 3). The internal consistency of parental efficacy at the three time points was .79 (Time 1), .80 (Time 2) and .88 (Time 3).

2.2.4. Intellectual functioning

In infancy (Time 1 and Time 2) the intellectual abilities of the children were assessed during the home visit with the Dutch version of the second edition of the Bayley Scales of Infant Development (BSID-II-NL; Van der Meulen, Ruiter, Lutje Spelberg, & Smrkovsky, 2004). The BSID-II-NL measures mental development and psychomotor development in children aged between 1 and 41 months. For the current analyses, the mental scale (mental developmental index) was used. Raw scores on this scale were converted to age-corrected standard scores (M = 100, SD = 15).

To get an indication of children's intellectual functioning at Time 3, two broad cognitive abilities were assessed, namely crystallized intelligence and fluid intelligence. These two cognitive abilities have the highest loadings on general intelligence according to the Cattell-Horn-Carroll (CHC) theory of cognitive abilities (Alfonso, Flanagan, & Radwan, 2005). More specifically, to assess crystallized intelligence (i.e., children's culturally acquired knowledge; Cattell, 1971) the information and the vocabulary subtest of the Dutch Wechsler Intelligence Scale for Children-Third Edition (WISC-III-NL; Kort et al., 2005; Wechsler, 1991) were administered. The information subtest consists of general knowledge questions (e.g., "Who was Anne Frank?"). In the vocabulary subtest the child is asked to define the meaning of words (e.g., "What is an umbrella?"). Raw scores on both subtests were converted to standardized scores (M = 10, SD = 3) and these standardized scores were transformed into an

IQ score (Sattler, 1992). In addition, to get an indication of children's general reasoning ability (an aspect of fluid intelligence; Cattell, 1971), the analogies and categories subtests of the Snijders-Oomen Non-Verbal Intelligence Test (SON-R 6-40; Tellegen & Laros, 2011) were administered. In the analogies subtest the child has to reason by analogy and in the categories subtest the child has to reason by categorization. Raw scores on both subtests were transformed to standardized scores (*M* = 10, *SD* = 3) which were used to estimate total cognitive performance on the SON-R 6-40.

2.2.5. School achievement

At Time 3 mothers asked their child's teacher to provide their child's most recent, standardized test scores (CITO-scores) with respect to mathematics and reading comprehension. CITO-tests are standardized tests that are administered in the majority of elementary schools in The Netherlands to assess school performance. Raw test scores can be transformed to performance levels which indicate how well a child does at school compared to the norm group of Dutch children in the same grade. Two different classifications of performance levels exist, namely an A-E classification (A = 25% highest scoring children, B = 25% children who score a lot or somewhat higher than average, C = 25% children who score somewhat or a lot lower than average, D = 15% children who score a lot lower than average, E = 10% children with the lowest scores) and a I-V classification (I = 20% highest scoring children, II = 20% children scoring above average, III = 20% average scoring children, IV = 20% children scoring below average, V = 20% children with the lowest scores). For the majority of children (*n* = 75) teachers provided CITO performance levels for mathematics and reading comprehension using the I-V classification, and for 14 children teachers only provided CITO performance levels using the A-E classification. Therefore we used the I-V classification in the current analyses, and we transformed the A-E classification to the I-V classification for the 14 children for whom only the A-E classification was provided. Because the categories in both classification systems do not overlap completely, we assigned the most likely I-V category for each A-E category (children with A were classified in I, children with B were classified in II, children with C were classified in IV and children with D or E were classified in V). The I-V classifications for mathematics (I: 31.5% , II: 20.2%, III: 19.1%, IV: 16.9%, V: 12.4%) and for reading comprehension (I: 37.1% , II: 27%, III: 13.5%, IV: 14.6%, V: 7.9%) were coded as 1-5 in the current analyses with lower scores indicating better math performance and better

reading comprehension (compared to the norm). Scores were log10 transformed to reduce positive skewness (mathematics: *M* = 0.34, *SD* = 0.26, range 0.00-0.70; reading comprehension: *M* = 0.29, *SD* = 0.25, range 0.00-0.70).

2.2.6. Executive functioning: problem-solving efficiency and speed

At Time 3 two components of executive functioning were assessed, namely executive problem-solving and response inhibition. To measure executive problem-solving (executive planning) the Tower of London-Drexel task (TOL^{DX}; Culbertson & Zillmer, 1998) - a modified version of the original Tower of London task of Shallice (1982) - was administered to the children during the home visit. In this task the child is presented with a tower structure that consists of three wooden pegs of descending height and three colored beads (blue, yellow, red). The examiner has a similar tower structure and presents several goal configurations to the child. The child is asked to replicate the examiner's configuration in as few as moves as possible while starting from the start configuration. Children are not allowed to move more than one bead at a time, and are not allowed to place more beads on a peg than it will hold. The child is asked to solve one demonstration problem, two practice problems and 15 test problems. The TOL^{DX} can be used to assess different performance measures. In the current analyses total move score and total problem-solving time were used. Total move score, an indicator of problem-solving efficiency (Berg & Byrd, 2002), is computed as the sum of the move scores (i.e., the observed number of moves to solve a problem minus the minimal number of moves necessary to solve that problem) of the 15 test problems. If the observed number of moves on a test problem exceeded 20, a score of 20 was assigned to the observed number of moves on that item to avoid inflation of the total move score (Culbertson & Zillmer, 1998). The higher a child's total move score, the more steps the child needed to solve the 15 test problems and thus the lower the child's problem-solving efficiency. Total problem-solving time – an indicator of problem-solving speed (Berg & Byrd, 2002) - is computed as the sum of the problem-solving time (i.e., time from the presentation of the test problem to the solution of the problem) on the 15 test problems (Culbertson & Zillmer, 1998). If a child needed more than 120s to solve a test problem, the problem-solving time for that item was rounded to 120s. The higher a child's problem-solving time, the more time the child needed to solve the 15 test problems and thus the lower the child's problem-solving speed. Because total

problem-solving time was positively skewed, it was log10 transformed (*M* = 2.66, *SD* = 0.15, range 2.39-3.04). Administration of the TOL^{DX} was videotaped for later coding.

2.2.7. Executive functioning: response inhibition

A free-to-use stop-signal task (SST), programmed by Verbruggen, Logan, and Stevens (2008), was administered to the children at the university (Time 3) to assess response inhibition. The SST consists of two different types of trials, namely no-signal trials (75% of the trials) and stop-signal trials (25% of the trials). On the no-signal trials, children have to discriminate between two primary-task stimuli (a square or a circle) displayed in the center of the screen, as fast and accurately as possible by pressing the correct button on the key board (square: left key, circle: right key). On the stop-signal trials, presentation of the primary-task stimulus is followed by an auditory stop signal that instructs the participants to inhibit their response. To compensate for the fact that a faster reaction time on no-signal trials makes it more difficult to successfully inhibit the response on the stop-signal trials (Logan, Van Zandt, Verbruggen, & Wagenmakers, 2014), the delay between the onset of the primary-task stimulus and the onset of the auditory stop signal (i.e. the stop signal delay, SSD) is continuously adjusted using the staircase tracking procedure (Verbruggen et al., 2008). This procedure tries to ensure that all children inhibit their response successfully on approximately 50% of the stop-signal trials. Therefore successful response-inhibition on a stop-signal trial is followed by a 50ms increase of SSD (which is initially set at 250ms), reducing the probability of successful response inhibition on the next stop-signal trial. Unsuccessful response inhibition is followed by a 50ms decrease of SSD, increasing the probability of successful response inhibition on the next stop-signal trial. The average SSD in the current study was 359.67ms (*SD* = 131.50).

For the current analyses the main dependent variable of the task - the stop signal reaction time (SSRT) - was computed using the integration method which has been found to result in more reliable estimates of SSRT than other methods such as the mean method (Verbruggen, Chambers, & Logan, 2013). SSRT is defined as the time it takes to inhibit a response (Logan et al., 2014). The lower the SSRT is, the less time a child on average needs to inhibit his response and thus the better the child's response inhibition. Eleven children who did not meet the criteria necessary for a reliable estimation of SSRT (namely the probability of successful response inhibition on the stop-signal trials has to be between 25% and 75%,

the probability of a missed response on the no-signal trials has to be lower than 10% (Congdon et al., 2012), and the mean stop-signal-respond reaction time has to be lower than the mean no-signal reaction time (Verbruggen & Logan, 2015)) were excluded from the analyses in which SSRT was used. We took the square root of SSRT, because SSRT was positively skewed (*M* = 15.94, *SD* = 2.08, range 11.52-21.33). See Table A1 in the Appendix for the descriptive statistics of the SST variables.

2.2.8. Effortful control

Children's effortful control (i.e., the self-regulatory ability to inhibit a dominant response in order to perform a subdominant response; Rothbart et al., 2003) was reported by mother with the Dutch parent-version of the Early Adolescent Temperament Questionnaire Revised (EATQ-R; Capaldi & Rothbart, 1992; Hartman, 2000). The EATQ-R consists of 62 items and aims to assess temperament of children and adolescents aged between 9 and 16 years. Parents have to rate all items on a five-point response scale ranging from 1 (*almost never true*) to 5 (*almost always true*). The items can be combined into 11 temperament scales, which cluster on four higher order temperament factors (effortful control, surgency, negative affectivity, and affiliativeness), and in two behavioral scales (aggression, depressive mood). For the current analyses only the effortful control factor was used, which is computed as the sum of the subscales attention (e.g., "My child finds it easy to really concentrate on a problem"), inhibitory control (e.g., "My child has a hard time waiting her turn to speak when excited"), and activation control (e.g., "My child usually gets started right away on difficult assignments"). The internal consistency (Cronbach's alpha) of the effortful control scale was .84.

2.3. Data-analysis

Prior to main analyses, three principal component analyses were performed to create a longitudinal compound score for supportive presence, for intrusiveness and for parental efficacy. In each principal component analysis, one factor was extracted based on Kaiser's criterion of retaining factors with eigenvalues greater than one. The supportive presence factor (*M* = 0, *SD* = 1, range from -2.27 to 2.07), which reflects the common variance between the supportive presence scores at the three time points, had an eigenvalue of 1.71 and explained 56.97% of total variance in the three supportive presence scores. The loadings of

Time 1, Time 2 and Time 3 supportive presence on this factor were .77, .76, and .73. The intrusiveness factor (*M* = 0, *SD* = 1, range from -1.91 to 2.58) had an eigenvalue of 1.59 and explained 53.12% of total variance in the intrusiveness scores. The loadings of the intrusiveness scores on this factor were .82 for Time 1, .76 for Time 2, and .58 for Time 3 intrusiveness. The parental efficacy factor (*M* = 0, *SD* = 1, range from -2.47 to 2.39) had an eigenvalue of 1.78 and explained 59.39% of the total variance in the parental efficacy scores. The loadings of the parental efficacy presence on this factor were .82 for Time 1, .81 for Time 2 and .68 for Time 3 parental efficacy.

To compare the mean intellectual functioning of the children in our study with the standardized IQ mean of 100 (*SD* = 15) two one-sample *t*-tests were performed. Besides, a Chi-square goodness-of-fit test was performed for math performance and for reading comprehension, to examine whether the distribution of children in our sample in each of the five school performance classification levels (I-V) differed from the general population distribution (equal proportion of children [namely 20%] in each category). Furthermore, the associations between adverse pre-adoption experiences (type of pre-adoption care and early deprivation) and the different domains of cognitive development were inspected using independent sample *t*-tests (type of pre-adoption care) and bivariate correlations (early deprivation).

Finally, to investigate our research question concerning the buffering effect of parenting in the association between pre-adoption experiences and cognitive development, moderation analyses were performed using the PROCESS macro in SPSS (Hayes, 2013). For each of the eight outcome variables, six separate interaction analyses were performed to test the interaction between the two indicators of pre-adoption experiences and the three parenting variables. In the analyses for the two indicators of intellectual functioning (crystallized and fluid intelligence) we controlled for Time 1 intellectual abilities, to test whether the interactions predicted additional variance in Time 3 intellectual functioning over and above the variance explained by Time 1 intellectual abilities. In the analyses for the other domains of cognitive development we did not control for Time 1 intellectual abilities, because Time 1 intellectual abilities did not correlate significantly with any of these other domains (see Table 2).

To interpret the significant interaction effects, the Johnson-Neyman technique was applied to determine the threshold level of the parenting variable below or above which the

effect of the pre-adoption variable on cognitive development became significant. In addition, follow-up analyses of the significant interactions were done to examine in which type of pre-adoption care group, or above or below which level of early deprivation the effect of parenting was significant. To increase interpretability of the interaction analyses, early deprivation was mean centered (M = 0, SD = 0.85, range from -0.44 to 3.56) and a dummy variable was computed for type of pre-adoption care (0 = post-institutionalized group, 1 = post-foster group). The continuous factor scores for parenting were not mean centered because they already have a mean of 0. In total there was 3.1% of data missing on all variables. Based on Little's MCAR test it was assumed that the data were missing completely at random, χ^2 (188) = 215.74, p = .081. Missing data were listwise deleted.

3. Results

3.1. Preliminary analyses

Descriptive statistics of the model variables are presented in Table 1 for the post-institutionalized children, the post-foster children and the total sample. The post-institutionalized children scored significantly higher on early deprivation than the post-foster children (see also Finet, Vermeer, Juffer, Bijttebier, et al., 2018). Furthermore, there were two significant differences between the two groups on the parenting variables. Parents of the post-institutionalized children scored significantly lower on supportive presence at Time 1, and significantly higher on parental efficacy at Time 2 than parents of the post-foster children (see also Finet, Vermeer, Juffer, Bijttebier, et al., 2018).

In Table 2 the correlations between the variables are shown. Supportive presence correlated positively with fluid intelligence, and parental efficacy correlated negatively with reading comprehension (lower scores indicating better reading comprehension). There were no other significant correlations between the parenting variables and cognitive functioning. No significant associations between Time 1 intellectual abilities and Time 3 cognitive functioning were found, with the exception of a significant association between Time 1 intellectual abilities and Time 3 fluid intelligence. Several measures of Time 3 cognitive functioning were significantly correlated with each other (see Table 2).

Table 1

Descriptives of model variables (prior to transformations)

	Type of pre-adoption care								
	Post-institutionalized (*N* = 50)			Post-foster (*N* = 42)			Total sample (*N* = 92)		
	N	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
Early deprivation[c]	49	0.65	0.99	42	0.19[b]	0.55	91	0.44	0.85
T1 Supportive presence	49	4.64	1.48	42	5.54[b]	1.06	91	5.06	1.37
T2 Supportive presence	49	5.01	1.58	42	4.89	1.48	91	4.95	1.53
T3 Supportive presence	46	4.16	1.24	41	4.14	1.25	87	4.15	1.23
T1 Intrusiveness	49	3.08	1.36	42	2.66	1.25	91	2.88	1.32
T2 Intrusiveness	49	2.89	1.39	42	3.33	1.45	91	3.10	1.43
T3 Intrusiveness	46	4.18	1.50	41	4.76	1.24	87	4.45	1.40
T1 Parental efficacy	47	24.00	5.32	39	24.08	6.98	86	24.03	6.09
T2 Parental efficacy	49	27.14	5.87	39	24.23[a]	6.05	88	25.85	6.09
T3 Parental efficacy	49	23.90	7.17	42	23.45	7.83	91	23.69	7.44
Crystallized intelligence	46	111.37	12.60	41	110.49	11.85	87	110.95	12.19
Fluid intelligence	46	108.98	16.33	41	109.27	15.96	87	109.11	16.06
Math performance[c]	48	2.52	1.37	41	2.66	1.46	89	2.58	1.40
Reading comprehension[c]	48	2.29	1.38	41	2.29	1.25	89	2.29	1.32
TOL problem-solving efficiency[d]	46	48.37	16.06	41	49.85	18.86	87	49.07	17.35
TOL problem-solving speed[c,e]	46	519.46	218.24	41	456.39	147.83	87	489.74	189.97
Response inhibition[c,f]	39	264.90	79.33	36	251.34	53.34	75	258.39	68.07
Effortful control	48	3.60	0.48	42	3.51	0.52	90	3.56	0.50

Note. [a] significant difference between the post-institutionalized and the post-foster children at $p < .05$. [b] significant difference between the two groups at $p < .01$. [c] original, untransformed values. [d] higher scores indicate higher move score. [e] higher scores indicate higher problem-solving time. [f] participants who did not meet the criteria to compute response inhibition were excluded, higher scores indicate slower response inhibition.

Table 2

Correlations between Time 1 intellectual abilities, pre-adoption experiences, parenting factor scores and Time 3 cognitive development

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. T1 intellectual abilities	1													
2. Type of pre-adoption care[a]	.28**	1												
3. Early deprivation[b]	-.10	-.27**	1											
4. Supportive presence	.00	.12	-.13	1										
5. Intrusiveness	-.03	.06	-.01	-.58***	1									
6. Parental efficacy	-.01	-.12	.02	.05	.02	1								
7. Crystallized intelligence	.06	-.04	-.09	.04	.06	.03	1							
8. Fluid intelligence	.25*	.01	-.03	.23*	-.05	.08	.41***	1						
9. Math performance[b]	-.07	.05	.01	.07	-.05	-.09	-.39***	-.48***	1					
10. Reading comprehension[b]	.01	.00	-.03	.04	-.06	-.27*	-.45***	-.48***	.66***	1				
11. TOL efficiency	-.09	.04	.06	-.00	-.09	-.12	-.11	-.31**	.25*	.12	1			
12. TOL speed[b]	-.09	-.17	-.04	.07	-.14	.11	.07	.20	-.04	-.24*	.24*	1		
13. Response inhibition[b, c]	.01	-.10	.09	-.09	.06	.01	.16	-.05	.01	.16	.27*	-.22	1	
14. Effortful control	-.14	-.09	.07	.08	.02	.22	.31**	.29**	-.29**	-.36**	-.21*	.07	-.18	1

Note. TOL efficiency = TOL^{DX} problem-solving efficiency (higher scores indicate higher move score). TOL speed = TOL^{DX} problem-solving speed (higher scores indicate higher problem-solving time). Response inhibition: higher scores indicate slower response inhibition (higher SSRT).

[a] 0 = institutional care, 1 = foster care. [b] original, untransformed values. [c] participants who did not meet the criteria to compute response inhibition (SSRT) were excluded.

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

3.2. Comparison with the norm

Next, we compared the mean intellectual functioning of the children in our sample with the standardized IQ mean of 100 (*SD* = 15). Results of the analyses for crystallized intelligence and fluid intelligence indicated that the adopted children scored above average (crystallized intelligence: *M* = 110.95, *SD* = 12.19, *t*(86) = 8.38, *p* < .001; fluid intelligence: *M* = 109.11, *SD* = 16.06, *t*(86) = 5.29, *p* < .001). Similar findings were found for the post-institutionalized (crystalized intelligence: *M* = 111.37, *SD* = 12.60, *t*(45) = 6.12, *p* < .001; fluid intelligence: *M* = 108.98, *SD* = 16.33, *t*(45) = 3.73, *p* < .001) and the post-foster children (crystalized intelligence: *M* = 110.49, *SD* = 11.85, *t*(40) = 5.67, *p* < .001; fluid intelligence: *M* = 109.27, *SD* = 15.96, *t*(40) = 3.72, *p* < .001) when their scores were compared with the norm. Comparison of the distribution of children in the school performance classification levels with the general population distribution (20% children in each category), revealed that the distributions did not differ significantly for math performance, χ^2 (4) = 8.92, *p* = .063, but did differ significantly for reading comprehension, χ^2 (4) = 24.88, *p* < .001. This indicates that there were statistically significant differences in the proportion of children in each classification level of reading comprehension. Inspection of the frequencies showed that there were more children in the two highest classification levels (I: *n* = 33, II: *n* = 24) and fewer children in the average and below-average classification levels (III: *n* = 12, IV: *n* = 13, V: *n* = 7) than what would be expected based on the general population distribution (*n* = 18 [20%] children in each classification level). Similar findings were found for the post-institutionalized and the post-foster children separately (math performance: post-institutionalized χ^2 (4) = 5.75, *p* =.219, post-foster χ^2 (4) = 3.76, *p* = .440; reading comprehension: post-institutionalized χ^2 (4) = 14.71, *p* = .005, post-foster χ^2 (4) = 11.32, *p* = .023)

3.3. Associations between pre-adoption experiences and cognitive development

Table 1 shows that there were no significant differences between the post-institutionalized and the post-foster children on the different indices of cognitive development at Time 3. Besides, early deprivation was not significantly associated with the indices of cognitive development (Table 2).

3.4. Pre-adoption experiences x parenting interactions

3.4.1. Type of pre-adoption care x parenting effects

Results of the moderation analyses revealed that there were no significant interactions between type of pre-adoption care and parenting in the prediction of the different domains of cognitive development (see Table 3), with te exception of a significant interaction in the prediction of fluid intelligence, in the prediction of problem-solving efficiency and in the prediction of problem-solving speed.

First, there was a significant interaction between type of pre-adoption care and supportive presence in the prediction of fluid intelligence controlling for Time 1 intellectual abilities.[1] The total variance explained in fluid intelligence by the total model was 15%, R^2 = .15, $F(4, 80) = 3.61$, $p = .009$. Results of the Johnson-Neyman procedure revealed that, controlling for Time 1 intellectual abilities, the post-institutionalized children scored higher on fluid intelligence than the post-foster children when mothers scored at least 1.01 on supportive presence (which was the case for 18.82% of the children in the total sample), but not when mothers scored below this threshold. Further probing of the interaction effect to examine the effects of supportive presence in the post-institutionalized and the post-foster children, showed that after controlling for Time 1 intellectual abilities supportive presence had a significant positive effect on fluid intelligence in the group of post-institutionalized children, $B = 6.73$, $t(80) = 3.11$, $p = .003$, but not in the group of post-foster children, $B = -0.45$, $t(80) = -0.17$, $p = .866$. This suggests that the post-institutionalized children showed a higher increase in intellectual functioning over time, but only if their mothers were more supportive (see Figure 2).

[1] We repeated the analyses controlling for Time 2 intellectual abilities (instead of Time 1 intellectual abilities). Results remained the same with the exception that the significant interaction between type of pre-adoption care and supportive presence in the prediction of fluid intelligence was no longer significant.

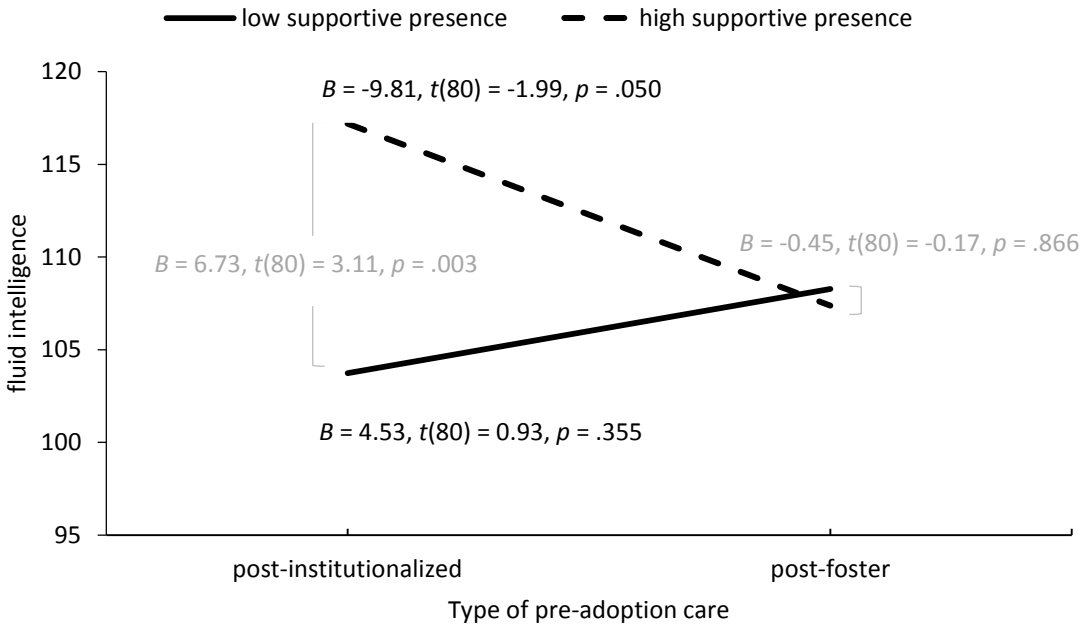


Figure 2. Interaction between type of pre-adoption care and supportive presence in the prediction of fluid intelligence after controlling for Time 1 intellectual abilities.

Second, there was a significant interaction between type of pre-adoption care and parental efficacy in the prediction of problem-solving efficiency. The total model accounted for 13% of the variance explained in problem-solving efficiency, R^2 = .13, F(3, 75) = 3.85, p = .013. The Johnson-Neyman analysis indicated that the post-institutionalized children had a better problem-solving efficiency than the post-foster children when mother scored lower than -0.60 on parental efficacy (24.05% of the participants), and that the post-institutionalized children were less efficient than the post-foster children when mother scored at least 1.02 on parental efficacy (17.72%). Further probing of the interaction effect, indicated that parental efficacy was associated with better problem-solving efficiency in the post-foster children, B = -7.19, t(75)= -2.90, p = .005, but was not related to problem-solving efficiency in the post-institutionalized children, B = 4.86, t(75)= 1.70 , p = .094. Thus, the post-foster children were more efficient in solving the TOL^{DX} when their mother reported higher parental efficacy than when their mother reported less parental efficacy (see Figure 3).

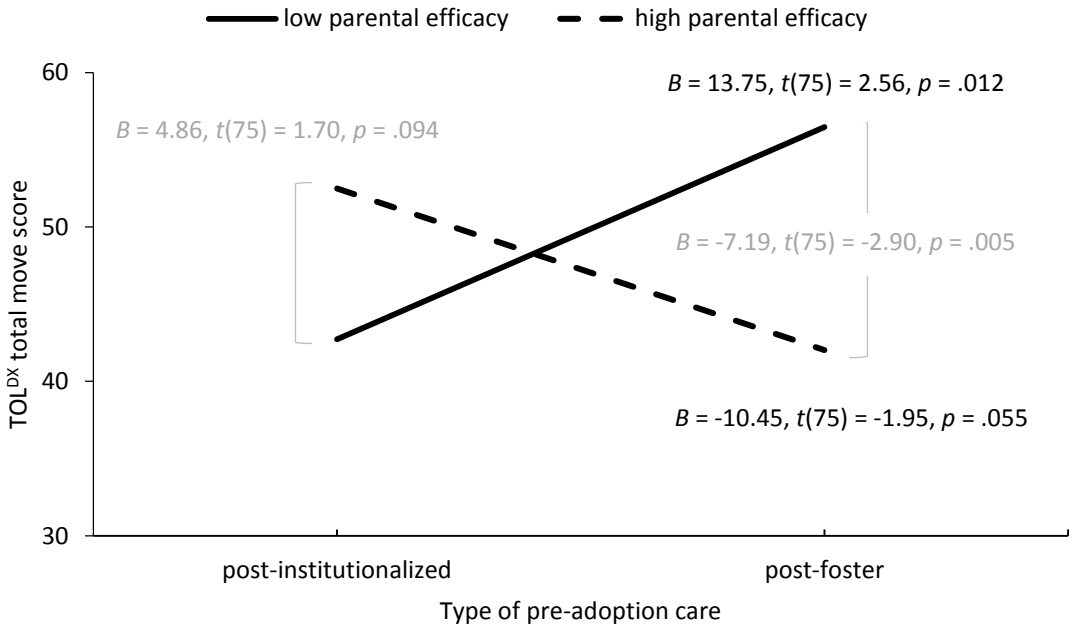


Figure 3. Interaction between type of pre-adoption care and parental efficacy in the prediction of problem-solving efficiency on the TOL^{DX} (TOL^{DX} total move score).

Third, there was a significant interaction between type of pre-adoption care and parental efficacy in the prediction of problem-solving speed. The total model accounted for 10% of variance explained in problem-solving speed, R^2 = .10, $F(3, 75) = 2.91$, p = .040. The Johnson-Neyman analysis revealed that the post-foster children had a faster problem-solving speed than the post-institutionalized children when mothers scored at least 0.22 on parental efficacy (35.44% of participants), but not when mothers scored below this threshold (see Figure 4). Further probing of the interaction effect showed that parental efficacy predicted slower problem-solving speed in the post-institutionalized children, B = 0.06, $t(75) = 2.30$, $p <$ .05, but not in the post-foster children, B = -0.02, $t(75)$ = -0.96, p = .340. Contrary to expectations, the post-institutionalized children needed more time to solve the TOL^{DX} when mothers reported higher parental efficacy than when mothers reported less parental efficacy.

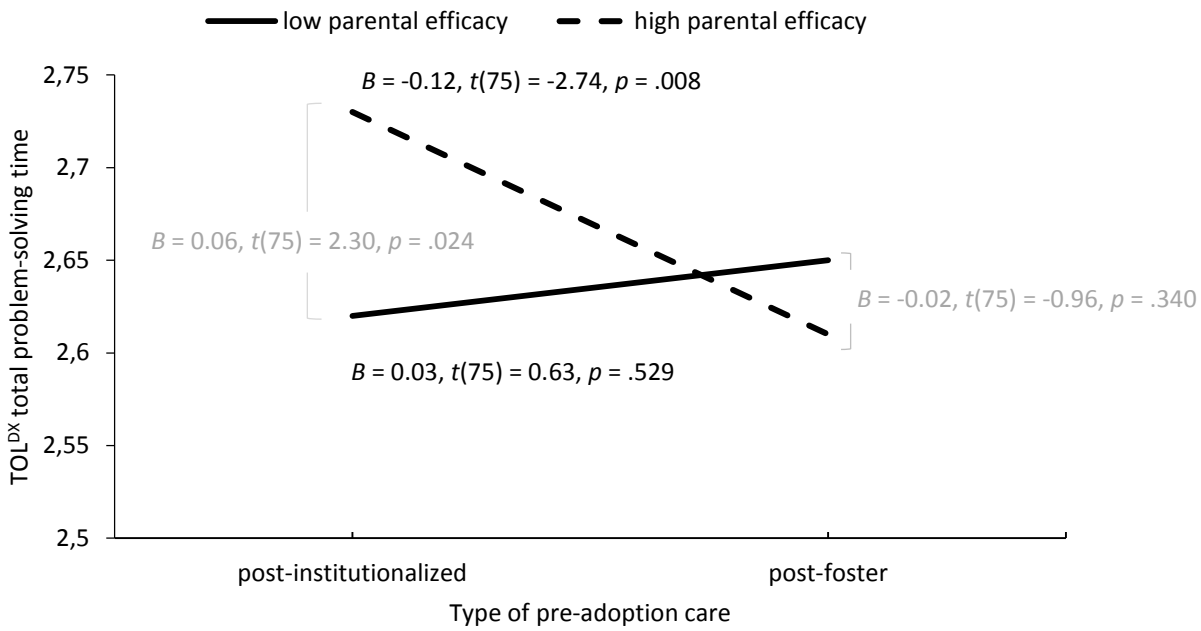


Figure 4. Interaction between type of pre-adoption care and parental efficacy in the prediction of problem-solving speed on the TOL^{DX} (TOL^{DX} problem-solving time).

3.4.2. Early deprivation x parenting effects

Moderation analyses revealed that there were no significant interactions between early deprivation and parenting in the prediction of the different domains of cognitive development, with two exceptions (see Table 4). First, the interaction between early deprivation and supportive presence in the prediction of problem-solving efficiency was significant, and second, the interaction between early deprivation and intrusiveness in the interaction of problem-solving speed was significant. However, because the total models of these two interactions were not significant (first interaction: R^2 = .07 , F(3, 80) = 2.00, p = .120; second interaction: R^2 = .06, F(3, 80) = 1.75, p = .163), we did not interpret these two interaction effects further.

Table 3

Interactions between type of pre-adoption care and the parenting factor scores in the prediction of cognitive functioning at age 10

	Supportive presence				Intrusiveness				Parental efficacy			
	F	*df*	*p*	*Δ* R^2	*F*	*df*	*p*	*Δ* R^2	*F*	*df*	*p*	*Δ* R^2
Crystallized intelligence	2.09	1, 80	.152	.03	0.85	1, 80	.358	.01	0.32	1, 74	.573	.00
Fluid intelligence	4.38	1, 80	.039*	.05	3.53	1, 80	.064	.04	0.01	1, 74	.933	.00
Math performance	0.29	1, 79	.595	.00	0.05	1, 79	.821	.00	1.86	1, 75	.177	.02
Reading comprehension	0.68	1, 79	.413	.01	0.09	1, 79	.764	.00	0.02	1, 75	.894	.00
TOL efficiency	2.36	1, 81	.129	.03	0.17	1, 81	.686	.00	10.09	1, 75	.002**	.12
TOL speed	2.35	1, 81	.129	.03	0.29	1, 81	.591	.00	5.60	1, 75	.021*	.07
Response inhibition[a]	2.73	1, 69	.103	.04	0.46	1, 69	.500	.01	0.17	1, 64	.684	.00
Effortful control	0.24	1, 81	.623	.00	0.82	1, 81	.368	.01	0.25	1, 76	.617	.00

Note. TOL efficiency = TOL^{DX} problem-solving efficiency (higher scores indicate higher move score). TOL speed = TOL^{DX} problem-solving speed (higher scores indicate higher problem-solving time).

[a] Participants who did not meet the criteria to compute response inhibition (SSRT) were excluded.

* $p < .05$. ** $p < .01$.

Table 4

Interactions between early deprivation (mean centered) and the parenting factor scores in the prediction of cognitive functioning at age 10

	Supportive presence				intrusiveness				Parental efficacy			
	F	*df*	*p*	*Δ* R^2	*F*	*df*	*p*	*Δ* R^2	*F*	*df*	*p*	*Δ* R^2
Crystallized intelligence	0.12	1, 79	.734	.00	0.04	1, 79	.851	.00	0.00	1, 73	.992	.00
Fluid intelligence	0.25	1, 79	.617	.00	1.45	1, 79	.232	.02	0.66	1, 73	.418	.01
Math performance	0.44	1, 78	.511	.01	0.01	1, 78	.938	.00	0.61	1, 74	.438	.01
Reading comprehension	0.01	1, 78	.917	.00	0.33	1, 78	.570	.00	0.25	1, 74	.617	.00
TOL efficiency	5.52	1, 80	.021*	.06	1.91	1, 79	.171	.02	3.35	1, 74	.071	.04
TOL speed	1.24	1, 80	.269	.02	4.23	1, 80	.043*	.05	2.40	1, 74	.126	.03
Response inhibition[a]	0.76	1, 69	.388	.01	1.46	1, 69	.231	.02	1.62	1, 64	.208	.02
Effortful control	0.27	1, 80	.61	.00	0.02	1, 80	.881	.00	0.20	1, 75	.655	.00

Note. TOL efficiency = TOL^{DX} problem-solving efficiency (higher scores indicate higher move score). TOL speed = TOL^{DX} problem-solving speed (higher scores indicate higher problem-solving time).

[a] Participants who did not meet the criteria to compute response inhibition (SSRT) were excluded.

** $p < .05$.*

4. Discussion

The current study is part of the longitudinal CAN study that started in infancy. We examined the cognitive functioning of 87 adopted Chinese girls at the age of 10, nine years after their adoption. We aimed (1) to investigate whether the adopted children showed complete catch-up in intellectual functioning and normative school achievement at age 10, (2) to investigate whether pre-adoption experiences (type of pre-adoption care and early derivation) were associated with the children's cognitive development, and (3) to investigate whether parental sensitivity and efficacy moderated the associations between pre-adoption experiences and cognitive development. We found that the adopted children showed complete catch-up in intellectual functioning and did at least as well at school as non-adopted children. Contrary to expectations and in contrast to the assessments in infancy, no significant differences in cognitive development were found between the post-institutionalized and the post-foster children. Similarly, early deprivation was not associated with the different domains of cognitive development. Furthermore, almost no evidence was found for significant interaction effects between pre-adoption experiences and adoptive parenting in the prediction of cognitive functioning. Out of all 48 interactions tested, only five interactions were significant of which two could not be further interpreted because the total model did not explain a significant proportion of variance in the outcome.

The finding that the adopted children showed complete catch-up in intellectual functioning is in line with the meta-analysis of Van IJzendoorn et al. (2005) on cognitive functioning of adopted children showing that adopted children display a remarkable, complete recovery in intellectual functioning. Moreover, on average the adopted children in our study were even found to have above-average IQ scores. Similar findings of above-average intellectual functioning among internationally adopted children, especially from Korea, have also been reported in several previous adoption studies (e.g., Frydman & Lynn, 1989; Stams, Juffer, Rispens, & Hoksbergen, 2000). Stams and colleagues (2000) suggested that this might point to high cognitive stimulation provided by adoptive families. An alternative explanation lies in the main reasons for child abandonment and in the related differences in prenatal experiences. Because the majority of Chinese children were adopted due to the Chinese birth planning policies and because many Korean adoptees were adopted because of the stigma associated with unwed motherhood in Korea, it is not unlikely they

have experienced less prenatal adversities such as prenatal alcohol or drug exposure than children adopted from other countries, for example, Eastern European countries (e.g., Landgren, Svensson, Strömland, & Andersson Grönlund, 2010). However, when interpreting the favorable intellectual functioning, it is important to keep two points in mind. First, due to time constraints we only administered a short intelligence battery consisting of two subtests that tap into fluid intelligence and two subtest that tap into crystallized intelligence. Although these two broad cognitive abilities have high loadings on general intelligence, other broad cognitive abilities (e.g. visual information processing, processing speed) should be measured as well to ensure a valid and thorough assessment of intellectual functioning and to be able to estimate a total IQ score. Second, the Flynn effect (i.e., the general increase in performance on intelligence tests over generations resulting in norm obsolescence; Flynn, 1987; Trahan, Stuebing, Hiscock, & Fletcher, 2014) might have overestimated the IQ scores of the children to some extent, because the norms of the WISC-III-NL has not been updated since 2000 and the norms of the SON-R 6-40 not since 2010. It has been estimated that there is an average yearly increase in crystallized intelligence of 0.21 IQ points and in fluid intelligence of 0.41 IQ points (Pietschnig & Voracek, 2015). However, even when controlling for the Flynn effect, the adopted children still scored above average on the tests.

Moreover, the adopted children showed normative school performance in mathematics and better school performance in reading comprehension than the general population. One the hand, this contradicts the meta-analyses of Van IJzendoorn and Juffer (2005) in which it was found that adopted children, despite their complete catch-up in intellectual functioning, performed somewhat less well at school than non-adopted children. This contrasting finding may be explained by the fact that in the meta-analyses no studies on Chinese adopted children were included. Indeed, some previous adoption studies with Chinese adopted children have shown that these children do as well at school as non-adopted children (e.g., Dalen & Rygvold, 2006).

Another remarkable finding is that the differential effects of type of pre-adoption care on intellectual functioning that were found in the first months after adoption (Van den Dries et al., 2010) had disappeared nine years after adoption. There were no significant differences between the post-institutionalized and the post-foster children in their performance on the intelligence tests, nor in the other domains of cognitive development. Similarly, the extent of early deprivation was not associated with any of the domains of cognitive development. A

possible explanation is that the initial differential effects of type of pre-adoption care may have disappeared because of a ceiling effect, as both the post-institutionalized and the post-foster children seemed to have reached their full intellectual potential at Time 3 (i.e., both groups had above-average IQ scores).

These findings might indicate that the adoptive family had a protective effect on the children's cognitive functioning. However, contrary to theory and evidence on the link between parenting and cognitive functioning in non-adopted children (e.g., Eisenberg et al., 2005; Fay-Stammbach et al., 2014; Mackintosh, 1998; Spera, 2005), the correlation analyses revealed that there were only two significant associations between adoptive parenting and cognitive functioning. Higher supportive presence was associated with higher fluid intelligence, and higher parental efficacy was associated with better reading comprehension. The relative lack of significant associations between our parenting measures and cognitive development does not necessarily imply that parenting did not matter for the adopted children's cognitive development, as it might be that other parenting behaviors that were not included in the current analyses - such as autonomy supportive (Bernier et al., 2010) and cognitive stimulating parenting (Fay-Stammbach et al., 2014) - impacted cognitive development. Besides, it is also possible that almost no direct effects of parenting were found because, as children get older, the effects of environmental influences on cognitive functioning decreases, wheras the influence of genetic factors increases (Bouchard, 2013).

These two explanations may also explain why we found little evidence for our hypothesis concerning the buffering effect of parenting in the associaton between pre-adoption experiences and cognitive functioning. Contrary to our expectations based on risk and resilience theories, moderation analyses revealed that none of the interactions between pre-adoption experiences and adoptive parenting were significantly associated with crystallized intelligence, with response inhibition, effortful control, math performance or with reading comprehension. In the prediction of the other outcome variables (fluid intelligence, problem-solving efficiency, and problem-solving speed), again all but five interactions were non-significant.

Two of the five interactions could not be interpreted because the total model did not explain a significant proportion of variance in the outcome measure. The other three significant interactions could not be interpreted straightforwardly. The interaction between type of pre-adoption care and supportive presence in the prediction of fluid intelligence was

to some extent in line with our expectations. This interaction suggested that maternal supportive presence buffered against the effects of pre-adoption institutional care on fluid intelligence. More specifically, maternal supportive presence was associated with larger change (increase) in intellectual functioning from Time 1 to Time 3 among the post-institutionalized children, but not among the post-foster children. The post-institutionalized children even even seemed to show a larger increase in intellectual functioning over time than the post-foster children when mothers scored relatively high on supportive presence. Because the post-institutionalized children had lower intellectual abilities than the post-foster children in the first months after adoption (Van den Dries et al., 2010), this finding may indicate that supportive presence facilitated recovery in intellectual abilities among the post-institutionalized children. However, this interaction should be interpreted with caution because the proportion of explained variance in the outcome variables was rather low (5%), and because this effect may be due to chance as it was no longer significant after adjusting the significance level using the Bonferroni correction for multiple testing.

The other two significant interaction effects, namely the interaction between type of pre-adoption care and parental efficacy in the prediction of problem-solving efficiency and problem-solving speed, were not in line with our hypotheses. These two interactions suggested that whereas parental efficacy seemed to act as protective factor for the post-foster children, it did not act as a protective factor or even rather as a risk factor for the post-institutionalized children. Higher parental efficacy was related to better problem-solving efficiency in the post-foster children, and to slower problem-solving speed in the post-institutionalized children. Moreover, when mothers reported relatively high levels of parental efficacy, the post-foster children were more efficient and faster in solving the TOL^{DX} than the post-institutionalized children. When mothers reported lower levels of parental efficacy, the post-foster children had worse problem-solving efficiency than the post-institutionalized children and the significant differences between the two groups on problem-solving speed turned non-significant. We have no compelling explanations for these two interactions. One speculative explanation is that slower problem-solving speed not necessarily reflects worse performance, but indicates that the post-institutionalized children of whom mothers felt more efficacious, more felt at ease to take their time to solve the task. Nevertheless, the two interaction effects were no longer significant after controlling for multiple testing and thus may reflect Type I error.

As an aside, it is interesting to note that although, as far as we know, the current study was the first to investigate the buffering effect of parental sensitivity and efficacy, Whitten and Weaver (2010) have investigated the buffering role of parent-child relationship quality. Specifically, Whitten and Weaver examined whether parent-child relationship quality buffered the association between pre-adoption abuse and school performance in adopted adolescents. Similarly to our findings, however, Whitten and Weaver did not find support for the buffering hypothesis. The current study adds to the study of Whitten and Weaver because we assessed multiple domains of cognitive development and because we did not only rely on parent-report in the assessment of our variables. Nonetheless, we also found little evidence for the buffering effect of parenting. Although more research on the buffering effect of parenting is needed, future studies should also attempt to examine other family-related or child-related factors that may explain variability in adopted children's cognitive development.

4.1. Limitations

Some limitations should be taken into account when interpreting the findings of this study. First, our study had a relatively small sample size which might have reduced the power to detect significant interaction effects. Furthermore, the sample size was somewhat further reduced because we handled missing data using listwise deletion instead of imputing the missing data. Despite this, we consider it a strength of our study that drop-out over the course of the study was relatively low with 94.6% of families still participating at Time 3. Second, information on children's pre-adoption experiences was obtained through parent-report. This information may be unreliable because parents often receive only limited and sometimes inaccurate information about their child's pre-adoption experiences (Juffer et al., 2011). Unreliable information about children's pre-adoption experiences might have obscured potential effects of pre-adoption experiences and might have made it more difficult to find potential buffering effects of adoptive parenting. Despite this, we consider it a strength of our study that we obtained some information about children's pre-adoption experiences, because this information is often lacking in international adoption studies. Third, although a strength of our study is that we assessed different indicators of cognitive functioning, we only included two broad cognitive abilities in our assessment of intellectual functioning, and only two components of executive functioning. Because different cognitive abilities and different components of executive functioning may be differentially affected by adverse experiences

and parenting, we do not know whether the findings of our study can be generalized to other aspects of intellectual and executive functioning. For future research it may be interesting to include a broader range of cognitive abilities and executive functions.

4.2. Conclusion

Our study adds to the adoption literature by examining a possible buffering effect of parental sensitivity and parental efficacy in the association between pre-adoption experiences and cognitive functioning. Results indicated that although the children in our study who were adopted from institutional care or foster care in China struggled with developmental delays in infancy, they showed above-average intellectual functioning and did not lag behind in school achievement at the age of 10 years. This points to their resilience to recover from early adversity. Furthermore, we found that the type of care that children received prior to adoption and the extent of early deprivation they had been exposed to was not related to intellectual functioning, school achievement, or self-regulation (executive functioning and effortful control) at the age of 10. It is conceivable that, contrary to the assessments in infancy, type of pre-adoption care was no longer associated with intellectual functioning, because the post-institutionalized and the post-foster children had reached their full cognitive potential (ceiling effect). The finding that type of pre-adoption care and early deprivation were not associated with the assessed domains of cognitive development at age 10 is a noteworthy finding given the importance of cognitive functioning, especially of self-regulation, for future success and wellbeing in life (e.g., Moffitt, Poulton, & Caspi, 2013). Finally, with a few exceptions, we found no interactions between pre-adoption experiences and parental sensitivity or parental efficacy in the prediction of the assessed domains of cognitive development. For future research it may be important to examine which other factors are predictive of adopted children's cognitive catch-up.

Appendix

Table A1

Descriptives of the SST variables

	p(acc|ns)	p(miss|ns)	p(resp|ss)	nsrt	SSD	SSRT	srrt
M	.97	.02	.47	650.16	359.67	258.39	565.33
SD	.03	.02	.05	104.62	131.50	68.07	89.06

Note. participants who did not meet the criteria to compute SSRT were excluded.

p(acc|ns) = probability of responding on the no-signal trials. p(miss|ns) = probability of missing a response on the no-signal trials. p(resp|ss) = probability of responding on the stop-signal trials. nsrt = no-signal reaction time; SSD = stop-signal delay. SSRT = stop-signal reaction time (response inhibition). srrt = signal respond reaction time.

CHAPTER 4
Behavioral Adjustment Of Chinese Adoptees: The Role Of Pre-Adoption Experiences

This chapter has been published as:

Finet, C., Vermeer, H. J., Juffer, F., & Bosmans, G. (2018). Behavioral adjustment of Chinese adoptees: The role of pre-adoption experiences. *Children and Youth Services Review*, *86*, 226–235. https://doi.org/10.1016/j.childyouth.2018.01.029

Abstract

Purpose: In the current study we examined associations between children's pre-adoption experiences (type of pre-adoption care and early deprivation) and their adaptive and maladaptive behavioral adjustment. Associations with prosocial behavior, attention problems, internalizing and externalizing behavioral problems were investigated.

Methods: Parental ratings of pre-adoption experiences and behavioral adjustment of 891 adopted Chinese girls aged between 4 and 12 year were obtained. The children were adopted from institutional care (*n* = 595), foster care (*n* = 66) or a combination of institutional and foster care (*n* = 228). Prosocial behavior was assessed using the Strengths and Difficulties Questionnaire (SDQ). Attention problems, internalizing and externalizing behavioral problems were assessed using the Child Behavior Checklist for ages 4-18 (CBCL). In addition to the main effects of pre-adoption experiences, we tested interaction effects between pre-adoption experiences and age at adoption, controlling for several family and child background variables.

Results: Hierarchical regression analyses revealed that type of pre-adoption care was not associated with behavioral adjustment. Early deprivation, on the other hand, was negatively associated with prosocial behavior, and positively associated with attention problems, internalizing and externalizing problems. Interaction analyses revealed no significant associations.

Conclusions: The results showed that pre-adoption deprivation increased the risk for less optimal behavioral adjustment. The effects however were small, leaving room for other explaining factors both in the pre- and post-adoption environment of the child.

Keywords. international adoption, institutional care, foster care, early deprivation, prosocial behavior, behavioral problems

1. Introduction

Each year, many children who cannot be raised by their birthparents and for whom no substitute family in their birth countries can be found, are adopted internationally (Selman, 2009). Adopted children not only have to cope with loss of or separation from their birth parents – which is one of the most potent stressors in early life (Loman & Gunnar, 2010) - but are also exposed to other early adverse experiences, such as institutionalization, lack of opportunities to develop secure attachment relationships, malnutrition, or even neglect and abuse. These depriving experiences may put adopted children at increased risk for less optimal behavioral adjustment (Loman & Gunnar, 2010) such as more internalizing and externalizing problems (Juffer & Van IJzendoorn, 2005), and more attention problems (Hoksbergen, Rijk, Van Dijkum, & Ter Laak, 2004; MacLean, 2003; Merz & McCall, 2010; Rosnati, Montirosso, & Barni, 2008; Stevens et al., 2008). However, differences in behavioral problems between adopted and non-adopted children are small (Juffer & Van IJzendoorn, 2005) and some studies even found that adopted children score higher than non-adopted children on indicators of adaptive behavioral adjustment such as prosocial behavior (Reinoso & Forns, 2010; Sharma, McGue, & Benson, 1996; Stams, Juffer, Rispens, & Hoksbergen, 2000). This suggests that the drastic improvement in rearing environment after adoption buffers against the negative effects of early depriving experiences. Thus, adoption can be seen as a positive intervention in the life of children who cannot be raised by their biological parents (Van IJzendoorn & Juffer, 2006). Nevertheless, some children show increased rates of behavioral problems (Bimmel, Juffer, van IJzendoorn, & Bakermans-kranenburg, 2003; Juffer & Van IJzendoorn, 2005), suggesting important individual differences in adjustment after adoption. This raises the question why some adopted children are better adjusted than others (Palacios & Brodzinsky, 2010).

The goal of the current study is to examine whether pre-adoption experiences are associated with individual differences in both adaptive behavioral adjustment – expressed by prosocial behavior - as well as maladaptive behavioral adjustment – expressed by attention problems, internalizing and externalizing problems. We used two indicators to assess children's pre-adoption experiences, namely type of pre-adoption care and early deprivation. The associations of type of pre-adoption care and early deprivation with behavioral adjustment are examined in a sample of children who were adopted from China to the

Netherlands. Studying these associations in a sample of adopted Chinese children is important, especially because China has been the main birth country of international adoptees since 1998 (Selman, 2010). Furthermore because one of the main causes of child abandonment in China were the strictly enforced birth planning policies, many Chinese adoptees - contrary to children adopted from some other countries - have not experienced serious prenatal adversity such as prenatal alcohol exposure (Johnson, 2004; Miller & Hendrie, 2000), reducing the risk that the effects of pre-adoption deprivation are confounded by prenatal adversity. Moreover, contrary to many countries where abandoned or orphaned children live in institutions before adoption, a minority of Chinese adoptees have lived in pre-adoption foster care instead of institutional care (Johnson, 2004). This allows examining the effects of these different types of pre-adoption care on later behavioral adjustment.

1.1. Type of pre-adoption care

Individual differences in adopted children's adjustment may be partly explained by different types of pre-adoption care, namely institutional care versus foster care. Many institutions fail to provide children with adequate care and opportunities to form personal relationships with stable caregivers (Van IJzendoorn et al., 2011). Instead, foster care resembles normal family life and is often believed to be less detrimental for children's adjustment. Research indeed provides support for the hypothesized beneficial effects of foster care compared to institutional care. For example, the Bucharest Early Intervention Project (BEIP; Zeanah et al., 2003) - a randomized controlled trial in which institutionalized children were randomly assigned to foster care versus continued institutional care (care as usual) - has shown that the children in foster care showed fewer internalizing problems at age 54 months (Zeanah et al., 2009) and fewer externalizing problems at age 12 years (Humphreys et al., 2015) than the children in institutional care. Associations with adaptive behavioral adjustment were not investigated. Although an important strength of the BEIP study is that differences between the foster care children and the institutionalized children were not confounded by selection bias, the BEIP study did not study whether institutional versus foster care differentially affects the development of *adopted* children. As far as we know, until now, only a few studies have investigated whether pre-adoptive institutional care and pre-adoptive foster care are differentially associated with behavioral adjustment once children are adopted. Moreover, to the best of our knowledge this has mainly been investigated with

respect to maladaptive behavioral adjustment, and never with respect to adaptive behavioral adjustment.

Concerning maladaptive behavioral adjustment, Rutter and colleagues suggest - based on their findings of the English and Romanian Adoptees study in which post-institutionalized Romanian adoptees were compared with within-UK adoptees - that a history of institutional care is associated with, among other things, inattention/overactivity, but not with internalizing and externalizing problems (Kreppner, O'Connor, & Rutter, 2001; Rutter et al., 2009; Rutter, Kreppner, & O'Connor, 2001). Although research findings were mixed, some pertinent studies have provided support for the argument of Rutter and colleagues (e.g., Gunnar & van Dulmen, 2007; Wiik et al., 2011). However, the design of those studies had some limitations that may affect the interpretation of the results. First, age at adoption differed between the post-institutionalized and the post-foster children, with the post-institutionalized children being older at the time of adoption. Second, type of pre-adoption care overlapped with differences in country of origin. The majority of the post-institutionalized children were adopted from Eastern European countries (mainly Romania), whereas the majority of the post-foster children were adopted from Asian countries. Consequently, effects of type of pre-adoption care might have been overestimated due to these two confounding factors. Third, the children in the post-foster group had not exclusively lived in foster care prior to adoption but also had experienced a short period of institutional care. As such, possible group differences in internalizing and externalizing problems might have been attenuated because both the post-institutionalized and the post-foster children had experienced institutional care to some extent.

The current study tried to overcome these limitations by investigating the associations between type of pre-adoption care and behavioral adjustment in a sample of children who were adopted from the same country (China) and for whom the average age at adoption did not differ between the different types of pre-adoption care. Moreover, in addition to a subsample of post-institutionalized children and a subsample of children who experienced a combination of foster care and institutional care, we included a subsample of children who exclusively experienced foster care.

1.2. Early deprivation

The quality of pre-adoption care may also be related to heterogeneity in adopted children's behavioral adjustment. Depriving experiences in pre-adoption institutional care and foster care may increase the risk for behavioral difficulties (Loman & Gunnar, 2010). Because often no information about children's early experiences is available, studies sometimes use age at adoption as a proxy for early deprivation (Tan, Marfo, & Dedrick, 2010). Studies in which information about pre-adoption experiences is available, incorporate different indicators such as malnutrition, neglect, abuse, or symptoms that may be suggestive of adverse pre-adoption conditions. In general, these studies confirm the detrimental effects of early deprivation on behavioral difficulties (Nickman et al., 2005). Adopted children who experienced more pre-adoptive deprivation scored higher on externalizing problems (Juffer & Van IJzendoorn, 2005; Tan & Marfo, 2006; Van Der Vegt, Van Der Ende, Ferdinand, Verhulst, & Tiemeier, 2009), on internalizing problems (Tan & Marfo, 2006; Van Der Vegt et al., 2009), and on attention problems (Audet & Le Mare, 2010; Roskam et al., 2014; Simmel, Brooks, Barth, & Hinshaw, 2001; Tan, 2009). Less is known about the impact of early deprivation on adaptive behavioral adjustment (but see Kriebel & Wentzel, 2011; Tan, 2006).

1.3. The current study

The current study examined associations between children's pre-adoption experiences - as indicated by type of pre-adoption care and early deprivation - and adaptive and maladaptive behavioral adjustment in girls adopted from China to the Netherlands. To assess early deprivation, we took into account pre-adoption sub-nutrition, social-emotional neglect, physical neglect, maltreatment and presence of health problems at the time of adoption. Age at adoption was added as a control variable in our analyses to examine whether pre-adoption experiences were related to behavioral adjustment over and above the effect of age at adoption. In addition, we controlled for two other child background variables - special needs (Rosenthal & Groze, 1991) and age at study (Juffer & Van IJzendoorn, 2005; Tan et al., 2010; Verhulst, 2000) – and for two family background variables – education (as indicator of SES) (Kalff et al., 2001; Nadeem et al., 2017), and presence of non-adopted children in the family (Howe, 1997) - that have been found to be associated with behavioral problems. Finally, because the effects of adverse pre-adoption experiences may become stronger when children

are older at the time of adoption, we tested whether age at adoption moderated the association between children's pre-adoption experiences and behavioral adjustment.

We hypothesized that (a) children adopted from institutional care would display less prosocial behavior, more attention problems, and more externalizing and internalizing problem behavior than children adopted from foster care, and that the association between type of pre-adoption care and behavioral adjustment would be stronger for children who were adopted at an older age. Furthermore, we hypothesized that (b) children who have experienced more early deprivation would display less prosocial behavior, more attention problems, and more externalizing and internalizing problems than children who have experienced less early deprivation, and that this association would be stronger for children who were adopted at an older age .

2. Method

2.1. Participants and procedure

The sample for this study was a subsample from a parent-report questionnaire study on the development of children adopted from China to the Netherlands (see Juffer & Tieman, 2009). The total sample of the broader study consisted of 1233 children. The families were recruited through all adoption organizations mediating adoption from China to the Netherlands (Meiling, Kind en Toekomst, and Wereldkinderen). The adoption agencies sent a questionnaire to all families with Chinese adopted children who were between 4 and 16 years old at the time of the study. The response rate was 55.4%. The study was conducted according to the ethical guidelines of the Centre for Child and Family Studies. Parents who agreed to participate gave their informed consent.

Because most adopted children from China were female (92% in this study) and because of our specific interest in early and middle childhood – which is a vulnerable stage for the development of behavioral problems in adopted children (Juffer & Van IJzendoorn, 2005; Tan, 2011) - we only included girls in the primary school age (aged 4 to 12). If parents filled out the questionnaire for more than one daughter, only the oldest girl was included in the analyses to avoid nesting effects. This resulted in a final sample of 891 Chinese girls who were adopted at a mean age of 17.30 months (*SD* = 11.00; range: 3-62 months) and were on average

87.27 months old (*SD* = 23.73; range: 48-143 months) at the time of the study. After adoption, none of the girls had experienced out of home placement.

2.2. Measures

2.2.1. Family and child background information

Parents (94% adoptive mothers) provided information about family background variables, namely parental education and family composition. Parents reported their highest level of education on a scale from 1 (*primary education*) to 5 (*university*). Responses were dichotomized to distinguish between parents with low/ middle (56%) versus high education (44%, see Table 2). The category low/middle did not include the lowest educational level (primary education), because this category did not exist in this sample. Families were classified in one of two types of families: adoptive family, including only adopted children (80%) versus mixed family, including adopted and birth children (20%). Parents also provided background information about their child, including age at adoption and age at the time of the study. In addition, parents reported whether or not their child had special needs (medical problems such as cleft palate and physical disabilities) at the time of adoption ("Did your child have any special needs at the time of adoption?"). Responses on this yes/no question were used to classify the children in the 'no special needs' (90%) or the 'special needs' category (10%).

2.2.2. Type of pre-adoption care

Parents reported whether their child had lived in institutional care or foster care in China before adoption. In addition, parents provided information about the rearing background (unknown, birth family, maternity hospital, hospital, children's home, other institution, foster family, or other) of their child during different periods of their child's life before adoption. Based on this information children were classified in one of three types of pre-adoption care categories: (1) institutional care (*n* = 593; 67%), (2) foster care (*n* = 66; 7%), and (3) a combination of institutional and foster care (mixed care, *n* = 228; 26%). Two parents did not know whether their child had received institutional care or foster care, and from two children all information about their pre-adoption living arrangement was missing. Type of pre-adoption care for these four children was imputed using multiple imputation (see Section 2.3. Data analysis).

The post-institutionalized children had on average lived for 15.03 months (*SD* = 8.81, range 1-56) in institutional care and the post-foster children had on average lived during 16.19 months (*SD* = 11.89, range 1-62) in foster care. The children in the mixed care group had on average lived for 8.53 months (*SD* = 8.98, range 1-54) in institutional care and during 10.60 months (*SD* = 7.52, range 1-37) in foster care. It is important to note that 70 (12%) post-institutionalized children had lived in their birth family for a short period. In contrast to the other post-institutionalized children, these 70 children did not experience institutional care exclusively prior to adoption. In addition, 4 (6%) children in the post-foster group and 22 (10%) children in the mixed care group also had lived in their birth family for a short period before the start of the foster/mixed care experiences. To control for this variation, all analyses were repeated excluding all children who had lived with their birth family. Results of these extra analyses were similar to the analyses in which these children were included. Therefore, we only report the results of the analyses in which all children were included.

2.2.3. Early deprivation

Parents indicated on a three-point scale to what extent (not, somewhat, a lot) their child had experienced each of the following adversities prior to adoption: sub-nutrition, social-emotional neglect, physical neglect, and maltreatment (see Appendix A). The three-point response scales were transformed into dichotomous scales. For each adversity a score of 0 was assigned if parents indicated that their child did not experience the adversity, and a score of 1 was assigned for the presence (somewhat, a lot) of each adversity (sub-nutrition: 32%, social-emotional neglect: 42%, physical neglect: 30%, maltreatment: 5%). In addition, parents indicated whether their child had good general health, unexpected mild health problems, unexpected severe health problems, or expected health problems at arrival. Responses on this question were also dichotomized. A score of 0 was assigned if parents reported that their child had good general health at arrival, and a score of 1 was assigned if parents indicated that their child had health problems (unexpected mild, unexpected severe or expected health problems) at arrival (24%). Responses on the four dichotomized questions about early adversities and on the dichotomized question about health condition at arrival were summed to get an indication of early deprivation (range 0-5). Higher scores indicated a higher number of early depriving experiences. Correlations between the different indicators of early deprivation are presented in Table 1. The internal consistency (Cronbach's alpha) of early deprivation was .68.

Table 1

Pearson bivariate correlations between the five early deprivation indicators before (under diagonal) and after (above diagonal) multiple imputation

	1.	2.	3.	4.	5.
1. sub-nutrition[a]	-	.40***	.42***	.30***	.31***
2.social-emotional neglect[a]	.41***	-	.56***	.28***	.24***
3. physical neglect[a]	.42***	.59***	-	.33***	.19***
4. maltreatment[a]	.24***	.24**	.26**	-	.09
5.health problems arrival[a]	.32***	26***	.21***	.07*	-

Note. [a] 0 = no, 1 = yes.

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

2.2.4. Prosocial behavior

To assess adaptive behavioral adjustment parents completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997; Van Widenfelt, Goedhart, Treffers, & Goodman, 2003). The SDQ consists of 25 items and can be used to assess behavioral adjustment of children aged 3 to 16 years. Items are rated on a three-point scale ranging from 0 (*not true*) to 2 (*certainly true*). For the current study, we only used the prosocial behavior subscale (5 items; Cronbach's alpha = .70). The difficulties subscales of the SDQ were not included because the Child Behavior Checklist (CBCL) was administered to assess maladaptive behavioral adjustment (see below), and the SDQ difficulties subscales and CBCL subscales were highly correlated (SDQ emotional symptoms and CBCL internalizing problems: $r = .71$, $p < .001$; SDQ conduct problems and CBCL externalizing problems: $r = .65$, $p < .001$; SDQ hyperactivity/inattention and CBCL attention problems: $r = .68$, $p < .001$). Because the prosocial behavior scores were negatively skewed, the scores were reversed (i.e., each score was subtracted from the maximum score) and log10 transformed. As a consequence, the interpretation of the transformed prosocial behavior scores is reversed, which means that higher scores indicate less prosocial behavior. The transformed scores of prosocial behavior ranged from 0 to 1.00 ($M = 0.36$, $SD = 0.29$).

2.2.5. Problem behavior

The Child Behavior Checklist for ages 4-18 (CBCL; Achenbach & Rescorla, 2001; Verhulst, Van Der Ende, & Koot, 1996) was completed by the parents. The CBCL consists of

113 items on child behavioral problems that are rated on a three-point scale ranging from 0 (*not true*) to 2 (*very true or often true*). For the present study, the two broadband syndrome scales – internalizing problems (anxious/depressed, withdrawn/depressed, and somatic complaints) and externalizing problems (rule-breaking behavior and aggressive behavior) – were used. In addition we included one narrowband subscale, attention problems, because research has shown that attention problems are one of the symptoms that are specifically associated with institutional deprivation (e.g., Rutter et al., 2009, 2001). The internal consistencies of attention problems, internalizing, and externalizing problems were .74, .84, and .87, respectively. The raw scores were not transformed to T scores (standardized scores), because for the narrowband subscales the use of raw scores in statistical analyses is recommended (Verhulst et al., 1996). However, because the raw internalizing, externalizing and attention problem scores were positively skewed, they were log10 transformed. The transformed scores ranged from 0 to 1.26 (M = 0.40, SD = 0.32) for attention problems, from 0 to 1.62 (M = 0.65, SD = 0.36) for internalizing problems, and from 0 to 1.56 (M = 0.63, SD = 0.38) for externalizing problems.

2.3. Data analysis

Eight hierarchical multiple regression analyses were performed to investigate our two research questions concerning the associations between (1) type of pre-adoption care and (2) early deprivation on the one hand, and the four outcome measures (prosocial behavior, attention problems, internalizing problems, and externalizing problems) on the other hand. In each analysis, the variables were entered in three steps. First, family and child background variables were entered. In the second step, type of pre-adoption care was added in the analyses for the first research question and early deprivation in the analyses for the second research question. In the third step, the interaction between age at adoption and type of pre-adoption care was added for research question 1 and between age at adoption and early deprivation for research question 2. To increase interpretability of findings and to prevent multicollinearity, all continuous independent variables (age at study, age at adoption, and early deprivation) were mean centered. For all categorical variables (education, type of family, special needs, and type of pre-adoption care) dummy variables were computed. Missing data – ranging between 0.1% for special needs and for prosocial behavior and 14.6% for early deprivation – were multiply imputed (10 times) using predictive mean matching imputation

(maximum 100 iterations). See Appendix B for an overview of the variables that were used in the imputation model. The ten imputed datasets were used in the hierarchical regression analyses and results were pooled over the imputed datasets using the SPSS Macro of Van Ginkel (van Ginkel, 2010a, 2010b). Although no consensus exists yet about the best way to compute pooled R^2 and to compute the pooled standardized regression coefficients after multiple imputation, in line with the suggestion of Van Ginkel (2017) pooled R^2 was computed by averaging R^2 across the ten imputed datasets. To obtain the pooled standardized regression coefficients, analyses were repeated using the standardized values for our model variables. Because different caregivers (e.g., mothers and fathers) may differ in their perception of children's behavioral adjustment (e.g., Rosnati et al., 2008), analyses were repeated only including the children whose adoptive mother had completed the questionnaire (n = 834, 94%) and excluding the children for whom the questionnaire was completed by another informant than the adoptive mother (53 adoptive fathers, 2 adoptive stepmothers, 1 adoptive stepfather, 1 missing). Results of these analyses were similar to the results of the analyses in which all children were included and therefore only the latter are reported.

3. Results

3.1. Descriptive statistics

Descriptive statistics are summarized in Table 2. Children in the three types of pre-adoption care groups differed significantly with respect to the extent of early deprivation they had experienced, $F(2, 756) = 23.51$, $p < .001$. Children in the institutional care group had experienced the highest level of early deprivation and children in the foster care group the lowest level. Children in the mixed care group fell in between. Furthermore, there was a significant group difference between the three types of pre-adoption care groups on parental education, $\chi^2(2) = 6.13$, $p < .05$. Children in the mixed care group more often had parents with a high education compared to children in the institutional care group. The groups did not differ significantly on the other background variables. Bivariate correlations between the variables prior and after imputation are shown in Table 3. Correlations between the independent variables were low, suggesting that there was no multicollinearity.

A comparison of the mean attention problem scores (M = 2.30, SD = 2.68), mean internalizing (M = 5.16, SD = 5.38) and mean externalizing (M = 5.17, SD = 5.37) problem scores

of the children in our sample with the mean attention problems (M = 2.45, SD = 2.46), mean internalizing (*M* = 5.16, *SD* = 5.02) and mean externalizing (*M* = 6.04, *SD* = 5.57) problems of the norm group of 4- to 11-year-old girls in the Netherlands (Verhulst et al., 1996), revealed that the children in our sample had similar rates of attention problems ($t(883) = -1.63$, $p = .103$) and internalizing problems ($t(868) = 0.00$, $p = 1.00$) and had significantly fewer externalizing problems ($t(881) = -4.82$, $p < .001$). Furthermore, it was found that 94.1% (*N* = 832) of the children scored in the normal range for attention problems, 3.2% (*N* = 28) in the subclinical range, and 2.7% (*N* = 24) in the clinical range. For internalizing problems 81% (*N* = 704) of the children were in the normal range, 8.4% (*N* = 73) in the subclinical range and 10.6% (*N* = 92) in the clinical range. For externalizing problems 87.2% (*N* = 769) were in the normal range, 5.6% (*N* = 49) in the subclinical range, and 7.3% (*N* = 64) in the clinical range.

Table 2

Descriptives of model variables (prior to transformation and prior to multiple imputation of missing data)

	Type of pre-adoption care											
	Institutional care (*N* = 593, 67%)			Foster care (*N* = 66, 7%)			Mixed care (*N* = 228, 26%)			Total (N = 891)		
	N	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
Age at adoption	593	16.92[a]	10.45	66	17.76[a]	12.46	228	18.13[a]	11.95	891	17.30	11.00
Age at study	544	86.46[a]	23.90	65	89.58[a]	21.32	215	88.57[a]	24.04	827	87.27	23.73
Early deprivation	510	1.44[a]	1.42	56	0.39[b]	0.76	193	0.89[c]	1.23	761	1.22	1.37
Prosocial behavior	593	8.13[a]	1.86	66	8.17[a]	1.83	227	8.19[a]	1.94	890	8.15	1.87
Attention problems	588	2.38[a]	2.75	65	1.72[a]	2.01	227	2.30[a]	2.66	884	2.30	2.68
Internalizing problems	575	5.20[a]	5.47	65	5.77[a]	4.91	225	4.94[a]	5.30	869	5.16	5.38
Externalizing problems	586	5.21[a]	5.44	65	4.54[a]	4.02	227	5.27[a]	5.54	882	5.17	5.37
	N	%		*N*	%		*N*	%		*N*	%	
Education												
Low/middle	344	59[a]		37	56[ab]		111	49[b]		495	56	
High	244	41[a]		29	44[ab]		116	51[b]		390	44	
Type of family												
Adoptive family	464	79[a]		58	88[a]		185	81[a]		711	80	
Mixed family	126	21[a]		8	12[a]		43	19[a]		177	20	
Special needs												
No	524	89[a]		61	92[a]		210	92[a]		799	90	
Yes	68	11[a]		5	8[a]		18	8[a]		91	10	

Note. Means and percentages with different letters differ significantly from each other at $p < .05$.

Table 3

Pearson bivariate correlations between model variables before (under diagonal) and after (above diagonal) multiple imputation

	1	**2**	**3**	4	**5**	**6**	**7**	**8**	**9**	**10**
1. Prosocial behavior[a]	-	-.30***	-.34***	-.40***	.13***	.01	.02	.04	.03	-.12***
2. Attention problems[a]	-.30***	-	.58***	.63***	-.02	.03	.06	.05	.04	.24***
3. Internalizing problems[a]	-.34***	.58***	-	.56***	-.07*	-.01	.02	-.04	.08*	.19***
4. Externalizing problems[a]	-.40***	.63***	.56***	-	-.01	.01	.06	.01	-.11**	.15***
5. Education[b]	.13***	-.02	-.08*	-.01	-	-.04	-.05	-.01	-.07*	-.06
6. Special needs[c]	.01	.03	-.01	.004	-.04	-	.16***	.14***	.16***	.14**
7. Type of family[d]	.02	.06	.02	.06	-.05	.16***	-	.13***	-.07	.08*
8. Age at adoption	.04	.05	-.03	.01	-.01	.14***	.13***	-	.14**	.03
9. Age at study	.04	.03	.08*	-.12**	-.07	.16***	-.08*	.13***	-	.14**
10. Early deprivation	-.14***	.28***	.21***	.19***	-.08*	.10**	.08*	.03	.09*	-

Note. [a] Original, untransformed values. [b] 0 = high, 1 = low/middle. [c] 0 = no special needs, 1 = special needs. [d] 0 = adoptive family, 1 = mixed family.

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

3.2. Type of pre-adoption care and behavioral adjustment

Four hierarchical regression analyses were performed to investigate the associations between type of pre-adoption care and the four indicators of behavioral adjustment. Results of the final step (step 3) of these analyses are presented in Table 4. In the first step, the family and child background variables were entered to control for their possible effects on behavioral adjustment. This first step was not significant for attention problems (R^2 = .007, F(5, 849) = 1.131, p = .342), but was significant for prosocial behavior (R^2 = .022, F(5, 879) = 3.973, p < .05), for internalizing problems (R^2 = .015, F(5, 867) = 2.669, p < .05), and for externalizing problems (R^2 = .027, F(5, 804) = 4.632, p < .001). Similarly, the overall model tested in the second step of the hierarchical regression analysis was not significant for attention problems (F(7, 867) = 1.232, p = .282), but was significant for the other outcome measures (prosocial behavior: F(7, 877) = 2.998, p < .05; internalizing problems: F(7, 873) = 2.267, p < .05; externalizing problems: F(7, 846) = 3.369, p < .05). The inclusion of type of pre-adoption care in the second step of the analyses did not result in a significant increase in explained variance in any of the outcome measures (prosocial behavior: R^2 change = .001, F change (2, 842) = 0.595, p = .552; attention problems: R^2 change = .003, F change (2, 879) = 1.490, p = .226; internalizing problems: R^2 change = .003, F change (2, 871) = 1.243, p = .289; externalizing problems: R^2 change = .000, F change (2, 864) = 0.072, p = .931). Furthermore, the overall model tested in the third step was no longer significant for any of the outcome measures, except for externalizing problems (see Table 4). Adding the interaction between type of pre-adoption care and age at adoption (step 3) did not result in a significant increase in explained variance in any of the outcome measures (prosocial behavior: R^2 change = .002, F change (2, 879) = 1.053, p = .349; attention problems: R^2 change = .005, F change (2, 871) = 2.119, p = .121; internalizing problems: R^2 change = .001, F change (2, 867) = 0.540, p = .583; externalizing problems: R^2 change = .003, F change (2, 841) = 1.468, p = .231). Overall, type of pre-adoption care and the interaction between type of pre-adoption care and age at adoption were not significantly associated with behavioral adjustment.

Table 4

Summary of the last step (Step 3) of the hierarchical regression analyses predicting prosocial behavior, attention problems, internalizing problems and externalizing problems with type of pre-adoption care as main predictor (research question 1)

	Prosocial behavior[f]			Attention problems			Internalizing problems			Externalizing problems		
	B	SE	*β*	*B*	*SE*	*β*	*B*	SE	*β*	*B*	SE	*β*
Step 1												
Education[a]	-0.077	0.019	-.133***	-0.017	0.022	-.027	-0.055	0.024	-.076*	-0.012	0.026	-.016
Type of family[b]	-0.011	0.025	-.016	0.013	0.028	.017	0.000	0.031	.000	0.039	0.033	.041
Special needs[c]	-0.016	0.033	-.017	0.007	0.037	.007	-0.017	0.041	-.014	0.055	0.044	.044
Age at study	-0.001	0.000	-.045	0.000	0.001	.008	0.001	0.001	.079*	-0.003	0.001	-.156***
Age at adoption	-0.002	0.001	-.070	0.002	0.001	.067	-0.002	0.001	-.072	-0.000	0.002	-.005
Step 2												
Type of pre-adoption care = 1[d]	-0.024	0.023	-.002	-0.015	0.025	-.060	-0.021	0.028	.041	0.004	0.030	-.013
Type of pre-adoption care = 2[e]	-0.002	0.037	-.036	-0.072	0.041	-.021	0.055	0.046	-.025	-0.019	0.049	.005
Step 3												
Age adoption X type pre-adoption care= 1[d]	0.001	0.002	.052	-0.002	0.002	.062	-0.000	0.002	.035	0.000	0.003	.061
Age adoption X type pre-adoption care= 2[e]	0.004	0.003	.011	0.006	0.003	-.031	0.004	0.004	-.006	0.007	0.004	.006
F	2.570			1.428			1.885			2.958*		
R^2	.026			.015			.020			.031		
Adjusted R^2	.016			.05			.009			.021		

Note. [a] 0 = high, 1 = low/middle. [b] 0 = adoptive family, 1 = mixed family. [c] 0 = no special needs, 1 = special needs. [d] 0 = institutional care, 1 = foster care. [e] 0 = institutional care, 1 = mixed care. [f] Because this variable was reflected before transformation, higher scores on this variable now mean less prosocial behavior. Age at study and age at adoption are mean centered. All reported values are of step 3 of the analyses. * $p < .05$. *** $p < .001$.

Table 5

Summary of the last step (Step 3) of the hierarchical regression analyses predicting prosocial behavior, attention problems, internalizing behavior problems and externalizing behavior problems with early deprivation as main predictor (research question 2)

	Prosocial behavior[d]			Attention problems			Internalizing problems			Externalizing problems		
	B	SE	*β*	*B*	*SE*	*β*	*B*	SE	*β*	*B*	SE	*β*
Step 1												
Education[a]	-0.073	0.019	-.126***	-0.010	0.021	-.016	-0.048	0.024	-.066*	-0.008	0.026	-.010
Type of family[b]	-0.018	0.025	-.025	0.004	0.027	.005	-0.013	0.031	-.014	0.029	0.033	.031
Special needs[c]	-0.029	0.033	-.030	-0.018	0.036	-.017	-0.040	0.041	-.034	0.034	0.044	.027
Age at study	-0.001	0.000	-.062	-0.000	0.001	-.022	0.001	0.001	.058	-0.003	0.001	-.174***
Age at adoption	-0.001	0.001	-.051	0.002	0.001	.070*	-0.002	0.001	-.064	0.001	0.001	.021
Step 2												
Early deprivation	0.023	0.007	.119***	0.049	0.008	.224***	0.041	0.009	.169***	0.037	0.009	.144***
Step 3												
Age adoption X Early deprivation	0.001	0.001	.045	0.000	0.001	.003	0.000	0.001	.021	-0.000	0.001	-.014
F	4.800***			6.851***			5.369***			5.911***		
R^2	.038			.055			.043			.048		
Adjusted R^2	.030			.048			.036			. 040		

Note. [a] 0 = high, 1 = low/middle. [b] 0 = adoptive family, 1 = mixed family. [c] 0 = no special needs, 1 = special needs. [d] Because this variable was reflected before transformation, higher scores on this variable now mean less prosocial behavior. Age at study, age at adoption and early deprivation are mean centered. All reported values are of step 3 of the analyses. * $p < .05$. *** $p < .001$.

3.3. Early deprivation and behavioral adjustment

Four hierarchical regression analyses were conducted to investigate the associations between early deprivation and behavioral adjustment. Results of the final step (step 3) of these analyses are summarized in Table 5. Results of the first step, in which the parent and child background variables were entered, are reported above. Next, the overall model tested in the second step of the analyses was significant for all indicators of behavioral adjustment (prosocial behavior: $F(6, 876) = 5.368$, $p < .001$, attention problems: $F(6, 843) = 8.100$, $p < .001$; internalizing problems*:* $F(6, 850) = 6.268$, $p < .001$; externalizing problems: $F(6, 831) = 6.866$, $p < .001$). More specifically, adding early deprivation in the second step, led to a significant increase in explained variance in prosocial behavior (R^2 change = .014, F change (1, 759) = 11.984, $p < .001$), attention problems (R^2 change = .048, F change (1, 431) = 40.525, $p < .001$), internalizing problems (R^2 change = .027, F change (1, 367) = 22.373, $p < .001$), and externalizing problems (R^2 change = .020, F change (1, 824) = 18.019, $p < .001$). More specifically, children who had experienced more early deprivation, scored lower on prosocial behavior, and higher on attention problems, and on internalizing and externalizing problems. Furthermore, the overall model tested in the third step was significant for all indicators of behavioral adjustment (see Table 5). However, adding the two-way interaction between early deprivation and age at adoption did not increase the proportion of explained variance in any of the outcome variables (prosocial behavior: R^2 change = .002, F change (1, 452) = 1.641, $p = .201$; attention problems: R^2 change = .000, F change (1, 314) = .009, $p = .926$; internalizing problems: R^2 change = .001, F change (1, 408) = 0.351, $p = .554$; externalizing problems: R^2 change = .000, F change (1, 656) = 0.174, $p = .677$).

In addition, to investigate whether the main effects of early deprivation were driven by a particular type of early deprivation, we repeated the second step of the hierarchical regression analyses for all outcome variables including the early deprivation indicators one by one. Results indicated that the indicator social-emotional neglect (prosocial behavior: $B = 0.11$, $p < .001$, attention problems: $B = 0.16$, $p < .001$, internalizing problems: $B = 0.14$, $p < .001$, externalizing problems: $B = 0.15$, $p < .001$), and the indicator maltreatment (prosocial behavior: $B = 0.08$, $p < .05$, attention problems: $B = 0.10$, $p < .05$, internalizing problems: $B = 0.12$, $p < .05$, externalizing problems: $B = 0.11$, $p < .05$) were significantly associated with all four outcomes. The indicator sub-nutrition was only significantly associated with attention

problems (*B* = 0.07, *p* < .01) and internalizing problems (*B* = 0.06, *p* < .05). Physical neglect was significantly associated with attention problems (*B* = 0.10, *p* < .001), internalizing problems (*B* = 0.10, *p* < .001) and externalizing problems (*B* = 06, *p* < .05), and health problems at arrival were significantly associated with attention problems (*B* = 0.09, *p* < .001) and externalizing problems (*B* = 0.06, p < .05). Next, in order to test whether the different indicators of early deprivation were uniquely related to the outcomes, we repeated the second step of the hierarchical regression analysis for each outcome variable including all indicators of early deprivation simultaneously. Results showed that social-emotional neglect was significantly associated with all outcome measures (prosocial behavior: *B* = 0.13, *p* < .001, attention problems: *B* = 0.15, *p* < .001, internalizing problems: *B* = 0.12, *p* < .001, externalizing problems: *B* = 0.15, *p* < .001). No significant associates between the other indicators of early deprivation and the outcome measures were found (*B*'s ranging between -0.02 and 0.06, *ns*).

In short, children who had experienced more early deprivation displayed less prosocial behavior, more attention problems, and more internalizing and externalizing problems than children who had experienced less deprivation. These associations between early deprivation and behavioral adjustment were mainly driven by social-emotional neglect and were not moderated by age at adoption.

4. Discussion

In the present study we examined the associations between pre-adoption experiences - indicated by type of pre-adoption care and early deprivation - and behavioral adjustment in 891 Chinese adopted girls in early and middle childhood. These associations were tested after controlling for the influence of family (parental education, type of family) and child (special needs, age at study, and age at adoption) background variables. In addition, interaction effects between children's pre-adoption experiences and age at adoption were tested. Findings partly supported our hypotheses. Whereas type of pre-adoption care was not significantly associated with any of the behavioral outcomes, early deprivation was significantly negatively associated with prosocial behavior, and significantly positively associated with attention problems and internalizing and externalizing problems. No evidence for the interaction effects was found. Furthermore, the adopted girls did not show elevated levels of behavioral problems compared to the norm group of non-adopted children.

In line with our hypotheses early deprivation was significantly associated with behavioral adjustment. Children who had experienced more deprivation prior to adoption scored lower on prosocial behavior, and higher on attention problems and on externalizing and internalizing problems. However, this finding should be interpreted with caution because early deprivation only explained a small proportion of variance in behavioral adjustment. Nonetheless, the significant association between early deprivation and behavioral adjustment is in line with empirical evidence that shows that adopted children who have suffered more early adversity have an increased risk for behavioral problems (Gagnon-Oosterwaal et al., 2012; Juffer & Van IJzendoorn, 2005; Tan & Marfo, 2006; Van Der Vegt et al., 2009) and attention problems (Audet & Le Mare, 2010; Simmel et al., 2001; Tan, 2009). To the best of our knowledge, few adoption studies have examined the association between early deprivation and adaptive behavioral adjustment such as prosocial behavior (but see Kriebel & Wentzel, 2011; Tan, 2006). Our study revealed that children who experienced more deprivation scored lower on prosocial behavior. More research is needed to see whether this effect can be replicated in other samples. Besides, exploratory analyses were performed to investigate whether the effects of early deprivation were driven by a particular type of early deprivation. Results revealed that the effects of early deprivation seemed to have been driven mainly by social-emotional neglect, which is in line with previous adoption studies showing that pre-adoption social-emotional neglect is related to higher levels of behavioral problems (e.g., Merz & McCall, 2010; Van IJzendoorn et al., 2011).

In contrast to early deprivation, type of pre-adoption care was not related with prosocial behavior, attention problems, internalizing or externalizing problems. This finding is surprising given that the preliminary analyses showed that the extent of early deprivation – which was associated with behavioral adjustment - varied significantly across the type of pre-adoption care groups. One possible explanation for this contradictory finding might be that there were not only between-group differences in the extent of early deprivation but also within-group differences, which might have suppressed possible effects of type of pre-adoption care. Consequently, our early deprivation measure might have more accurately assessed the factor that determines the detrimental outcomes of pre-adoption care. This might help explain why effects of early deprivation on the outcomes were slightly stronger in comparison to the effects of type of pre-adoption care. Future adoption studies should try to gather information about differences in the quality of caregiving conditions among different

institutions and foster families. Nonetheless our study indicated that, contrary to expectations, the Chinese adopted girls with a history of institutional rearing showed comparable adaptive and maladaptive behavioral adjustment as the girls who were adopted from foster care.

With respect to prosocial behavior, this association has, as far as we know, never been investigated before. Although an association would be theoretically reasonable (with less prosocial behavior in children with an institutional background), it was not demonstrated in the current study. With regard to internalizing and externalizing problems, on the one hand, our findings confirm previous studies in which no association between pre-adoption institutional care and internalizing and externalizing problems were found (Gunnar & van Dulmen, 2007; Pearlmutter, Ryan, Johnson, & Groza, 2008; Rutter et al., 2010, 2001; Wiik et al., 2011), and provide support for the argument of Rutter and colleagues (Rutter et al., 2009) that internalizing and externalizing problems are not specifically related with institutional care. Our study extends to some extent the generalizability of these previous studies because our study did not only include children who had experienced institutional care and children who had experienced a mix of institutional and foster care, but also children who had exclusively lived in foster care prior to adoption. On the other hand, however, our study seems to contradict findings of the BEIP study (Zeanah et al., 2003) in which some protective effects from the foster care intervention compared to continued institutional care on behavioral adjustment were found (Humphreys et al., 2015; Zeanah et al., 2009). However, the BEIP study did not test whether these different types of care (foster care versus institutional care) differentially affect adjustment of children after adoption. The current study suggests that growing up in a stable adoptive family can compensate for the negative effects of institutional care compared to foster care.

Finally, regarding attention problems, our findings contradict studies in which attention problems have been found to be one of the symptoms that are specifically associated with a history of institutional care (i.e., institutional deprivation symptoms) (Gunnar & van Dulmen, 2007; Kreppner et al., 2001; Rutter et al., 2009, 2001; Wiik et al., 2011). There are several reasons why our findings are different. First, in many of the previous studies age at adoption and country of origin differed between the post-institutionalized and the post-foster children (see Section 1. Introduction), whereas in our study children's age at adoption and country of origin did not differ between the different types of pre-adoption

care. Consequently, the different ages at adoption and birth countries of the post-institutionalized and the post-foster children may be partly responsible for the association between type of pre-adoption care and attention problems that has been found in previous research. Second, in many of the previous studies the post-institutionalized children were adopted from Romania, whereas in our study they were adopted from China. The extent of deprivation in Romanian institutions is generally known to be unusually severe (Rutter et al., 2009) and it is not unlikely that the conditions in the Romanian institutions were more severely depriving than the conditions in the Chinese institutions. As such, the association between institutional care and attention problems that has been reported in previous research may have been caused by these extremely depriving conditions in the Romanian institutions, rather than by the history of institutionalization per se. This would be in line with the argument of Van IJzendoorn et al. (2011) that attention problems and the other symptoms that are referred to as institutional deprivation symptoms - cognitive impairment, quasi-autism and disinhibited attachment (Rutter et al., 2010) - may rather reflect a severe deprivation syndrome than an institutional deprivation syndrome. More research, in which type of pre-adoption care is not confounded with country of origin or with age at adoption and in which children adopted from other countries than Romania participate, is needed to improve our understanding about the association between type of pre-adoption care and behavioral adjustment.

Findings of our study did not provide support for the hypothesized interactions between children's pre-adoption experiences and age at adoption, indicating that the association between pre-adoption experiences and behavioral adjustment did not depend on age at adoption. More specifically, the association between type of pre-adoption care and behavioral adjustment remained non-significant, irrespective of the age at which the children were adopted - ranging between 3 and 62 months in this study. Furthermore, children's age at adoption did not influence the strength of the significant association between early deprivation and behavioral adjustment.

Some limitations of our study should be kept in mind. First, our study had a cross-sectional design which limits the possibility to draw causal conclusions. Second, our study relied on parent report. These two limitations make it difficult to exclude the possibility that parents attributed the less optimal behavioral adjustment of their child to more severely depriving pre-adoption conditions. Related to this, a third limitation of our study – which is a

limitation of adoption studies in general – is that we do not know whether the information about children's pre-adoption conditions is completely reliable. Parents reported retrospectively about their child's pre-adoption living conditions and it is not unlikely that the parents only had limited, possibly inaccurate information about their child's pre-adoption experiences (Miller & Hendrie, 2000). Therefore the finding that type of pre-adoption care was not related to behavioral adjustment should be interpreted with caution, especially because this finding contradicts studies showing that children who receive alternative family care fare better on different developmental domains than children who receive institutional care (e.g., Humphreys et al., 2015; Julian & McCall, 2011; Van IJzendoorn et al., 2011). Besides, it is possible that differences between the three types of pre-adoption care groups might have been attenuated by differences in the quality of care between different institutions and between different foster families (Julian & McCall, 2011), or by the possibility that institutionalized children who were most likely to be adopted received better care (Johnson, 2004). A fourth limitation of our study is that, although we consider it a strength that we included children who had exclusively lived in foster care prior to adoption, the size of this group was relatively small (*N* = 66, 7%). This may have affected the statistical power to detect effects of type of pre-adoption care and consequently our findings might be an underestimation of the actual effects. One possible solution to overcome this limitation is to investigate the associations between duration of institutional care and duration of foster care and behavioral adjustment, instead of investigating the effects of type of pre-adoption care. Exploratory inspection of these correlations in our study indicated that duration of institutional care and duration of foster care were not significantly associated with behavioral adjustment, with one exception: duration of institutional care was positively associated with attention problems. However, this correlation was no longer significant after controlling for early deprivation, whereas the associations between early deprivation and behavioral adjustment remained significant after controlling for duration of institutional or foster care. This suggests that the level of early deprivation drove the association between duration of institutional care and attention problems, which is in line with previous studies showing that quality of pre-adoption care might even be more important than duration of deprivation (e.g., Dalen, 2012). Besides, although the relatively small sample size of the post-foster group, compared to the sample sizes of the two other groups, limits the study's power to detect significant group differences, it is also important to note that it is a typical phenomenon that

children in pre-adoption foster care in China often have resided in institutional care before being referred to a foster family, because foster care systems are often connected to child welfare institutions (Johnson, 2004).

5. Conclusion

The current study revealed that pre-adoption institutional care did not put the adopted Chinese girls at an increased risk for less optimal behavioral adjustment in early and middle childhood. However, as mentioned above, due to the fact that we do not know whether the information about the children's type of pre-adoption care is completely reliable some caution should be exercised when interpreting this finding. In contrast to type of pre-adoption care, early deprivation was linked to less prosocial behavior and to more attention problems and internalizing and externalizing problems. This might suggest that parent-reported early deprivation was a more informative, proximal indicator of children's preadoption experiences than parent-reported type of pre-adoption care. It is possible that parents based their responses on the questions about early deprivation on their child's health condition at adoptive placement, whereas for type of pre-adoption care they could only rely on the scarce information they had received at the time of adoption. Nevertheless, it should be noted that early deprivation explained only a relatively small proportion of variance in behavioral adjustment, leaving room for other underlying factors in children's pre- and post-adoption environment. There is need for more research in which more reliable information about children's pre-adoption experiences is available and in which other possible correlates and underlying factors of adopted children's development are studied. Finally, comparison with the norm group of non-adopted children showed that the adopted Chinese girls in our sample did not score higher on behavioral problems. These findings suggest that adopted Chinese girls, even though they have experienced various degrees of deprivation, display adequate behavioral adjustment which provides evidence for their remarkable resilience.

Appendix A. Early deprivation questions posed to the parents

According to your opinion, has your child been exposed to any of the following:

1.	Sub-nutrition	Not	Somewhat	A lot
2.	Social-emotional neglect	Not	Somewhat	A lot
3.	Physical neglect	Not	Somewhat	A lot
4.	Maltreatment	Not	Somewhat	A lot

How was the health condition of your child at the time of arrival (chose one of the following responses)?

- Good general health
- Unexpected (not previously mentioned) mild health problems
- Unexpected (not previously mentioned) severe health problems
- Expected health problems

Appendix B. Variables used in imputation model

- Type of pre-adoption care (categorical variable, 3 categories)
- Parental education (categorical variable, 5 categories)
- Age at adoption
- Age at study
- Number of other biological children in the family
- Number of stepchildren in the family
- Number of foster children in the family
- Number of “other” children in the family
- Sub-nutrition prior to adoption (categorical variable, 3 categories)
- Social-emotional neglect prior to adoption (categorical variable, 3 categories)
- Physical neglect prior to adoption (categorical variable, 3 categories)
- Maltreatment prior to adoption (categorical variable, 3 categories)
- Health condition child at time of adoption (categorical variable, 4 categories)
- Special needs child at time of adoption (categorical variable, 2 categories)
- The eight syndrome scales of the CBCL: anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior
- The five scales of the SDQ: emotional symptoms, conduct problems, hyperactivity-inattention, peer problems, and prosocial behavior
- Two-way interactions between categorical predictors were include

CHAPTER 5
Adopted Children's Behavioral Adjustment Over Time: Interactions Between Pre-Adoption Experiences And Adoptive Parenting

Abstract

In the current study, we tested whether adoptive parenting moderated the association between pre-adoption experiences and change in adaptive (child responsiveness) and maladaptive (internalizing problems, externalizing problems, attention problems and sleep problems) behavioral adjustment over time. Ninety-two girls, adopted at a mean age of 13 months from institutional care (*n* = 50) or foster care (*n* = 42) in China to the Netherlands, took part in the study 2 months (Time 1, *N* = 92), 6 months (Time 2, *N* = 92), and 9 years after adoption (Time 3, *N* = 87). The adopted girls did not score higher on behavioral problems compared to the norm group of non-adopted children, except for internalizing problems at Time 3. Moreover, children's pre-adoption experiences (type of pre-adoption care and extent of early deprivation) were not associated with their behavioral adjustment. Repeated measures analyses generally did not provide support for the hypothesis regarding the interaction between pre-adoption experiences and parenting in the prediction of change in behavioral adjustment over time. Despite this, the finding that the children generally did not show above-average levels of behavioral problems provided support that adoption had a positive impact on their development.

Keywords. International adoption, China, institutional care, foster care, early deprivation, behavioral problems, responsiveness, parenting

1. Introduction

One of the first research questions that has been pursued in the adoption literature aimed to clarify whether adopted children are at increased risk for psychological difficulties, such as behavioral problems, compared to non-adopted children raised by their biological parents (Palacios & Brodzinsky, 2010; Wilson, 2004). The numerous studies that have addressed this question yielded somewhat inconsistent results, which suggests that there exists large variability in adopted children's adjustment. Whereas many studies have found that adopted children, especially during middle childhood, have somewhat elevated rates of behavioral problems compared to non-adopted children (for a meta-analysis, see Juffer & Van IJzendoorn, 2005), other studies have shown that adopted children are equally well adjusted (e.g., Rojewski, Shapiro, & Shapiro, 2000), or even better adjusted than non-adopted children (e.g., Tan & Marfo, 2006). Improving our understanding about why some adopted children are better adjusted than others is essential for the development of prevention programs or interventions aimed at further enhancing adopted children's resilience. Therefore, the research focus shifted from merely comparing adopted and non-adopted children to studying factors that might explain within-group differences among adopted children (Barroso, Barbosa-Ducharne, Coelho, Costa, & Silva, 2017; Palacios & Brodzinsky, 2010; Simmel, Brooks, Barth, & Hinshaw, 2001).

One of the factors that has been investigated, is variability in early adverse experiences. Research findings indicate that even though adverse pre-adoption experiences can have long lasting effects on later adjustment, these effects are not deterministic (Barroso et al., 2017; Sroufe, Coffino, & Carlson, 2010). This suggests that the effects of early adversity can be mitigated by other factors (Masten, 2001), such as positive parenting in the adoptive family. Although evidence is gradually emerging that parenting is related to adopted children's behavioral adjustment (e.g., Van der Voort et al., 2014; Van der Voort, Linting, Juffer, Bakermans-kranenburg, & Van IJzendoorn, 2013), few studies have studied whether parenting buffers the negative impact of adverse pre-adoption experiences. Therefore, in the current longitudinal study we investigated whether parenting moderated the association between pre-adoption experiences and behavioral adjustment over time in a sample of internationally adopted children from China. Contrary to many previous adoption studies that focus exclusively on indicators of maladaptive behavioral adjustment, we studied both maladaptive

as well as adaptive behavioral adjustment. We used two indicators to measure children's pre-adoption experiences, namely type of pre-adoption care and extent of early deprivation.

1.1. Pre-adoption experiences: type of pre-adoption care and early deprivation

Although all adopted children have experienced early adversities such as separation from or loss of their birth parents, there is considerable heterogeneity in level of early adversities, and this heterogeneity should be taken into account when studying adopted children's development (Kriebel & Wentzel, 2011). Heterogeneity, for example, relates to the type of pre-adoption care children have received (e.g. institutional care or foster care) and to the extent of early depriving experiences (such as sub-nutrition and neglect) they have been exposed to. Several theoretical explanations have been put forward about how early adverse experiences may impact behavioral adjustment.

With regard to type of pre-adoption care, from an attachment theoretical perspective it can be predicted that children who were raised in institutional care prior to adoption have an increased risk for behavioral problems, because they did not have the opportunity to build long-term relationships with a sensitive caregiver (Gunnar, Bruce, & Grotevant, 2000; Van IJzendoorn et al., 2011). Empirical evidence on the effects of type of pre-adoption care, however, is somewhat inconclusive. Some studies have shown that pre-adoption institutionalization is linked with an overall increase in behavioral problems (for a review, see MacLean, 2003). Other studies, however, reported that pre-adoption institutional care is only associated with an increase of a limited number of specific symptoms, such as inattention/overactivity (Gunnar & van Dulmen, 2007; Kumsta et al., 2015; Wiik et al., 2011). Still other studies did not find any associations between pre-adoption institutional care and behavioral problems (Finet, Vermeer, Juffer, & Bosmans, 2018)

With regard to the effects of pre-adoption deprivation, research findings are also mixed. Whereas most adoption studies report the detrimental effects of early deprivation on behavioral adjustment (Juffer & Van IJzendoorn, 2005; Kriebel & Wentzel, 2011; Nickman et al., 2005; Tan, 2011), some adoption studies do not find evidence for a link between early deprivation and later behavioral adjustment (e.g., Gleitman & Savaya, 2011; Grotevant, Ross, Marchel, & Mcroy, 1999), or only find small effects (Finet et al., 2018). These mixed findings indicate that there exists variability in the association between pre-adoption experiences and behavioral adjustment. This suggests that not all children are equally affected by early

adversities. According to developmental psychopathology models (e.g., risk and resilience models) protective factors can moderate the negative effects of pre-adoption experiences, and hence explain variability in child outcomes (Masten, 2001). One possible protective factor that may buffer the effects of adverse pre-adoption experiences on behavioral adjustment is adoptive parenting (Del Pozo de Bolger, Dunstan, & Kaltner, 2016; Juffer et al., 2011).

1.2. Adoptive parenting

It has been proposed that parenting impacts children's behavioral adjustment (Ainsworth, Blehar, Waters, & Wall, 1978; De Wolff & Van IJzendoorn, 1997). Parenting studies in non-adopted children indeed reveal small but consistent associations between various dimensions of parenting behaviors – such as parental support, psychological control, and behavioral control - and indicators of maladaptive (e.g., Bell & Belsky, 2008; Belsky, Fearon, & Bell, 2007; Pinquart, 2017a, 2017b) and adaptive behavioral adjustment (e.g., Bornstein, Hendricks, Haynes, & Painter, 2007). Moreover, it has been found that not only parenting behavior, but also parenting cognitions such as parental self-efficacy (i.e., parents' belief in their ability to parent their children successfully) are related to children's behavioral adjustment, either directly or indirectly via parenting behavior (for a review, see Jones & Prinz, 2005).

In contrast to the numerous parenting studies in non-adopted children, parenting research in adopted children is relatively scarce (Juffer et al., 2011) and most studies focus on parenting behavior, not on parental efficacy. Although some adoption studies fail to find associations between parenting behavior and behavioral adjustment (e.g., Castle, Beckett, Rutter, & Sonuaga-Barke, 2008), results of most studies reveal that positive parenting behaviors or other aspects of the parent-child relationship, such as parent-child relationship quality, have a positive impact on adopted children's behavioral adjustment (e.g., Groza & Ryan, 2002; Kriebel & Wentzel, 2011; Le Mare & Audet, 2014; Pearlmutter, Ryan, Johnson, & Groza, 2008). In particular sensitive parenting (which is an expression of the parental warmth/support dimension and refers to noticing a child's signals, correctly interpreting these signals, and timely and adequately responding; Ainsworth et al., 1978) has been found to promote adopted children's development (e.g., Stams, Juffer, & Van IJzendoorn, 2002; Van der Voort et al., 2014, 2013).

1.3. Interplay between children's pre-adoption experiences and adoptive parenting

The findings discussed above concerning the direct, but probabilistic effects of pre-adoption experiences and the effects of adoptive parenting on behavioral adjustment, suggest that it is reasonable to assume that adoptive parenting may act as a protective factor in the association between pre-adoption experiences and later behavioral adjustment. In line with theories of risk and resilience (Masten, 2001), it can be expected that adverse pre-adoption experiences negatively affect behavioral adjustment when parenting is compromised, but that these effects are reduced when parents show positive parenting (Garvin, Tarullo, Van Ryzin, & Gunnar, 2012). A few studies have indeed found support for buffering effects of protective factors in the adoptive family, such as a family's capacity to cope with stress and challenges (Ji, Brooks, Barth, & Kim, 2010). Despite this, there is a scarcity of studies that have examined the hypothesized buffering effect of adoptive parenting. In one study, Kriebel and Wentzel (2011) found that warm, involved parenting buffered against the negative effects of cumulative pre-adoption risks on adaptive behavior. Although findings of this study provide support for an interaction between pre-adoption experiences and parenting, the cross-sectional design of the study limited the possibility to draw firm conclusions about the interaction effect on the long run. However, investigating this interaction on the long run is important, especially because research has shown that the negative effects of early adversity on behavioral adjustment might increase over time (Merz & McCall, 2010). Therefore, in the current longitudinal adoption study we aimed to investigate whether pre-adoption experiences and parenting interact with each other in the prediction of change in behavioral adjustment over time, from infancy to middle childhood. Hereby, we focused on behavioral aspects of parenting (namely parental sensitivity), as well as on cognitive aspects of parenting (namely parental efficacy).

1.4. Current study

In the current study we aimed to gain insight into the role that parental sensitivity and parental efficacy may play in enhancing children's resilience to overcome risks associated with early adversity. In specific, we examined whether parental sensitivity and parental efficacy moderated the association between pre-adoption experiences and the behavioral adjustment over time (see Figure 1). This was investigated in a sample of 10-year-old girls who were adopted from institutional care or foster care in China and who participated in the Chinese

adoptees in the Netherlands (CAN) study two months, six months and nine years after adoption. We hypothesized that the effects of pre-adoption experiences (type of pre-adoption care and early deprivation) on change in adaptive behavioral adjustment (child responsiveness) and maladaptive behavioral adjustment (internalizing problems, externalizing problems, attention problems, sleep problems) would depend upon the quality of adoptive parenting, with low parental sensitivity (as indicated by low supportive presence and high intrusiveness) and low parental efficacy increasing the risk that pre-adoption adversities will be linked with less optimal behavioral adjustment, and with high parental sensitivity (as indicated by high supportive presence and low intrusiveness) and high parental efficacy buffering against such effects. Besides, we compared the level of behavioral problems of the adopted children with the mean level of behavioral problems of the norm group of non-adopted children.

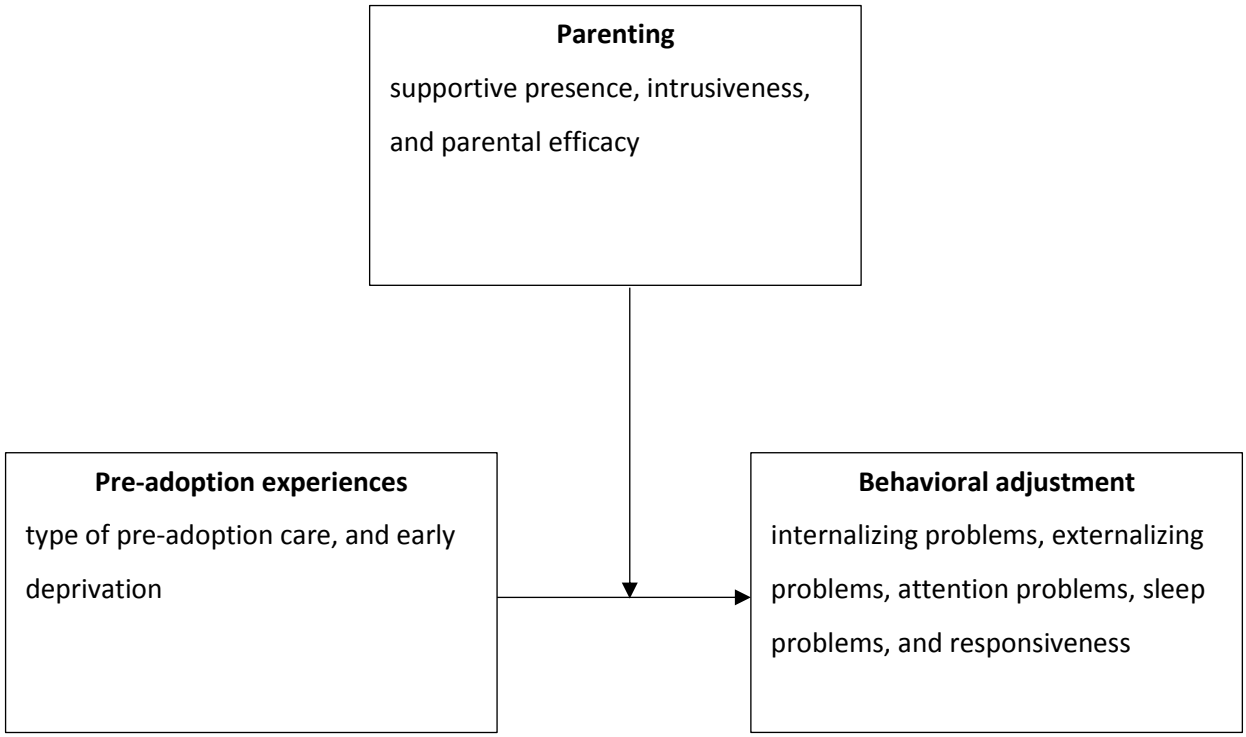


Figure 1. Conceptual model of the interaction tested between pre-adoption experiences and parenting in the prediction of change in behavioral adjustment over time.

2. Method

2.1. Participants and procedure

The sample of the CAN study comprised 92 Chinese girls, born between 2004 and 2007, who were adopted by Dutch parents at a mean age of 13.03 months (*SD* = 1.35, range = 10.84-16.53). The families were recruited through all three Dutch adoption organizations mediating adoption from China to the Netherlands (for details on the recruitment and the first two time points of the study, see Van den Dries, Juffer, Van IJzendoorn, & Bakermans-Kranenburg, 2010; Van den Dries, Juffer, Van IJzendoorn, Bakermans-Kranenburg, & Alink, 2012). Ninety-two families took part in the first two time points of the study, two (Time 1) and six months after adoption (Time 2), and 87 families (5.4% dropouts) participated in the third time point, nine years after adoption (Time 3). Moreover, four of the five families who did not participate in the third time point agreed to complete the online background information questionnaire (*n* = 91) and three families agreed to complete the questionnaire on behavioral problems (*n* = 90). The major reason for non-participation at Time 3 was time constraints. At each time point the families were visited at home and they visited the university. The girls participated in these visits together with their primary caregiver (90 mothers and 2 fathers at Time 1 and Time 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), who in this article is referred to as mother. The girls were on average 15.24 (*SD* = 1.35) and 15.66 (*SD* = 1.42) months old at the first home and university visit, 19.33 (*SD* = 1.40) and 19.85 (*SD* = 1.48) months old at the second visit, and 119.72 (*SD* = 5.23) and 122.07 (*SD* = 5.57) months old at the third home and university visit.

Ninety girls were adopted by two-parent families and two girls were adopted by single mothers. Of the 91 parents who completed the background questionnaire at Time 3, four parents had divorced and one of the single mothers was living together with her new partner. The other girls were living with their adoptive mother and father. Mean education at Time 3 of the primary caregiver on a scale from 1 (primary school) to 5 (university) was 3.92 (*SD* = 0.93) and mean education of the second caregiver was 4.10 (*SD* = 0.88). Furthermore, 24 families were single-child families and 67 families had more than one child. More specifically, 52 families had other adopted children, 17 families had birth children, one family had a foster child, and three families had step children. In infancy (Time 1 and time 2) parents gave their informed consent for participation in the CAN study and at Time 3 both the parents and the

girls gave their informed consent. The Ethics Review Board of the Faculty of Social Sciences of Leiden University approved the follow-up study (ECPW-2014/067).

2.2. Measures

2.2.1. Pre-adoption experiences: type of pre-adoption care and early deprivation

At Time 1 parents reported whether their child had lived in an institution or in a foster family in China before adoption. Based on this information children were classified in the post-institutionalized or the post-foster group (see Van den Dries et al., 2010, 2012). The post-institutionalized children (*n* = 50) had mainly experienced institutional care before adoption (*M* = 12.44 months, *SD* = 1.36) and a maximum of one month of other forms of care such as foster care (*M* = 0.65 months, *SD* = 0.59). The post-foster group consisted of children who had exclusively received foster care prior to adoption (*n* = 16) or a combination of foster and institutional care (*n* = 26). The post-foster children (*n* = 42) 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.

In addition, at Time 1 parents were asked whether and to what extent their daughter had experienced (1) sub-nutrition, (2) other physical neglect, (3) socio-emotional neglect, and (4) maltreatment (physical or sexual). Items were rated on a four-point response scale (no, somewhat, a lot, unknown) that was dichotomized for the current analyses. For each item, a score of 0 was assigned if parents indicated that their child had not experienced the adversity or if parents answered unknown. A score of 1 was assigned if parents reported that their child had experienced the adversity somewhat or a lot. The dichotomized responses on the four items were summed to get an indication of early deprivation. Scores could range between 0 and 4, with higher scores indicating more early deprivation. Because a score of 0 was also assigned if parents did not know whether their child had experienced the adversity, the variable can be considered a conservative estimate of early deprivation. The internal consistency (Cronbach's alpha) of early deprivation was .63.

2.2.2. Parental sensitivity: supportive presence and intrusiveness

At each time point, mother and child engaged in a problem solving task and these videotaped interactions were subsequently coded for maternal supportive presence and intrusiveness with the Erickson scales (Egeland, Erickson, Clemenhagen-Moon, Hiester, &

Korfmacher, 1990; Erickson, Sroufe, & Egeland, 1985). We used supportive presence and intrusiveness as indicators of parental sensitivity, with higher levels of supportive presence and lower levels of intrusiveness indicative of higher levels of sensitivity. Supportive presence refers to the extent to which mother expresses emotional support and positive regard to her child and lets her child know that she has confidence in her child's competence. Intrusiveness, on the other hand, refers to the degree to which mother interferes with her child's autonomy and exploration, and to which she exerts her own expectations on her child. Both scales were rated on a seven-point scale ranging from 1 (*very low*) to 7 (*very high*). At Time 1 and Time 2 supportive presence and intrusiveness were assessed at the university while mother and child engaged in two problem-solving tasks of 4 min each. Mothers were instructed that the two tasks were somewhat too difficult for children of this age and that they therefore were allowed to help her child in the same way she usually did. Supportive presence and intrusiveness were averaged across the two tasks. At Time 3 a developmentally appropriate task was used. More specifically, supportive presence and intrusiveness were assessed at home during a 10 min tangram puzzle solving task. Children were asked to solve the puzzle, and mothers were told that they were allowed to help their child and to work together. The more verbal nature of mother-child interactions at this age, compared to the more frequent physical mother-child interactions in infancy, was taken into account in the coding of supportive presence and intrusiveness at Time 3 (convergent with Stams et al., 2002). Time 1, Time 2 and Time 3 assessments of the same family were coded by different coders. Coders were blind to the children's pre-adoption experiences. At Time 1 and Time 2 the intraclass interrater reliability (intraclass correlations) with the expert coder (FJ) was >.70 for supportive presence and intrusiveness. At Time 3 the intraclass correlation of the single rater with the expert coder (FJ) was .92 for supportive presence, and .96 for intrusiveness (n = 15).

2.2.3. Parental efficacy

To assess parental efficacy, parents filled out the Parental Efficacy Questionnaire (Van IJzendoorn, Bakermans-Kranenburg, & Juffer, 1999) at the three time points. The Parental Efficacy Questionnaire is a self-report questionnaire that consists of 22 items that measure how competent parents feel in rearing their child, particularly under stressful circumstances (e.g., "I can understand my daughter's feelings when she is sad, even if I'm angry."). At Time 3, the questionnaire was adjusted prior to administration by omitting two items that were not

considered developmentally appropriate. The items are rated on a 5-point scale ranging from -2 (*no self-efficacy*) to 2 (*very high self-efficacy*). The total parental efficacy score was computed by summing the scores on all items (possible scores range from -44 to 44 at Time 1 and 2 and from -40 to 40 at Time 3). The internal consistency of parental efficacy at the three time points was .79 (Time 1), .80 (Time 2) and .88 (Time 3).

2.2.4. Problem behavior

Parents completed the Child Behavioral Checklist for ages $1^{1/2}$-5 (CBCL$1^{1/2}$-5; Achenbach & Rescorla, 2000; Koot, Van Den Oord, Verhulst, & Boomsma, 1997) at Time 1 and Time 2, and the CBCL for ages 6-18 (CBCL 6-18; Achenbach & Rescorla, 2001; Verhulst, Van Der Ende, & Koot, 1996) at Time 3. The CBCL is a parent-report questionnaire that consists of different items on child behavioral problems (CBCL $1^{1/2}$-5: 100 items; CBCL 6-18: 113 items) that have to be rated on a three-point rating scale ranging from 0 (*not true*) to 2 (*very true or often true*). The items of the CBCL $1^{1/2}$-5 can be combined into eight narrowband syndrome scales (emotionally reactive, anxious/depressed, somatic complaints, withdrawn, sleep problems, attention problems, aggressive behavior and other problems) and in two broadband scales, namely internalizing problems (sum of emotionally reactive, anxious/depressed, somatic complaints and withdrawn) and externalizing problems (sum of attention problems and aggressive behavior). The items of the CBCL 6-18 can be combined into nine narrowband syndrome scales (anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behavior, aggressive behavior and other problems) and in two broadband scales, namely internalizing problems (sum of anxious/depressed, withdrawn/depressed and somatic complaints) and externalizing problems (sum of rule-breaking behavior and aggressive behavior).

In the current analyses, the two broadband scales – internalizing and externalizing problems – and two narrowband scales – attention problems and sleep problems – were used. Attention problems (i.e., problems with regulating one's attention) and sleep problems (i.e., irregular sleeping patterns including for example nightmares and difficulties falling asleep) were included because research has shown that attention problems are specifically associated with institutional deprivation (Rutter, Kreppner, & O'Connor, 2001), and that sleep problems are a common risk factor among Chinese adoptees (Rettig & McCarthy-Rettig, 2006; Tan, 2010). Because the CBCL 6-18 does not contain a sleep problem scale, we constructed a sleep

problem scale by summing 4 items (trouble sleeping, nightmares, sleep less, and sleep talks/walks) that closely resemble the 6 sleep problems items of the CBCL $1^{1/2}$-5. The internal consistencies of the scales at each time point were .73 (Time 1), .71 (Time 2), and .86 (Time 3) for internalizing problems, .85 (Time 1), .89 (Time 2), and .88 (Time 3) for externalizing problems, .50 (Time 1), .64 (Time 2), and .77 (Time 3) for attention problems, and .74 (Time 1), .75 (Time 2), .67 (Time 3) for sleep problems.

The raw scale scores of the CBCL $1^{1/2}$-5 and the CBCL 6-18 cannot be compared directly because the number and the content of the items of the scales differ across the two versions of the CBCL. Therefore we transformed the raw scale scores to T scores, which reflect the child's standing relative to children of the same age and which enables comparisons between the two versions of the CBCL (Verhulst et al., 1996). T scores for Time 3 sleep problems could not be determined because the CBCL 6-18 does not contain a sleep problem scale. In the analyses, T scores for internalizing problems, externalizing problems and attention problems and raw scores for sleep problems were used.

2.2.5. Child responsiveness

Child responsiveness (i.e., a child's eagerness and willingness to engage with his parents and a child's pleasure in interacting with the parent) was used as indicator of adaptive behavioral adjustment. At each time point child responsiveness was observed during video-recorded mother-child interactions and coded with the Emotional Availability Scales (EAS; Biringen, Robinson, & Emde, 2000) on a seven-point rating scale ranging from 1 (*clearly nonoptimal in responsiveness*) to 7 (*optimal responsive*). At Time 1 and Time 2 child responsiveness was observed at home during 8 min of free play and at Time 3 it was observed at the university during 10 min of free play. Different coders, who were blind to the child's pre-adoption experiences, assessed child responsiveness at each time point. The intraclass interrater reliability with the expert coder (FJ) was .77 at Time 1, .79 at Time 2 (see Van den Dries et al., 2012), and .81 and .86 for the two coders at Time 3 (n = 19).

2.3. Data-analysis

Prior to the main analyses, three principal component analyses were performed to create a longitudinal compound score for each parenting variable. A separate principal component analysis was performed on the three supportive presence scores, on the three

intrusiveness scores and on the three parental efficacy scores. Based on Kaiser's criterion of retaining factors with eigenvalues greater than one, one factor was extracted in each principal component analysis, The supportive presence factor (*M* = 0, *SD* = 1, range from -2.27 to 2.12), which reflects the common variance between the supportive presence scores at the three time points, had an eigenvalue of 1.64 and explained 54.72% of total variance in the three supportive presence scores. The loadings of the three supportive presence scores on this factor were .75 (Time 1), .74 (Time 2), and .73 (Time 3). The intrusiveness factor (*M* = 0, *SD* = 1, range from -2.91 to 2.51) had an eigenvalue of 1.61 and explained 53.81% of total variance in the three intrusiveness scores. The loadings of the intrusiveness scores on this factor were .83 (Time 1), .74 (Time 2), and .62 (Time 3). The parental efficacy factor (*M* = 0, *SD* = 1, range from -2.51 to 2.34) had an eigenvalue of 1.79 and explained 59.52% of the total variance in the three parental efficacy scores. The loadings of the parental efficacy presence on this factor were .82 (Time 1), .81 (Time 2) and .68 (Time 3). These parenting factor scores were computed after imputation of missing values with expectation maximization (see below). Furthermore, prior to main analyses mean behavioral problems of the adopted girls at the three time points were compared with average scores of the norm group of non-adopted children.

To answer our research question concerning the interaction between pre-adoption experiences and adoptive parenting in the prediction of change in behavioral adjustment over time (Figure 1), repeated measures analyses of (co)variance with time as within-subject factor were performed. For each indicator of adaptive and maladaptive behavioral adjustment, except for sleep problems, six repeated measures analyses were performed to investigate the interaction between each of the two pre-adoption variables and each of the three parenting variables. In total 24 repeated measures analyses were performed in which all main effects were included (the main effect of time, of one of the two pre-adoption experiences, and of one of the three parenting variables), all possible two-way interactions (time x pre-adoption experiences, time x parenting, pre-adoption experiences x parenting), and the three-way interaction between time x pre-adoption experiences x parenting. We only report the results of the three-way interactions because these interactions indicate whether pre-adoption experiences interact with parenting in the prediction of change in behavioral adjustment.[2] If the assumption of sphericity was violated, the degrees of freedom were corrected using the

[2] The main effects and two-way interactions are not reported but can be requested from the corresponding author.

Greenhouse-Geisser correction. For sleep problems it was not possible to perform repeated measures analyses, because no T scores for sleep problems at Time 3 could be determined and thus sleep problem at Time 1 and 2 could not be directly compared with sleep problems at Time 3. Instead, moderation analyses were conducted with the macro PROCESS (Hayes, 2013) to assess whether parenting moderates the association between pre-adoption experiences and sleep problems at Time 3. Six moderation analyses were performed in which the main effects of pre-adoption experiences, of parenting, and the two-way interaction between pre-adoption experiences x parenting were included. Besides, we controlled for the main effects of sleep problems at the first two time points. Only results of the interaction between pre-adoption experiences x parenting are reported.[3]

In addition to the main analyses, two sets of supplementary analyses were conducted. In the first set of supplementary analyses the parenting factor scores were replaced with the separate parenting scores at Time 1, Time 2, and Time 3. Separate analyses for each time point were performed (Time 1 parenting: repeated measures analysis with behavioral adjustment at the three time points as outcome; Time 2 parenting: repeated measures analyses with behavioral adjustment at the second and third time point as outcome; Time 3: moderation analysis with behavioral adjustment at Time 3 as outcome). These analyses allow to determine whether similar results are found when the non-shared variance in the parenting scores at each time point is not partialled out. In the second set of supplementary analyses, we assessed whether the results of the main analyses hold after controlling for some family and child background variables that have been found to be related to adopted children's development. More specifically, we controlled for age at adoption (Julian, 2013), age at study (Juffer & Van IJzendoorn, 2005), education of both caregivers (Nadeem et al., 2017; Tieman, van der Ende, & Verhulst, 2005) and medical problems of the child (Welsh & Viana, 2012).

In total, there was 2.2% of data missing on all independent variables, outcome variables and background variables. Based on Little's MCAR test it was assumed that the data were missing completely at random, χ^2 (559) = 541.52, p = .694. Therefore, prior to the main analyses, missing data on the continuous variables were imputed using expectation maximization. In order to retain as much information as possible, all narrowband CBCL

[3] Results of the main effects can be requested from the corresponding author.

syndrome scales were used in the expectation maximization procedure. The broadband internalizing and externalizing scale were calculated after the expectation maximization.

3. Results

3.1. Preliminary analyses

Table 1 shows the descriptive statistics of all model variables for the post-institutionalized children, the post-foster children and the total sample. The post-institutionalized children scored significantly higher on medical problems and on early deprivation than the post-foster children. In addition, there were three significant differences between the two groups on the parenting variables. Parents of the post-institutionalized children scored significantly lower on supportive presence at Time 1, significantly higher on parental efficacy at Time 2, and significantly lower on intrusiveness at Time 3 than parents of the post-foster children. The post-institutionalized and the post-foster children did not differ significantly from each other on adaptive and maladaptive behavioral adjustment at the three time points.

Next, because research has shown that parental divorce is a risk factor for behavioral problems (e.g., Lansford, 2001), we investigated whether change in family composition between the first two and the third time point was associated with change in behavioral adjustment over time. Change in family composition did not significantly predict change in internalizing problems, externalizing problems, attention problems or responsiveness over time and was not associated with sleep problems at Time 3. Therefore, change in family composition was not included in the analyses.

Table 1

Descriptives of model 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	13.08	1.23	12.96	1.49	13.03	1.35
Age at study	122.16	5.20	121.05	6.23	121.65	5.69
Education caregiver 1	3.86	0.93	4.00	0.94	3.92	0.93
Education caregiver 2	4.06	0.84	4.14	0.93	4.10	0.88
Medical problems	1.27	1.25	0.61[b]	0.80	0.97	1.11
Early deprivation	0.64	0.98	0.19[a]	0.55	0.44	0.84
T1 Supportive presence	4.70	1.52	5.54[b]	1.06	5.09	1.39
T2 Supportive presence	5.01	1.57	4.89	1.48	4.95	1.52
T3 Supportive presence	4.12	1.25	4.14	1.23	4.13	1.24
T1 Intrusiveness	3.02	1.41	2.66	1.25	2.86	1.34
T2 Intrusiveness	2.81	1.50	3.33	1.45	3.05	1.49
T3 Intrusiveness	4.18	1.47	4.77[a]	1.23	4.45	1.39
T1 Parental efficacy	24.17	5.50	24.03	7.03	24.10	6.21
T2 Parental efficacy	27.24	5.85	24.37[a]	6.00	25.93	6.06
T3 Parental efficacy	23.86	7.10	23.45	7.83	23.67	7.41
T1 Responsiveness	4.86	0.99	4.67	0.70	4.77	0.87
T2 Responsiveness	5.07	0.90	5.32	0.76	5.18	0.85
T3 Responsiveness	5.09	0.98	5.13	1.26	5.11	1.11
T1 Internalizing problems T score	45.30	8.90	45.88	7.94	45.57	8.43
T1 Externalizing problems T score	45.78	7.55	47.36	8.07	46.50	7.78
T1 Attention problems T score	54.38	5.44	53.67	4.18	54.05	4.89
T1 Sleep problems T score	54.18	6.43	55.31	6.78	54.70	6.58
T2 Internalizing problems T score	41.10	7.95	44.52	8.74	42.66	8.45
T2 Externalizing problems T score	45.08	7.74	46.60	10.18	45.77	8.91
T2 Attention problems T score	52.80	4.44	53.69	4.96	53.21	4.68
T2 Sleep problems T score	52.74	5.54	53.31	5.17	53.00	5.35
T3 Internalizing problems T score	54.06	11.55	54.33	8.75	54.18	10.31
T3 Externalizing problems T score	50.70	10.55	52.71	6.33	51.62	8.89
T3 Attention problems T score	56.06	6.09	56.38	6.14	56.21	6.08
T3 Sleep problems	1.30	1.58	1.50	1.84	1.39	1.70

Note. [a] significant difference between the post-institutionalized and the post-foster children at $p < .05$. [b] significant difference between the post-institutionalized and the post-foster children at $p < .01$.

Besides, we inspected the correlations between pre-adoption experiences, adoptive parenting, and behavioral adjustment (see Table 2), and we investigated the direct effects of pre-adoption experiences and adoptive parenting on change in behavioral adjustment using repeated measures analyses. For each outcome variable (except sleep problems) a repeated measures analysis was performed in which the two pre-adoption variables and the three parenting factor scores were included to examine the direct effects of pre-adoption experiences and parenting on change in behavioral adjustment. No significant two-interactions between time and the two pre-adoption variables and between time and the three parenting factor scores were found. Besides, an ANCOVA for sleep problems showed that the pre-adoption variables and the parenting variables were not significantly associated with Time 3 sleep problems, controlling for Time 1 and Time 2 sleep problems.

The concurrent and longitudinal correlations between type of pre-adoption care, early deprivation and the parenting measures (see Table A1), and among the indices of behavioral adjustment (see Table A2) are displayed in the Appendix.

3.2. Comparison with the norm

Furthermore, mean behavioral problem scores of the children in our sample were compared with mean scores of the norm group of 1.5-5 year old children (Achenbach & Rescorla, 2000) at Time 1 and Time 2, and of 6-11 year old girls at Time 3 (Achenbach & Rescorla, 2001). Results indicated that the children in our sample scored significantly lower than the norm group on internalizing problems, $t(91) = -6.34$, $p < .001$, and on externalizing problems at Time 1, $t(91) = -4.79$, $p < .001$. Furthermore, they displayed similar rates of attention problems, $t(91) = 1.15$, $p = .252$, and sleep problems, $t(91) = .50$, $p = .622$, at Time 1. At Time 2, the children did not only score lower on internalizing problems, $t(91) = -10.66$, $p < .001$, and externalizing problems, $t(91) = -4.92$, $p < .001$, but also on sleep problems, $t(91) = -2.99$, $p = .004$. Their attention problems score did not differ significantly from the norm group at Time 2, $t(91) = -1.26$, $p = .213$. At Time 3 the children scored significantly higher on internalizing problems, $t(91) = 3.68$, $p < .001$, and showed similar rates of externalizing problems, $t(91) = .98$, $p = .331$, and attention problems, $t(91) = 1.95$, $p = .054$, as the norm group. Table 3 presents the percentage of children scoring in the normal, subclinical and clinical ranges.

Table 2

Correlations between pre-adoption experiences and postadoption parenting on the one hand and behavioral adjustment on the other hand (after expectation maximization)

	Time 1					Time 2					Time 3				
	Resp	Int	Ext	Att	Sleep	Resp	Int	Ext	Att	Sleep	Resp	Int	Ext	Att	Sleep
Type pre-adoption care[a]	-.11	.04	.10	-.07	.12	.15	.20	.09	.10	.10	.02	.01	.11	.03	.06
Early deprivation	.04	-.07	-.21*	-.12	-.04	.06	-.06	-.13	-.19	.06	.03	-.09	.00	-.05	.05
Fact. Supportive pres.	.24*	.10	-.07	.03	.04	.33**	.07	-.08	-.16	.06	.17	.22*	.16	-.04	.13
T1 Supportive pres.	.26*	.09	.01	.06	.12	.31**	.08	-.11	-.03	.05	.04	.13	.04	-.12	.13
T2 Supportive pres.	.26*	.09	-.04	.06	-.07	.27*	.05	-.00	-.09	-.02	.14	.19	.08	-.11	.07
T3 Supportive pres.	.00	.05	-.14	-.06	.02	.16	.03	-.07	-.24*	.11	.18	.15	.24*	.13	.10
Fact. Intrusiveness	-.22*	-.21*	.02	.05	-.19	-.07	-.15	-.10	.04	-.22*	-.03	-.28**	-.19	-.02	-.25*
T1 Intrusiveness	-.21*	-.20	-.13	-.02	-.25*	-.15	-.20	-.12	-.10	-.25*	-.04	-.24*	-.14	.02	-.17
T2 Intrsuiveness	-.20	-.09	.10	.05	-.04	.01	-.05	-.07	.09	-.11	-.17	-.21	-.14	.05	-.20
T3 Intrusiveness	-.07	-.20	.08	.11	-.14	-.00	-.08	-.02	.09	-.13	.19	-.16	-.13	-.15	-.18
Fact. Parental efficacy	-.08	-.18	-.15	-.02	-.11	.06	-.21*	-.19	-.10	-.05	-.22*	-.23*	-.19	-.26*	.03
T1 Parental efficacy	-.02	-.25*	-.14	.01	-.11	.05	-.26*	-.23*	-.19	-.12	-.16	-.03	.05	-.11	.06
T2 Parental efficacy	-.12	-.14	-.22*	-.03	-.11	-.01	-.25*	-.24*	-.06	-.08	-.30**	-.17	-.23*	-.29**	-.05
T3 Parental efficacy	-.03	.00	.03	-.04	-.02	.12	.07	.06	.05	.11	-.04	-.37***	-.28**	-.20	.06

Note. Resp = responsiveness. Int = T scores internalizing problems. Ext = T scores externalizing problems. Att = T scores attention problems. Sleep = sleep problems. Fact. Supportive pres. = factor score supportive presence.

[a] 0 = institutional care, 1 = foster care.

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

Table 3

Percentage of children scoring in the normal, subclinical and clinical range on internalizing problems, externalizing problems, attention problems and sleep problems

	Type of pre-adoption care								
	Post-institutionalized			Post-foster			Total sample		
	Normal	Subclinical	Clinical	Normal	Subclinical	Clinical	Normal	Subclincial	Clinical
T1 Internalizing problems	94.0	6.0	0.0	97.6	0.0	2.4	95.7	3.3	1.1
T1 Externalizing problems	94.0	2.0	4.0	97.6	0.0	2.4	95.7	1.1	3.3
T1 Attention problems	90.0	10.0	0.0	100	0.0	0.0	94.6	5.4	0.0
T1 Sleep problems	94.0	6.0	0.0	90.5	4.8	4.8	92.4	2.2	5.4
T2 Internalizing problems	100	0.0	0.0	95.2	4.8	0.0	97.8	2.2	0.0
T2 Externalizing problems	98.0	2.0	0.0	88.1	9.5	2.4	93.5	5.4	1.1
T2 Attention problems	94.0	6.0	0.0	95.2	4.8	0.0	94.6	5.4	0.0
T2 Sleep problems	94.0	2.0	4.0	97.6	2.4	0.0	95.7	2.2	2.2
T3 Internalizing problems	68.0	8.0	24.0	71.4	14.3	14.3	69.6	10.9	19.6
T3 Externalizing problems	82.0	8.0	10.0	85.7	9.5	4.8	83.7	8.7	7.6
T3 Attention problems	88.0	10.0	2.0	88.1	7.1	4.8	88.0	8.7	3.3

3.3. Time x pre-adoption experiences x parenting interactions

3.3.1. Time x type of pre-adoption care X parenting effects

Results of the repeated measures analyses indicated that there were no significant three-way interactions between time x type of pre-adoption care x parenting (supportive presence, intrusiveness, parental efficacy) in the prediction of responsiveness, internalizing problems, externalizing problems and attention problems, with two exceptions (see Table 4). First, there was a significant interaction between time x type of pre-adoption care x supportive presence in the prediction of externalizing problems. Inspection of the within-subject contrasts showed that the interaction effect was only significant when Time 1 was compared to Time 3, $F(1, 88) = 6.31$, $p = .014$, $\eta^2_p = .067$. To interpret the significant interaction between type of pre-adoption care and supportive presence in the prediction of change in externalizing problems from Time 1 to Time 3, a moderation analysis in PROCESS (Hayes, 2013) was performed. Change in externalizing problems from Time 1 to Time 3 was computed as the difference between Time 3 externalizing problems minus Time 1 externalizing problems, with positive scores indicating an increase in externalizing problems over time. Results revealed that the total model accounted for 10% of variance explained in change in externalizing problems, $R^2 = .10$, $F(3, 88) = 3.29$, $p = .024$. A Johsnon-Neyman analysis in PROCESS (Hayes, 2013) was performed to determine the threshold value of supportive presence above or below which there was a significant effect of type of pre-adoption care on change in externalizing problems. Results indicated that the post-institutionalized children showed a significantly higher increase in externalizing problems over time than the post-foster children if mothers scored lower than -1.19 on supportive presence (which was the case for 9.78% of all the children in the sample), and a significantly lower increase in externalizing problems if mother scored at least 1.32 on supportive presence (14.13%). Further probing of the interaction to investigate the effect of supportive presence in the post-institutionalized and the post-foster children, showed that supportive presence had a significant effect on change in externalizing problems in the post-foster children, $B = 5.49$, $t(88) = 3.14$, $p = .002$, but not in the post-institutionalized children, $B = -0.12$, $t(88) = -0.08$, $p = .933$. Contrary to expectations, higher supportive presence was associated with a larger increase in externalizing problems in the group of post-foster children (see Figure 2).

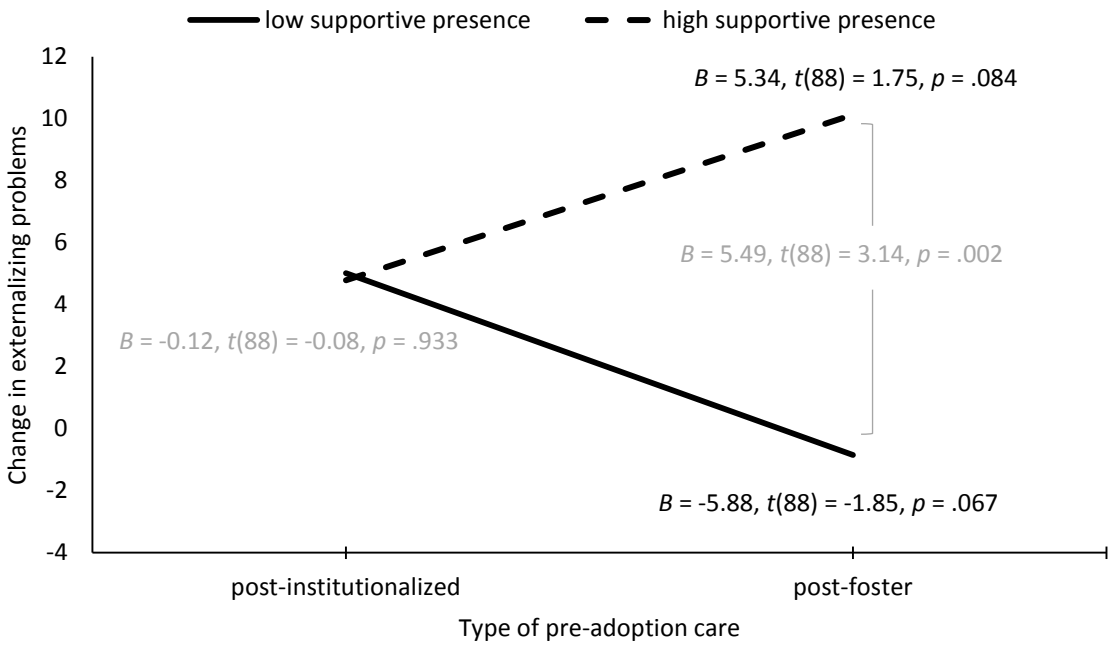


Figure 2. Interaction between type of pre-adoption care and supportive presence in the prediction of change in externalizing problems from Time 1 to Time 3.

Second, there was a significant interaction between time x type of pre-adoption care x parental efficacy in the prediction of internalizing problems. Inspection of the within-subject contrasts showed that the interaction effect was only significant when Time 2 was compared to Time 3, $F(1, 88) = 6.44$, $p = .013$, $\eta^2_p = .068$. A moderation analysis in PROCESS (Hayes, 2013) was performed to interpret this significant interaction between type of pre-adoption care and parental efficacy in the prediction of change in internalizing problems from Time 2 to Time 3 (i.e., Time 3 internalizing problems minus Time 2 internalizing problems). The total model explained 9% variance in change in internalizing problems between Time 2 and Time 3, $R^2 = .09$, $F(3, 88) = 2.80$, $p < .05$. Results of the Johnson-Neyman analysis indicated that the post-institutionalized children showed a significantly larger increase in internalizing problems over time than the post-foster children if mothers scored lower than -0.29 on parental efficacy (35% of participants), but not when mothers scored higher on parental efficacy. Further probing of the interaction effect, revealed that parental efficacy had a significant effect on change in internalizing problems in the post-institutionalized children, $B = -4.60$, $t(88) = -2.34$, $p = .022$, but not in the post-foster children, $B = 1.96$, $t(88) = 1.17$, $p = .245$. More specifically, the post-institutionalized children showed a smaller increase in internalizing problems over

time when their mother scored higher on parental efficacy than when their mother scored lower on parental efficacy (see Figure 3).

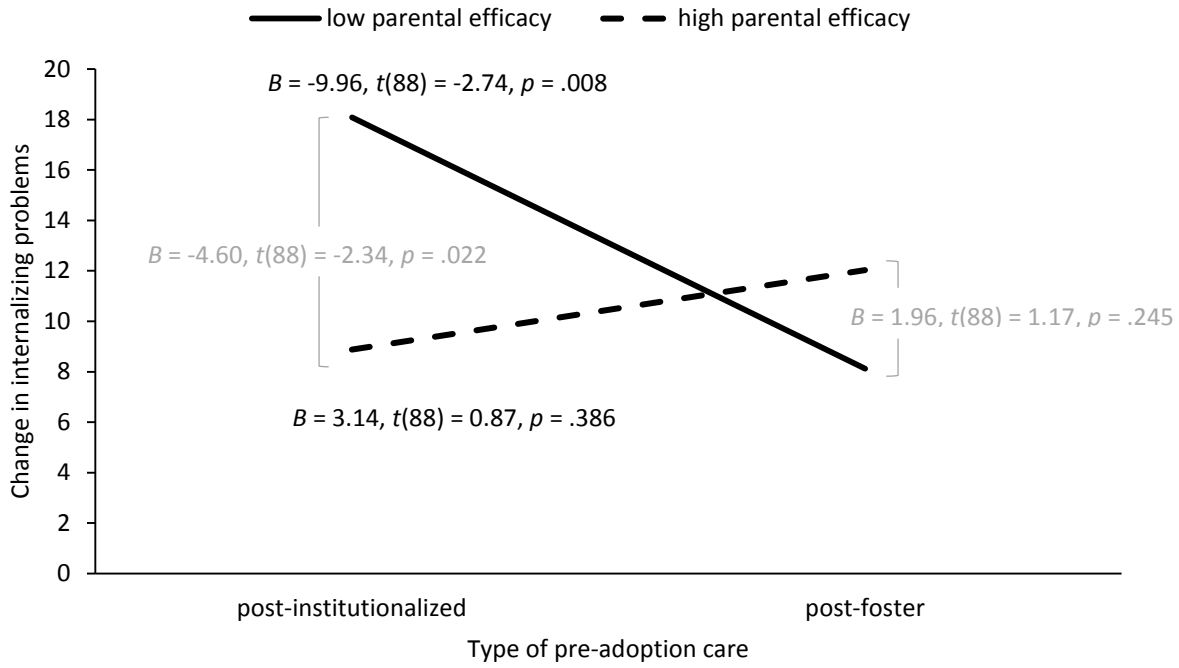


Figure 3. Interaction between type of pre-adoption care and parental efficacy in the prediction of change in internalizing problems from Time 2 to Time 3.

Next, the moderation analysis for Time 3 sleep problems revealed that the two-way interactions between type of pre-adoption care and supportive presence, B = 0.28, t(86) = 0.76, p = .448, or intrusiveness, B = -0.26, t(86) = -0.75, p = .456, or parental efficacy, B = 0.19, t(86) = 0.53, p = .596, were not significantly associated with Time 3 sleep problems controlling for Time 1 and Time 2 sleep problems.

Finally, with a few exceptions results of the two sets of supplementary analyses were similar to results of the main analyses. The two significant interactions were no longer significant in the supplementary analyses, with the exception of the significant interaction between time x type of pre-adoption care x parental efficacy which remained significant in the prediction of internalizing problems when the covariates were included in the model. Besides, two three-way interactions that were non-significant in the main analyses reached significance in the supplementary analyses. More specifically, in the first set of supplementary analyses a significant interaction between time x type of pre-adoption care x Time 1 parental

efficacy emerged in the prediction of change in child responsiveness. Within-subject contrasts showed that the interaction effect was only significant when Time 1 was compared to Time 3. However, as follow-up moderation analyses indicated that the total model was not significant, we abstained from further interpreting this interaction effect. Furthermore, after adding the covariates to the model the interaction between time x type of pre-adoption care x parental efficacy in the prediction of externalizing problems became significant. However, because this suggests a suppression effect and thus might be vulnerable to only reflecting a statistical artifact, we decided not to interpret this effect.

Table 4

Interactions between time x type of pre-adoption care x parenting in predicting change in adaptive and maladaptive behavioral adjustment

	F	*df*	*p*	partial η^2
		Supportive presence		
Responsiveness	2.03	(1.79, 157.54)	.140	.023
Internalizing problems	1.39	(1.58, 138.79)	.250	.016
Externalizing problems	3.42	(1.64, 144.18)	.044*	.037
Attention problems	2.23	(1.61, 141.29)	.122	.025
		Intrusiveness		
Responsiveness	0.20	(1.77, 156.03)	.079	.002
Internalizing problems	1.13	(1.58, 139.35)	.316	.013
Externalizing problems	0.44	(1.61, 142.06)	.604	.005
Attention problems	0.05	(1.61, 141.74)	.924	.001
		Parental efficacy		
Responsiveness	0.18	(1.78, 156.16)	.807	.002
Internalizing problems	4.27	(1.60, 140.94)	.023*	.046
Externalizing problems	3.28	(1.64, 144.33)	.050	.036
Attention problems	2.82	(1.64, 144.60)	.073	.031

Note. Degrees of freedom were adjusted using the Greenhouse-Geisser correction.

* $p < .05$.

3.3.2. Time x early deprivation x parenting effects

The repeated measures analyses revealed that there were no significant three-way interaction effects between time x early deprivation x parenting (supportive presence, intrusiveness, or parental efficacy) in the prediction of responsiveness, externalizing problems, internalizing problems and attention problems, with the exception of a significant

interaction between time x early deprivation x parental efficacy in the prediction of internalizing problems (see Table 5). Inspection of the within-subject contrasts showed that the interaction was only significant when Time 1 was compared to Time 3, $F(1,88) = 6.19$, $p = .015$. A moderation analysis was performed in PROCESS to examine the conditional effect of early deprivation on change in internalizing problems from Time 1 to Time 3 (i.e., Time 3 internalizing problems minus Time 1 internalizing problems) for different values of parental efficacy. However, because the variance explained in change in internalizing problems by the total model was not significant, $R^2 = .07$, $F(3, 88) = 2.25$, $p = .088$, we abstained from interpreting the interaction effect.

Furthermore, the moderation analyses for Time 3 sleep problems revealed that the interactions between early deprivation x supportive presence, $B = 0.10$, $t(86) = 0.62$, $p = .534$, or between early deprivation x intrusiveness, $B = -0.08$, $t(86) = -0.41$, $p = .686$, or between early deprivation x parental efficacy, $B = 0.11$, $t(86) = 0.45$, $p = .652$, were not significantly associated with Time 3 sleep problems controlling for Time 1 and Time 2 sleep problems. Finally, the results of the two sets of supplementary analyses did not differ from the results of the main analyses, with the exception that the interaction between time x early deprivation x parental efficacy in the predication of internalizing problems turned non-significant in the supplementary analyses.

Table 5

Interaction between time x early deprivation x parenting in predicting change in adaptive and maladaptive behavioral adjustment

	F	*df*	*p*	partial η^2
		Supportive presence		
Responsiveness	0.04	(1.80, 157.92)	.953	.000
Internalizing problems	0.20	(1.59, 140.31)	.767	.002
Externalizing problems	0.01	(1.65, 145.40)	.985	.000
Attention problems	0.43	(1.61, 141.92)	.611	.005
		Intrusiveness		
Responsiveness	1.50	(1.80, 158.69)	.227	.017
Internalizing problems	0.29	(1.59, 140.21)	.698	.003
Externalizing problems	0.07	(1.62, 142.56)	.901	.001
Attention problems	0.41	(1.63, 143.42)	.623	.005
		Parental efficacy		
Responsiveness	0.16	(1.80, 158.43)	.827	.002
Internalizing problems	3.69	(1.60, 140.35)	.037*	.040
Externalizing problems	0.73	(1.62, 142.68)	.458	.008
Attention problems	0.16	(1.63, 143.68)	.807	.002

Note. Degrees of freedom were adjusted using the Greenhouse-Geisser correction.

* $p < .05$.

4. Discussion

The main aim of the current study was to investigate whether parenting buffered against the negative effects of adverse pre-adoption experiences on adopted children's behavioral adjustment. In specific, we examined whether parental sensitivity (supportive presence and intrusiveness) and parental efficacy moderated the association between pre-adoption experiences (type of pre-adoption care and early deprivation) and change in adaptive (responsiveness) and maladaptive behavioral adjustment (internalizing, externalizing, attention and sleep problems) over time. This was tested in a sample of 92 adopted Chinese girls who participated in the CAN study two months, six months and nine years after adoption. Results generally did not support our hypothesis regarding the buffering effect of parenting in the association between pre-adoption experiences and behavioral adjustment. Only three of the 30 interactions were significant, of which one could not be interpreted because the total model was not significant. In what follows we discuss the two other significant interaction effects. However, it is important to note that caution is warranted

in interpreting these effects, because they may reflect Type I error as they were no longer significant after adjusting the significance level using the Bonferroni correction for multiple testing.

First, there was a significant interaction between time, type of pre-adoption care, and supportive presence in the prediction of externalizing problems. This interaction effect indicated that the post-institutionalized children showed a higher increase in externalizing problems over time than the post-foster children if mothers scored low on supportive presence, and a smaller increase if mothers scored high on supportive presence. Contrary to expectations, although supportive presence was not associated with change in externalizing problems among the post-institutionalized children, it predicted increase in externalizing problems over time in the post-foster children. Although this finding contradicts theory and empirical evidence on the beneficial effects of parental sensitivity (e.g., Van der Voort et al., 2013), a few studies in non-adopted children also found counterintuitive associations between parental sensitivity and behavioral adjustment (e.g., higher levels internalizing symptoms; Kerns, Siener, & Brumariu, 2011; Kok et al., 2013).

One possible explanation for this finding may be that the relation between supportive presence and behavioral adjustment is a U-shaped relation rather than a linear relation. This would mean that only moderate levels of supportive presence are adaptive, and that both low and high levels are maladaptive (Kok et al., 2013). This does not explain, however, why the counterintuitive effect of supportive presence on change in externalizing problems was only found in the post-foster and not in the post-institutionalized children. Given that the levels of externalizing problems at Time 3 still fell in the normal range, another possible explanation may be that high levels of supportive presence helped the post-foster children to express positive and negative emotions, apparent in the increase in their externalizing problems scores. Research in non-adopted children indeed shows associations between parenting and emotion expression (e.g., Morris, Silk, Steinberg, Myers, & Robinson, 2007). This explanation may suggest that the post-foster children were more susceptible to supportive presence, and is in line with the finding that the post-foster children showed a larger increase in responsiveness between the first two time points of the study than the post-institutionalized children (Van den Dries et al., 2012). Nevertheless, both explanations are speculative and the fact that this interaction turned nonsignificant in the supplementary

analyses and after controlling for multiple testing, raises concern about the validity of this effect.

Second, there was a significant interaction between time, type of pre-adoption care and parental efficacy in the prediction of internalizing problems. In line with expectations, the post-institutionalized children only showed a larger increase in internalizing problems over time than the post-foster children when mothers scored relatively low on parental efficacy, but not when mothers reported higher levels of parental efficacy. Moreover, higher parental efficacy was associated with a smaller increase in internalizing problems across time among the post-institutionalized children. This interaction effect suggests that parental efficacy served as a buffer against the development of internalizing problems for children who were adopted from institutional care. This is an interesting finding, especially because preliminary analyses indicated that the adopted children had above-average levels of internalizing problems at Time 3. Although clearly more research on the hypothesized buffering effect of parental efficacy in adoptive families is needed, this finding tentatively suggests that enhancing parental efficacy may be a relevant target for prevention and intervention programs aimed at reducing the risks associated with pre-adoption institutionalization. Though, as far as we know, to date no interventions for promoting adoptive parents' self-efficacy exists, pioneering evidence in non-adopted children has shown that the manipulation of parental efficacy contributes to positive changes in child behavior (e.g., Mouton & Roskam, 2015; Roskam, Brassart, Loop, Mouton, & Schelstraete, 2015). Nevertheless, caution is warranted in interpreting this interaction effect because it was no longer significant in the supplementary analyses in which the parental efficacy compound score was replaced with parental efficacy at Time 1, Time 2 and Time 3, and because it was no longer significant after controlling for multiple testing.

Besides the significant three-way interaction in the prediction of internalizing problems and in the prediction externalizing problems, there were no other significant interactions in the prediction of internalizing and externalizing problems, nor in the prediction of the other indicators of maladaptive or adaptive behavioral adjustment. This is not in line with the study of Kriebel and Wentzel (2011), in which an interaction between cumulative pre-adoption risks and warm, involved parenting on adaptive behavior was found. However, contrary to their cross-sectional study, the current study included time as factor in the analyses to investigate change in behavioral adjustment (with some nuance with regard to

the analyses for sleep problems). These tests were more conservative as longitudinal interaction effects are more difficult to reveal. In addition, the contrasting findings might be explained by the fact that our study focused on a different sample (only internationally adopted children versus a combination of internationally and domestically adopted children), and used different measures of the variables of interest (e.g., observations and parent-report questionnaires to assess parenting instead of only parent-report parenting questionnaires). More research is needed to evaluate which findings are most robust.

Finally, it is important to note that the preliminary analyses showed that there were no main effects of adverse pre-adoption experiences on change in behavioral adjustment and that the adopted children did not display above-average levels of behavioral problems, except for internalizing problems at Time 3. Hence, although we did not found support for buffering effects of parenting, the adopted girls were generally functioning well, irrespective of their pre-adoption experiences.

4.1. Limitations

When interpreting these results, several limitations should be kept in mind. First, our study had a relatively small sample, which reduces the power to detect significant interaction effects. Moreover, due to the small sample size we could not test our hypothesis using more sophisticated statistical techniques, such as multilevel analyses (Wang & Wang, 2012). Because multilevel analyses can handle time-varying predictors, an advantage of this technique would have been that the parenting scores at the three different time points could have been included, instead of using the longitudinal compound parenting scores. Despite this, we consider it a strength of our study that drop-out over the course of the longitudinal study was relatively low and hence the initial sample size was not substantially further reduced. At the third time point, still 94.6% of the families were participating, which makes it unlikely that our findings were compromised by attrition. A second limitation is that information on the children's pre-adoption experiences was reported by the parents. One problem with parent-report of pre-adoption experiences is that this information may be unreliable because adoptive parents often receive only limited, sometimes incorrect background information about their child (Juffer et al., 2011). Unreliable information about children's pre-adoption experiences may obscure potential effects of pre-adoption experiences and consequently make it more difficult to detect potential buffering effects of

adoptive parenting. Nevertheless, our study extends many previous adoption studies in which no information about pre-adoption experiences was available or in which only age at adoption was used as indicator of pre-adoption adversity. Another limitation is the fact that the post-foster group consisted of both children who had exclusively experienced pre-adoption foster care and children who had experienced a combination of mainly pre-adoption foster care and to some extent pre-adoption institutional care. These two groups were combined because only 16 children were in the exclusively foster care group, and because it is a typical phenomenon that children who are living in pre-adoption foster care have resided in institutional care before they are referred to foster care (Johnson, 2004). Besides that, it is important to mention that a large scale cross-sectional study on Chinese adopted children, in which the exclusively foster group and the combination group were treated as separate groups, also revealed no significant associations between type of pre-adoption care and behavioral adjustment (Finet et al., 2018).

4.2. Conclusion

Notwithstanding these limitations, results of the CAN study indicated that the adopted children were functioning well when compared to the norm group of non-adopted children, with the exception of the somewhat elevated levels of internalizing problems at the age of 10 years. Moreover, the children's behavioral adjustment did not seem to be affected by adverse pre-adoption experiences, as children who were adopted from institutional care or children who had experienced relatively high levels of early deprivation were equally well adjusted as children who were adopted from foster care or children who had experienced lower levels of early deprivation. Finally, contrary to expectations, little evidence was found for a buffering effect of parental sensitivity and parental efficacy in the association between adverse pre-adoption experiences and change in behavioral adjustment over time. Only two significant interaction effects emerged, which may represent Type I error given the number of analyses performed. Nonetheless, the good behavioral adjustment of the adopted children suggests that placement in an adoptive family supported their ability to thrive despite having experienced pre-adoption adversities.

Appendix

Table A1

Correlations between pre-adoption experiences and post-adoption parenting (after expectation maximization)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Type pre-adoption care[a]	-													
2. Early deprivation	-.27**	-												
3. Fact. Supportive pres.	.12	-.09	-											
4. T1 Supportive pres.	.30**	-.07	.73***	-										
5. T2 Supportive pres.	-.04	-.09	.74***	.31**	-									
6. T3 Supportive pres.	.01	-.05	.75***	.33**	.33**	-								
7. Fact. Intrusiveness	.11	-.02	-.52***	-.30**	-.44***	-.42***	-							
8. T1 Intrusiveness	-.13	.05	-.45***	-.57***	-.21*	-.22*	.74***	-						
9. T2 Intrusiveness	.18	.00	-.43***	-.08	-.58***	-.29**	.83***	.43***	-					
10. T3 Intrusiveness	.21*	-.11	-.24*	.02	-.11	-.44***	.62***	.16	.31**	-				
11. Fact. Parental efficacy	-.12	-.01	.04	.08	-.05	.07	.03	.11	.12	-.22*	-			
12. T1 Parental efficacy	-.01	-.03	.14	.15	-.01	.17	-.00	.06	.09	-.20	.82***	-		
13. T2 Parental efficacy	-.24*	-.01	.07	.08	-.00	.09	-.09	-.02	.02	-.24*	.81***	.51***	-	
14. T3 Parental efficacy	-.03	.03	-.14	-.07	-.12	-.13	.18	.23*	.18	-.05	.67***	.33**	.33**	-

Note. Fact. Supportive pres. = factor score supportive presence. Fact. Intrusiveness = factor score intrusiveness. Fact. Parental efficacy = factor score parental efficacy.

[a] 0 = institutional care, 1 = foster care.

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

Table A2

Correlations between the Time 1, Time 2, and Time 3 indices of behavioral adjustment (after expectation maximization)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. T1 Responsiveness	-														
2. T1 Internalizing prob.	-.01	-													
3. T1 Externalizing prob.	-.03	.55***	-												
4. T1 Attention prob.	.02	.35**	.55***	-											
5. T1 Sleep prob.	.12	.38***	.43***	.15	-										
6. T2 Responsiveness	.30**	-.07	-.09	-.08	.02	-									
7. T2 Internalizing prob.	.04	.59***	.43***	.22*	.33**	-.04	-								
8. T2 Externalizing prob.	.08	.41***	.62***	.31**	.27**	-.13	.63***	-							
9. T2 Attention prob.	.10	.30**	.39***	.51***	.14	-.11	.45***	.63***	-						
10. T2 Sleep prob.	.07	.23*	.13	-.06	.55***	.15	.29**	.25*	.01	-					
11. T3 Responsiveness	.05	.15	.08	-.03	.06	.16	.13	.10	-.11	.17	-				
12. T3 Internalizing prob.	.10	.18	.12	.02	.18	-.03	.14	.05	-.15	.22*	.04	-			
13. T3 Externalizing prob.	-.02	.10	.19	.01	.18	.01	.05	.15	-.22*	.11	-.12	.56***	-		
14. T3 Attention prob.	-.02	.19	.30**	.24*	.18	-.24*	.07	.18	.04	-.09	-.13	.41***	.62***	-	
15. T3 Sleep prob.	.14	.09	-.03	-.18	.27**	.10	.02	-.18	-.24*	.35***	.07	.43***	.19	.12	-

Note. Internalizing prob. = T scores internalizing problems. Externalizing prob. = T scores externalizing problems. Attention prob. = T scores attention problems. Sleep prob. = sleep problems.

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

CHAPTER 6
General Discussion

1. Introduction

In the current dissertation, we aimed to increase insight in factors that may play a role in explaining variability in adopted children's cognitive and behavioral development. More specifically, we aimed (1) to study the associations between pre-adoption experiences (type of pre-adoption care and early deprivation) and cognitive and behavioral adjustment, and (2) to study whether adoptive parenting (parental sensitivity and parental efficacy) buffered these associations. These research objectives were examined in two samples of adopted Chinese children who currently live in the Netherlands. In the first chapter of the current dissertation, we discussed the research framework within which the current studies are situated. In the following two chapters (Chapters 2 and 3) we focused on cognitive adjustment and in the next two chapters (Chapters 4 and 5) on behavioral adjustment. Specifically, in Chapter 2 we discussed the main findings of a selection of longitudinal studies on the cognitive development of adopted and fostered children. In Chapter 3 we studied the two main research questions with respect to cognitive development. In Chapter 4 we investigated the first research question concerning behavioral adjustment. In addition, as secondary objective we tested whether the effects of adverse pre-adoption experiences on behavioral adjustment differed depending on age at adoption. Finally, in Chapter 5 we mainly concentrated on the second research question concerning the buffering effect of parenting in the association between pre-adoption experiences and behavioral adjustment. In general, our results did not confirm the hypotheses concerning the negative effects of adverse pre-adoption experiences and concerning the buffering role of parenting. In this concluding chapter we summarize and integrate the main findings of the preceding chapters in more detail (Chapters 2-5), discuss some main strengths and limitations of the current studies, and propose directions for future research and tentative clinical implications.

2. Main findings

In this section we provide a summary of the current dissertation findings with respect to the two main research questions (1) concerning the effects of pre-adoption experiences, and (2) concerning the buffering effects of parental sensitivity and parental efficacy. In addition, before summarizing these results, we present the findings of the comparison of adopted children's functioning with the norm group. Although this comparison was not the

main focus of the current dissertation because numerous studies have examined adoptee-nonadoptee differences before (Palacios & Brodzinsky, 2010), it seemed relevant to present these findings because this information may help to provide a context to interpret the main research findings of the current dissertation. Below, the findings concerning cognitive development and behavioral adjustment are first presented separately, and afterwards shortly integrated.

2.1. Cognitive development

In this section we present the findings concerning the adopted children's cognitive development. Because different domains of cognitive development may be differentially affected by early experiences and by adoptive parenting (Palacios, Román, Moreno, León, & Peñarrubia, 2014), we included different domains of cognitive development, namely intellectual functioning, school achievement, and self-regulation (executive functioning and effortful control).

2.1.1. Comparison with a norm group of non-adopted children

Both chapters on cognitive development (Chapters 2 and 3) provided compelling evidence that adopted children, as a group, show remarkable catch-up in their cognitive development after adoption. In Chapter 2 we summarized the main findings of four longitudinal "natural experiments", of the longitudinal Bucharest Early Intervention Project (BEIP; Zeanah et al., 2003) and of the meta-analysis of Van IJzendoorn, Juffer, and Klein Poelhuis (2005) on adopted children's cognitive development. These studies generally revealed that foster care and adoption can be seen as effective interventions for children who cannot be raised by their biological family. Although children generally showed below average cognitive functioning at arrival in their foster family (Nelson et al., 2007) or in their adoptive family (O'Connor et al., 2000; Rutter & the ERA study team, 1998; Van den Dries, Juffer, Van IJzendoorn, & Bakermans-Kranenburg, 2010), they showed remarkable recovery some time later (O'Connor et al., 2000; Rutter & the ERA study team, 1998; Stams, Juffer, Rispens, & Hoksbergen, 2000; Van den Dries et al., 2010; e.g., Vorria et al., 2006). The extent of recovery depended on which domain of cognitive development was studied. Generally the best outcomes (i.e., complete recovery) were found for intellectual functioning and adequate but somewhat less favorable results for school achievement (for a meta-analysis, see Van

IJzendoorn et al., 2005) and executive functioning (e.g., Bos, Fox, Zeanah, & Nelson, 2009; Colvert et al., 2008).

Nonetheless, in Chapter 3 we found support for complete catch-up in intellectual functioning as well as in school achievement. In this chapter we reported the results concerning the cognitive development of the adopted children who participated in the third time point of the Chinese Adoptees in the Netherlands (CAN) study (of which the results of the first two time points were summarized in Chapter 2). Although the children showed some delays in intellectual abilities at the first two time points, two and six months after adoption (Van den Dries et al., 2010), they seemed to have achieved complete catch-up nine years later (Time 3). They even scored higher than the population average on the two short intelligence tests we used (measuring crystallized intelligence and fluid intelligence). Outcomes for school achievement were similarly positive. Compared to the general population distribution, the adopted children showed normative school achievement in mathematics and better school achievement in reading comprehension in middle childhood. These findings confirm previous studies on the cognitive development of Chinese adopted children (e.g., Cohen, Lojkasek, Zadeh, Pugliese, & Kiefer, 2008; Dalen & Rygvold, 2006; Delcenserie, Genesee, & Gauthier, 2013). For the other domains of cognitive development assessed in Chapter 3 (namely executive functioning and effortful control) catch-up could not be examined, because there were no standardized norm scores available for the tasks that we used to assess these domains, and because no comparison group of non-adopted children against which to compare the adopted children's performance was included in the CAN study. Nonetheless, we acknowledge that it would have been interesting to examine whether the positive findings for intellectual functioning and school achievement applied to self-regulation (executive functioning and effortful control) as well, especially because research has shown that delays in these domains might be more difficult to overcome than delays in cognitive functioning (Merz, McCall, & Groza, 2013), and because self-regulation has a fundamental impact on development and well-being throughout the lifespan (Mischel et al., 2011; Moffitt, Poulton, & Caspi, 2013).

2.1.2. Effects of age at adoption and of pre-adoption experiences

Ample evidence shows that there is marked heterogeneity in adopted children's outcomes (e.g., Barroso, Barbosa-Ducharne, Coelho, Costa, & Silva, 2017). Although it was

not the main focus of Chapter 2 to investigate factors that may explain this heterogeneity, heterogeneity in outcomes seemed to be related to age at adoption and to variability in adopted children's pre-adoption experiences. Several studies demonstrated that higher age at adoption, which is often used as indicator of duration of pre-adoption deprivation (Hawk et al., 2012), predicted worse cognitive outcomes. For instance, the English and Romanian Adoptee (ERA) study showed that later age at adoption (specifically, adoption after the age of 6 months) was associated with less optimal intellectual functioning, lower levels of school achievement, and worse executive functioning in childhood and adolescence (Beckett et al., 2006; Beckett, Castle, Rutter, & Sonuga-Barke, 2010; Colvert et al., 2008; O'Connor et al., 2000). Despite this, these age effects seemed to have disappeared once the children entered young adulthood (Sonuga-Barke et al., 2017). Furthermore, the BEIP study (Nelson et al., 2007) and the meta-analysis on cognition (Van IJzendoorn et al., 2005) also found evidence for the effects of age at placement in adoptive or in foster families on some, but not all, domains of cognitive development. However, no consensus exists about the exact form of the function relating age at adoption and child outcomes (e.g., linear or stepwise function; Zeanah et al., 2003), and some other studies did not find evidence for age at adoption effects (e.g., Miller, Chan, Tirella, & Perrin, 2009). Moreover, it has increasingly been argued that the quality of pre-adoption experiences might be more influential than age at adoption itself (Dalen, 2012; Odenstad et al., 2008). Therefore, we examined the effects of pre-adoption experiences instead of age at adoption in the current dissertation (Chapters 3-5).

One indicator of the quality of pre-adoption experiences that may play a role and that was studied in the current dissertation, is the type of care children received prior to adoption (e.g., institutional care versus foster care). Indeed, as discussed in Chapter 2, the CAN study revealed that children who were adopted from institutional care in China showed poorer intellectual abilities 2 and 6 months after adoption, than children who were adopted from foster care in China (Van den Dries et al., 2010). However, contrary to these findings, the third follow-up of the CAN study (Chapter 3) demonstrated that the effects of type of pre-adoption care on intellectual functioning had disappeared nine years after adoption. At that time, the post-institutionalized and the post-foster children showed similar intellectual functioning. Moreover, they also did not differ from each other on the other domains of cognitive development that were assessed at age 10. These findings are in contrast with the BEIP study showing that although the children in foster care did not catch up completely to their never-

institutionalized peers, the children in foster care had better cognitive outcomes than the children in institutional care (Bick, Zeanah, Fox, & Nelson, 2017; Fox, Almas, Degnan, Nelson, & Zeanah, 2011; Nelson et al., 2007). A possible explanation for these different findings is that the BEIP study did not study whether institutional care and foster care differentially affected children's development *after adoption*. Previous studies in which the effects of pre-adoption institutional versus foster care after adoption have been investigated, have yielded mixed results. In line with the studies in which no effects of type of pre-adoption care were found (e.g., Katzenstein, LeJeune, & Johnson, 2016), the CAN study found that the post-institutionalized and the post-foster children did not differ from each other nine years after adoption (Chapter 3). This may suggest that the transition to an adoptive family has diminished the initial detrimental effects of institutional rearing. Besides, the finding of the BEIP study that not only the children in the institutional care group but also the children in the foster care intervention group did not show complete catch-up in cognitive development, also contrasts with the CAN study in which both the post-institutionalized and the post-foster children showed complete catch-up (Chapter 3). This different result may be due to the fact that the children in the BEIP study may have experienced more severe prenatal and postnatal adversities than the children in the CAN study. As the children in the CAN study were probably adopted because of the Chinese birth planning policies, it is not unlikely that they have experienced less prenatal adversities (such as alcohol or drug exposure) than Romanian children who are often abandoned due to poverty or alcohol and drug abuse (Gunnar & van Dulmen, 2007; Landgren, Svensson, Strömland, & Andersson Grönlund, 2010). In addition, differences in the extent of early deprivation that Romanian and Chinese children have experienced may play a role in explaining the different results of the BEIP and the CAN study.

Differences in level of early deprivation were included as second indicator of the quality of pre-adoption experiences in the current dissertation. Comparison of the results of the studies summarized in Chapter 2 suggests that children who had experienced more severe pre-adoption deprivation, on average, displayed poorer cognitive functioning than children who had experienced less severe deprivation. For instance, outcomes of studies in which adopted or fostered Romanian children participated (e.g., Rutter & the ERA study team, 1998; Zeanah et al., 2003) generally appeared to be somewhat less favorable than outcomes of studies in which children adopted from other countries than Romania participated, such as the Greek Metera study (Vorria, Ntouma, & Rutter, 2015) and the Leiden Longitudinal

Adoption Study (LLAS; Stams et al., 2000). The less favorable cognitive outcomes of the studies on Romanian children might be explained by the fact that the conditions in Romanian institutions were more severely depriving than the conditions in institutions in many other countries (Woodhouse, Miah, & Rutter, 2018). Besides, the meta-analysis of Van IJzendoorn et al. (2005) also found support for an effect of early deprivation, although only on school achievement, not on intellectual functioning. In contrast, in the third follow-up of the CAN study (Chapter 3) early deprivation was not associated with any of the assessed domains of cognitive development. Thus, contrary to expectations, in the CAN study type of pre-adoption care and early deprivation did not predict the children's cognitive development nine years after adoption. Although this finding contradicts theory and evidence on the adverse effects of institutional care and early deprivation, it is consistent with studies suggesting that the effects of early negative experiences are not deterministic (e.g., Sroufe, Coffino, & Carlson, 2010) and that children are able to recover from early negative experiences (Van IJzendoorn & Juffer, 2006). In Chapter 3, we tested whether parenting explains the lack of association between pre-adoption experiences and cognitive functioning.

2.1.3. The role of adoptive parenting

In general, we did not find strong support for the hypothesized effect of parental sensitivity and parental efficacy on the association between pre-adoption experiences and the domains of cognitive functioning that were studied in Chapter 3. Out of all 48 interactions that we tested, only three interactions were significant and these interactions could not be interpreted straightforwardly. Moreover, these three significant interaction effects were no longer significant after controlling for multiple testing, which may imply that they merely reflected Type I error. Hence, contrary to our predictions based on risk and resilience theories, we conclude that parental sensitivity and parental efficacy generally did not buffer the association between pre-adoption experiences and cognitive development. Although, as far as we know, we were the first to investigate the buffering role of parental sensitivity and parental efficacy in the association between adverse pre-adoption experiences and later cognitive development, Whitten and Weaver (2010) investigated the buffering role of *parent-child relationship quality* on the association between pre-adoption abuse and neglect and school achievement. Similar to our results, Whitten and Weaver (2010) did not find support for a buffering effect of parent-child relationship quality. However, the authors argued that

measurement issues (such as their exclusive reliance on parent-report, and the limited scope of measurement of their outcome variables) might have hampered the ability to detect significant interaction effects. In Chapter 3 we were able to address these limitations, because we not only studied the effects on school achievement but also on other domains of cognitive development, and because we not only relied on parent-report questionnaires, but also included observational measures and standardized tests. In spite of this, we also did not find strong support for buffering effects.

One possible explanation for the non-significant interaction effects in the CAN study (Chapter 3), may be that the lack of significant main effects of pre-adoption experiences and of parenting on the children's cognitive development, made it difficult to find significant interactions. We expected to find buffering interactions between pre-adoption experiences and parenting, so that the effects of adverse pre-adoption experiences would be reduced when parents score higher on parental sensitivity or efficacy. However, given that there were no direct effects of children's pre-adoption experiences and nearly no direct effects of the parenting variables, the only significant interaction effects that could have emerged are cross-over interactions (i.e., the effect of pre-adoption experiences on cognitive development would be opposite depending on whether parents scored low versus high on the parenting variable). Theoretically, however, this is not very plausible, as a cross-over interaction would not only mean that the children who had experienced more pre-adoption adversity would show worse cognitive functioning than children who had experienced less pre-adoption adversity when parenting is compromised, but would also mean that the latter group would outperform the first group when parenting is not compromised.

Furthermore, the lack of significant buffering effects of adoptive parenting may be due to the fact that the heritability of intellectual functioning increases in the transition to middle childhood, whereas the influence of environmental factors decreases (Davis, Haworth, & Plomin, 2009; Del Giudice, 2014). Also self-regulation has been found to have a strong genetic component (Miyake & Friedman, 2012; e.g., Polderman et al., 2006), although links between children's caregiving environment and self-regulation have been reported as well (e.g., Bernier, Carlson, Deschênes, & Matte-Gagné, 2012). Nonetheless, as we only investigated the buffering effects of parental sensitivity and parental efficacy in one sample, more research is needed to investigate whether different findings would be obtained in different samples.

Finally, it is important to note that our findings concerning the lack of buffering effects of parental sensitivity and parental efficacy do not imply that these variables are not important. As mentioned above, the results indicated that the adopted children showed remarkable catch-up in their intellectual functioning nine years after adoption. Although the natural experimental design of the study does not allow for causal inferences, these findings suggest that the drastic shift in caregiving environment that took place after adoption may have contributed to the catch-up. Thus, irrespective of variations in our specific parenting measures, adoption appeared to be an effective intervention for children adopted from institutional or from foster care and for children who had been exposed to different levels of early deprivation. This is in line with the argument that variations in the quality of the adoptive rearing environment may sometimes be too subtle to contribute to the variability in adopted children's outcomes over and above the effects of the drastic shift in caregiving (Castle, Beckett, Rutter, & Sonuaga-Barke, 2008; Croft et al., 2001; Kumsta et al., 2015).

2.2. Behavioral adjustment

Comparable to research findings on adopted children's cognitive development, findings on behavioral adjustment demonstrate heterogeneity among adopted children. In the second part of the current dissertation we investigated (1) whether adverse pre-adoption experiences were associated with this heterogeneity in behavioral adjustment (Chapters 4 and 5), and (2) whether parental sensitivity and parental efficacy acted as a buffer in this association (Chapter 5). In both chapters we studied adaptive behavioral adjustment (Chapter 4: prosocial behavior; Chapter 5: responsiveness), as well as maladaptive behavioral adjustment (Chapters 4 and 5: attention problems, internalizing problems, externalizing problems; and Chapter 5: sleep problems). Before summarizing the most important findings regarding the two main research questions, we present the findings of the comparison of the adopted children's behavioral adjustment with the norm. Given that Dutch norm data were only available for our indicators of maladaptive behavioral adjustment, not for our indicators of adaptive behavioral adjustment, we could only make this comparison for maladaptive behavioral adjustment.

2.2.1. Comparison with a norm group of non-adopted children

Confirming previous studies on children adopted from China (e.g., Rojewski, Shapiro, & Shapiro, 2000; Tan & Marfo, 2006), Chapters 4 and 5 indicated that the adopted Chinese children generally were well adjusted. In the Leiden Questionnaire Study (Chapter 4) a sample of 891 adopted Chinese girls, aged between 4 and 12 years (*M* = 87 months), participated. The girls had similar rates of attention problems and of internalizing problems as the norm group and lower rates of externalizing problems. In the CAN study (Chapter 5) results concerning the comparison of the adopted children's problem scores with the norm group, differed slightly across the three time points, which took place two months, six months, and nine years after adoption. In what follows, we discuss the findings per problem domain.

For attention problems, we found no differences between the adopted children and the norm group of non-adopted children at each time point. This finding and the converging finding of the Leiden Questionnaire Study (Chapter 4) are surprising given that previous studies have repeatedly observed rather persistent, elevated rates of attention problems among adopted children (e.g., Humphreys et al., 2015; Vorria, Ntouma, & Rutter, 2014). However, other studies with children adopted from China also did not find elevated levels of attention problems, with the exception of Dedrick, Tan, and Marfo (2008) who found that attention problems were slightly elevated among Chinese adopted children aged 12-18 years, but not among younger Chinese adopted children (Dedrick et al., 2008; Tan, Dedrick, & Marfo, 2007). In the same vein, the adopted children did not show more externalizing problems than the norm group at the three time points. They even had lower levels of externalizing problems than the norm group at the first two time points, and average levels of externalizing problems at the third time point.

For internalizing problems a different pattern of results emerged. Whereas the children scored lower than the norm group of non-adopted children at the first two time points, they scored higher than the norm at the third time point. The relative increase in internalizing problems between the first two time points and the third time point of the CAN study is in line with previous adoption studies (e.g., Cohen & Farnia, 2011; Tan & Marfo, 2016). However, the above-average levels of internalizing symptoms at the third time point of the CAN study (Chapter 5) contradicts with the average levels of internalizing problems that were reported in the Leiden Questionnaire Study (Chapter 4), and that were reported in other

studies with Chinese adopted children (e.g., Rojewski et al., 2000; Tan & Marfo, 2016; but see Cohen & Farnia, 2011). Children in the Leiden Questionnaire Study, however, were on average slightly younger than children in the CAN study, and correlation analyses in the Leiden Questionnaire Study indicated that the older children had higher rates of internalizing problems than the younger children. Therefore, for the purpose of this discussion, we explored the possibility that the subgroup of children of the Leiden Questionnaire Study who fell in the same age range as children who participated in the third time point of the CAN study (age range 105–140 months) had elevated rates of internalizing problems (M = 5.67, SD = 5.88) compared to the norm group (M = 5.16, SD = 5.02). However, this was not the case, $t(183) = 1.19$, $p = .237$. We have no compelling explanations why children in the CAN study had above-average rates of internalizing problems, whereas children in the Leiden Questionnaire Study or participants of other studies with Chinese adopted children had not (e.g., Rojewski et al., 2000; Tan & Marfo, 2016; but see Cohen & Farnia, 2011). One possibility is that the Leiden Questionnaire study may have yielded a more precise estimate of the population mean of internalizing problems, because the sample size of the Leiden Questionnaire Study (N = 891) was larger than the sample size of the CAN study (N = 92). Finally, contrary to the slightly elevated levels of sleep problems reported in some previous studies on Chinese adopted children (e.g., Rettig & McCarthy-Rettig, 2006; Tan et al., 2007), participants of the CAN study had similar rates of sleep problems at Time 1 and lower rates at Time 2 compared with the norm group. Mean sleep problems scores at Time 3 could not be compared with the norm group, because the CBCL 6-18 that was administered at Time 3 does not contain a sleep problems scale.

2.2.2. Effect of pre-adoption experiences

Concerning the effects of adverse pre-adoption experiences on adopted children's behavioral adjustment, results of Chapters 4 and 5 largely converged in showing that (1) there were no effects of type of pre-adoption care (Chapters 4 and 5), and (2) no (Chapter 5) or only small effects (Chapter 4) of early deprivation on behavioral adjustment. Moreover, in Chapter 5 also no effects of type of pre-adoption care and early deprivation on change in behavioral adjustment over time were found. The finding that type of pre-adoption care did not differentially affect the adopted children's behavioral adjustment contradicts theory on the adverse effects of institutional care. Empirical studies on the differential effects of type of

pre-adoption care on behavioral adjustment are relatively scarce. The few studies that investigated this found that type of pre-adoption care was associated with attention problems, but not associated with internalizing externalizing problems (Gunnar & van Dulmen, 2007; Wiik et al., 2011). Findings of these studies, however, were somewhat limited because the post-institutionalized children were on average adopted at an older age than the post-foster children, and were more often adopted from countries (e.g., Romania) that are known for the severely depriving conditions in their institutions and for severe prenatal deprivation (e.g., alcohol or drug exposure) than the post-foster children. The fact that we could not replicate the effect of type of pre-adoption care on attention problems in our studies, may suggest that the effects on attention problems reported in previous studies were caused by the severe deprivation in the institutions or by prenatal deprivation, rather than by the history of institutional care.

Furthermore, although Chapter 5 did not provide support for an association between early deprivation and behavioral adjustment, evidence for an association between early deprivation and behavioral adjustment was found in Chapter 4. Parents reported that children with higher levels of early deprivation prior to adoption, exhibited less prosocial behavior, more attention problems, and more internalizing and externalizing problems than children with less early deprivation. However, early deprivation only explained a small proportion of variance in the outcome variables, so the inconsistency between the findings of Chapters 4 and 5 could have been due to the substantially smaller sample size in Chapter 5. This may have reduced the power to detect small effects. Nonetheless, the reverse possibility, namely that the study described in Chapter 4 was overpowered, holds as well (Faber & Fonseca, 2014). Furthermore, because the study reported in Chapter 4 was cross-sectional, a second possible explanation for the discrepancy between Chapters 4 and 5 may be that the measure of early deprivation in Chapter 4 might have been more strongly affected by retrospective response bias. This might, in turn, have overestimated the correlations because in Chapter 4 all measures were parent-report measures.

Finally, in Chapter 4 we tested whether age at adoption moderated the association between pre-adoption experiences and behavioral adjustment. No support for the interaction effects was found, indicating that the effects of type of pre-adoption care on behavioral adjustment remained non-significant irrespective of children's age at adoption (within the range of 3 to 62 months), and that the strength of the associations between early deprivation

and behavioral adjustment did not increase with increasing age at adoption. In conclusion, no evidence was found for an association between pre-adoption experiences and behavioral adjustment (Chapters 4 and 5), with the exception of a small effect of early deprivation in Chapter 4. These results did not differ depending on the children's age at adoption (Chapter 4).

2.2.3. The role of adoptive parenting

Besides investigating the associations between pre-adoption experiences and behavioral adjustment, we tested whether parental sensitivity and parental efficacy buffered these associations in the CAN study (Chapter 5). The longitudinal design of the CAN study allowed examining the buffering influence of parenting in the development of behavioral adjustment *over time* (between infancy and middle childhood). This is important because some evidence shows that adopted children are especially at risk to develop elevated levels of behavioral problems as they enter middle childhood (Juffer & Van IJzendoorn, 2005), which was also the case in our study with respect to internalizing problems. Results, however, generally did not support our hypotheses. Out of the 30 interactions, only two interaction effects were significant and both interactions may reflect Type I error instead of real effects as they were no longer significant after controlling for multiple testing. Thus, contrary to expectations, we cannot conclude that parental sensitivity and efficacy buffered the association between pre-adoption experiences and change in behavioral adjustment over time.

Although, as far as we know, no previous adoption studies have investigated the buffering effect of parental sensitivity and parental efficacy in the association between pre-adoption experiences and behavioral adjustment, our results contradict with adoption studies providing first, though mainly cross-sectional evidence for buffering effects of other parenting factors (e.g., Ji, Brooks, Barth, & Kim, 2010; Kriebel & Wentzel, 2011). Kriebel and Wentzel (2011), for instance, found evidence for a buffering effect of child-centered parenting (i.e., warm, involved parenting) in the association between cumulative risk factors and adaptive child behavior at home. Furthermore, Ji, Brooks, Barth, and Kim (2010) reported that family sense of coherence (i.e., families' capacity to cope with stress) buffered the association between pre-adoption maltreatment and development of depressive symptoms. The contrasting results of the CAN study (Chapter 5) and these two studies might be due to

methodological differences. In contrast to the studies of Kriebel and Wentzel (2011) and of Ji et al. (2010), the CAN study had a longitudinal design and parenting in the CAN study was assessed using observational measures instead of parent-report questionnaires (with the exception of parental efficacy). Besides, another possible explanation why we did not find evidence for interaction effects between pre-adoption experiences and adoptive parenting, may come from the fact that there were no or only few direct effects of pre-adoption experiences and of adoptive parenting on behavioral adjustment (see also Section 2.1.3.). Furthermore, it may be that we did not find evidence for buffering effects of adoptive parenting, because we did not include child characteristics (e.g., temperament, genetic constellation) that may impact children's susceptibility to parenting influences (see also Section 4. Directions for future research). Hence, possible buffering effects of parenting may have been obscured because they may have been averaged across more and less susceptible children. Nonetheless, despite the fact that we did not find evidence for buffering effects of parenting, the children were well-adjusted with the exception of the elevated levels of internalizing problems (Chapter 5).

2.3. Conclusion

In sum, the CAN study and the Leiden Questionnaire Study demonstrated that the Chinese adopted children on average were well-adjusted in terms of their cognitive and their behavioral adjustment in middle childhood. The initial delays in the children's intellectual abilities that were present in the first months after adoption, had diminished nine years later (Chapter 3). In the same way, the initial differential effects of type of pre-adoption care on the children's intellectual functioning had disappeared. Children adopted from institutional care or foster care did not differ in their cognitive functioning (Chapter 3), nor in their behavioral adjustment (Chapters 4 and 5) in middle childhood. Similarly, there were no effects of early deprivation on cognitive development (Chapter 3), and no (Chapter 5) or only small effects (Chapter 4) of early deprivation on the children's adaptive and maladaptive behavioral adjustment. Finally, we found little evidence for buffering effects of parental sensitivity and parental efficacy in the association between pre-adoption experiences and cognitive (Chapter 3) and behavioral adjustment (Chapter 5). In short, the effects of adoption and the effects of pre-adoption experiences on children's cognitive and behavioral adjustment declined over time and parenting did not seem to act as a buffer in the association between pre-adoption

experiences and later outcomes. Despite this the children were well-adjusted in middle childhood, which points to the importance of adoption in the care of deprived children.

3. General strengths and limitations

In this section we discuss the general strengths and limitations of the empirical studies of the current dissertation (Chapters 3-5). Specifically, we discuss limitations (1) with respect to our two samples, (2) with respect to the measurement of our main variables, and (3) with respect to the design of our studies and the analyses we performed. These limitations should be taken into account in the interpretation of the results of our studies, because some may have hampered the ability to detect significant effects of pre-adoption experiences and significant buffering effects of parenting.

3.1. Samples

Our two samples were homogeneous with respect to country of origin because in both samples only Chinese adopted children were included. On the one hand, this can be seen as a strength of our studies, because our results cannot be confounded by between-countries differences in, for example, the main reasons for adoption, risks for prenatal adversities, or quality of pre-adoption conditions. Moreover, it is an important strength of our studies that the children who were adopted from institutional care or from foster care did not differ from each other with respect to their birth country or mean age at adoption. In this way our study added to previous studies on the effects of type of pre-adoption care, because in many previous studies type of pre-adoption care and age at adoption varied among the post-institutionalized and the post-foster children. On the other hand, however, the fact that our samples were homogeneous with respect to birth country can also be seen as a limitation, because our results may not be generalizable to children adopted from other countries. Hence, it remains to be investigated whether or not the findings of the current dissertation generalize to these children. Moreover, because only girls participated in our study, we do not know whether our findings are generalizable to adopted boys.

A second limitation, which is an inherent limitation of adoption research, is that our studies may suffer from selection bias with respect to which children were placed for adoption. It has been argued that children who are adopted may differ in important ways

(e.g., show a more favorable development) from children who stay in their birth country (Zeanah et al., 2003), which may bias the results of adoption studies.

Third, the findings of the CAN studies (Chapters 3 and 5) are limited by the small sample size. As this may have reduced the power to find significant effects, there is need to study our two research questions in larger samples. However, despite the small sample size of the CAN study, it is a strength that the retention rate was high (only 5 of 92 families dropped out from Time1-2 to Time 3).

3.2. Measurement of the main model variables

3.2.1. Measurement of pre-adoption experiences

An important limitation that applies to the three empirical chapters is the fact that we measured children's pre-adoption experiences indirectly through parent-report. One problem with parent-report is that adoptive parents often receive only limited information about their child's early experiences (Juffer et al., 2011). Indeed, some parents in our studies reported that they did not know whether or not their child had experienced a specific pre-adoption adversity, such as sub-nutrition or socio-emotional neglect. Another problem with parent-report, is that the information that adoptive parents receive on their child's background is not always accurate (Juffer et al., 2011; Miller & Hendrie, 2000). Anecdotically, a few parents who participated in the third time point of the CAN study mentioned during the home visit that they found out that they had received incorrect information about, for instance, their child's date of birth, about the place where their child had been found, or about the places where their child had lived prior to adoption. These two problems with parent-report may have affected the reliability of the pre-adoption experiences measures, and may have reduced the likelihood to detect significant effects of pre-adoption experiences on later adjustment. However, it is important to mention that this limitation is not unique to the current studies, but applies to most, if not all, intercountry adoption studies (Hawk et al., 2012). Besides, it is important to acknowledge that post-adoption measures of pre-adoption experiences may be confounded with other risk factors that already existed before children were orphaned or abandoned (such as genetic predispositions, and pre- and perinatal adversities) and that may impact children's adjustment (Hawk et al., 2012; Juffer et al., 2011). Thus, if possible, future research might profit from adopting a more comprehensive approach

in the assessment of pre-adoption risk factors, by including not only indicators of the quality of pre-adoption care, but also information on children's genetic makeup and their pre- and perinatal history.

Another limitation with respect to the pre-adoption experiences measure, is the fact that in the CAN study (Chapters 3 and 5) we did not differentiate between children who had exclusively lived in foster care prior to adoption and children who had lived in foster care as well as in institutional care. As the size of this first group was quite small (*n* = 16 at Time 1), this group was combined with the group of children who had experienced both pre-adoption institutional care as well as foster care (*n* = 26 at Time 1), and this combined group was contrasted with the group of post-institutionalized children (*n* = 50 at Time 1) who had mainly lived in institutional care prior to adoption and had lived for maximum one month in other types of care (such as foster care). Hence, the boundaries between the group of the post-institutionalized and the post-foster children were less well-defined - a few post-foster children had stayed nearly as long in institutional care (range institutional care 1.44-14.85 months) as the post-institutionalized children (range institutional care 10-16 months). This limitation may provide an alternative explanation why no effects of type of pre-adoption care were found at the third time point of the CAN study. However, contrasting this explanation, type of pre-adoption care differentially affected some outcomes, such as cognitive development, at the first two time points of the study (Van den Dries et al., 2010; Van den Dries, Juffer, Van IJzendoorn, Bakermans-Kranenburg, & Alink, 2012). In addition, in the Leiden Questionnaire Study (Chapter 4) – in which we could differentiate the group of children who had exclusively lived in foster care from the group of children who had lived in both institutional and foster care - also no effects of type of pre-adoption care on behavioral adjustment were found. Although this finding should be interpreted cautiously as the size of the exclusively foster care group was relatively small compared to the size of the other two groups, this finding suggests that it is possible that in the CAN study at Time 3 (at least for behavioral adjustment) also no type of pre-adoption care effects would have been found if both groups of foster children would have been treated separately. Indeed, additional analyses of the first two time points of the CAN study revealed that results of the main analyses did not differ when the children who had experienced a combination of pre-adoption institutional and foster care were excluded from the analyses (Van den Dries et al., 2010).

3.2.2. Measurement of parental sensitivity and parental efficacy

A strength of the CAN study (Chapters 3 and 5) is that we applied a mixed-method approach in the assessment of parenting. We used observational measures to assess behavioral aspects of parenting (parental sensitivity) and parent report to assess cognitive aspects of parenting (parental efficacy). This way we aimed to add to the relatively scarce literature on parenting in adopted children. Our observational and parent-report measures, however, were not without limitations which should be considered when drawing conclusions about our findings.

In the assessment of parental sensitivity, we made use of the supportive presence and the intrusiveness scale of the Erickson observation scales (Egeland, Erickson, Clemenhagen-Moon, Hiester, & Korfmacher, 1990; Erickson, Sroufe, & Egeland, 1985). Although observational measures of parenting behavior have several advantages in comparison with parent-report questionnaires (e.g., observations do not suffer from reporter bias), observational measures are also subject to some limitations. One of these limitations is that our observations may lack ecological validity because the parents may have behaved differently during the observations than they usually do because they were aware that they were being observed (i.e., observer reactivity; Aspland & Gardner, 2003). In addition, our observations may lack ecological validity because the parent-child interactions that were elicited during the observation tasks at the lab visit (Time 1 and 2) or home visit (Time 3) may differ from parent-child interactions in typical day-to-day situations.

One other concern about our observational measures is that the original Erickson scales may not have been entirely age appropriate at Time 3, because they were originally developed for use with toddlers and preschoolers. However, we adapted the coding system slightly to make it more age appropriate for the observations at Time 3 (e.g., by taking the more verbal nature of parent-child interactions in middle childhood into account; in line with Stams, Juffer, & Van IJzendoorn, 2002). Further, previous research has found support for valid use of the Erickson scales to code sensitivity in middle childhood (e.g., Alink et al., 2009; Stams et al., 2002). Nonetheless, despite the alterations that we made to the coding system to try to ensure that we measured the same constructs, we cannot be certain about construct invariance over time.

Finally, a limitation in our assessment of parental efficacy is that we only assessed general parental efficacy, and that we did not include task-relevant measures of parental efficacy (i.e., parents' feeling of competence in their parenting role in a specific task such as helping their child to do their homework) or narrow-domain measures of parental efficacy (i.e., parents' feelings of competence in a specific parenting domain such as promotion of learning; Jones & Prinz, 2005). It might be that more specific measures of parental efficacy (e.g., promotion of learning) could be more influential for specific child outcomes (e.g., cognitive development) than general measures of parental efficacy. Therefore, for future adoption studies we suggest to (also) include task-specific or narrow-domain measures of parental efficacy. Nonetheless, it is a strength of the current studies that we assessed general parental efficacy because, as far as we know, the effects of parental efficacy on child outcomes have not yet been studied in adoptive families. Although in the CAN study (Chapters 3 and 5) few evidence was found for buffering effects of parental sensitivity, the correlation analyses demonstrated that parental efficacy was associated with some outcomes in the behavioral domain and with better reading comprehension at school.

3.2.3. Measurement of cognitive and behavioral development

We consider it a strength of the current dissertation that we used a broad approach to assess the main outcome variables. In the assessment of cognitive development we included different domains of cognitive development, namely intellectual functioning, school achievement and self-regulation. This is meaningful because research has shown that these different domains are differentially affected by early experiences (Merz et al., 2013; Van IJzendoorn et al., 2005). In the assessment of behavioral development, we included measures of maladaptive behavioral adjustment as well as of adaptive behavioral adjustment. This way, our study is a valuable contribution to the adoption literature that has focused primarily on maladaptive behavioral outcomes. Despite this, there are some limitations to the measurement instruments used to assess the outcome variables in the current studies.

We first discuss the limitations to the measures that we used to assess the various domains of cognitive development in the CAN study. First, as described in Chapter 3, the findings concerning intellectual functioning should be interpreted with caution because we only assessed two broad cognitive abilities (namely crystallized and fluid intelligence), although it is necessary to assess multiple broad cognitive abilities to obtain a valid

assessment of intellectual functioning and to estimate children's total IQ. Second, it has been demonstrated that individual differences in performance on CITO tests (the nationwide standardized tests of school achievement in the Netherlands) may reflect individual differences in intelligence, and that these individual differences are largely explained by genetic effects and less by environmental effects (Bartels, Rietveld, Van Baal, & Boomsma, 2002). The large heritability of CITO scores may explain why we did not find evidence for buffering effects of parenting in Chapter 3. As it might be that non-standardized school performance tests (school results, homework) are more affected by environmental factors than standardized CITO tests, it would be interesting to examine whether parenting buffers adopted children's performance on such tests. Nonetheless, this might be difficult to test because the non-standardized school results of children who attend different schools are not necessarily directly comparable. Besides, it is important to mention that the use of CITO scores in the assessment of school achievement is valuable, because much importance is attached to these tests in the Netherlands for educational decision making (Bartels et al., 2002). Third, due to time constrains we only assessed two components of executive functioning in the CAN study (Chapter 3), namely executive problem solving and response inhibition. However, because different components of executive functioning differ in their susceptibility to the effects of early adversities and differ in their potential for recovery (Merz, Harlé, Noble, & McCall, 2016), our findings are not generalizable to other executive functioning components, such as working memory and shifting. Hence, for future studies it is recommended to include a more comprehensive executive functioning test battery.

With respect to behavioral adjustment, the main shortcoming of the current studies is that the assessment of children's behavioral adjustment was solely based on the report by one parent (with the exception of the observation of child responsiveness as indicator for adaptive behavioral adjustment in Chapter 5). The questionnaires on adaptive and maladaptive behavioral adjustment were completed mainly by the children's mothers and in a minority of children by their fathers. Although maternal report yields valuable information about child functioning, it would have been desirable to involve multiple informants, such as fathers and teachers. Considering reports of multiple informants is important because studies in non-adoptive (De Los Reyes & Kazdin, 2005; Grietens et al., 2004; Verhulst & Akkerhuis, 1989) and in adoptive families (Rosnati, Barni, & Montirosso, 2010; Rosnati, Montirosso, & Barni, 2008; Stams et al., 2000) have shown that different informants only partially agree on

their ratings of children's behavioral adjustment. These discrepancies among informants are meaningful as they not necessarily reflect informant bias, but may also reflect actual differences in children's behaviors (De Los Reyes, 2011; De Los Reyes, Henry, Tolan, & Wakschlag, 2009; Grietens et al., 2004). Similarly, it would have been valuable to combine other-report with child self-report, because research in non-adopted children showed that children may rate their behavioral adjustment differently than their parents do (Rey, Schrader, & Morris-Yates, 1992; Verhulst & Van Der Ende, 1992) and because there is a lack of studies in which self-report of middle-childhood-aged adopted children is included (but see Wiik et al., 2011).

3.3. Design and data-analysis

As mentioned previously, a limitation of the Leiden Questionnaire Study (Chapter 4) is that it had a cross-sectional design. Consequently, we do not know whether the small, yet significant associations between early deprivation and behavioral adjustment reflect actual effects of early deprivation on later adjustment. In contrast, an important strength of our other study, the CAN study (Chapters 3 and 5), is that it is a longitudinal study. However, we acknowledge that there are some limitations to the traditional statistical methods that we used to analyze the data (namely moderation analyses in Chapter 3 and repeated measures analyses in Chapter 5). A particular limitation of these techniques, is that they cannot handle time-varying covariates (i.e., variables which values can change as a function of time, such as parenting). Therefore we computed a longitudinal compound score for each of our three parenting variables (supportive presence, intrusiveness, parental efficacy) over the three time points. But, hence, we could not investigate the impact of change in parenting over time, nor the unique impact of parenting at each time point. These questions could have been addressed if we had used more sophisticated methods for analyzing longitudinal data (such as Latent Growth Curve Modelling [LGM]), because these methods can incorporate time-varying covariates. Nonetheless, because our sample size was rather low, LGM seemed not to be the most adequate technique to apply to our data.

4. Directions for future research

The fact that we found little to no evidence for long-term negative effects of early adversities nor for buffering effects of parenting raises the question which other factors may

explain the individual differences found in the post-adoption developmental pathways in the current samples, or in adoption samples in general. Although several factors may be involved and are worth investigating - such as recent stressful events (Loman & Gunnar, 2010; Tan, Camras, Deng, Zhang, & Lu, 2012), discrimination (R. M. Lee, 2010), adoptive or ethnic identity (Grotevant & McDermott, 2014; J. P. Lee, Lee, Hu, & Kim, 2015), and child temperament (e.g., Van der Voort et al., 2014; Van der Voort, Linting, Juffer, Bakermans-kranenburg, & Van IJzendoorn, 2013) - one specific child-related resilience mechanism is of special importance, namely variations in children's genetic makeup. Research on the role of genetic factors in adopted children's development is still in its infancy, but gradually emerging evidence suggests that genetic factors may affect children's susceptibility to early adverse experiences (Van IJzendoorn et al., 2011). Two possible (interrelated) mechanisms that may account for the interaction between genetic and environmental factors in the prediction of child outcomes, are differential susceptibility and epigenetic mechanisms (Van IJzendoorn et al., 2011).

First, according to the differential susceptibility hypothesis individuals differ in their susceptibility to environmental influences in a for-better-and-for-worse manner (Belsky & Pluess, 2009). This means that individuals with certain genotypic characteristics are more susceptible to the adverse effects of negative environments as well as to the beneficial effects of positive environments, whereas individuals with non-susceptible genotypes are less affected by their environment (Belsky & Pluess, 2009). In keeping with the differential susceptibility hypothesis, some adoption studies found that genetic markers of differential susceptibility (related to the dopaminergic or serotonergic system) moderate the impact of pre-adoption adversity on adopted children's developmental outcomes (e.g., Brett et al., 2015; Kumsta et al., 2010; Li, Tan, Camras, Chen, & Moyzis, 2014). Although some adoption studies have investigated the moderating role of these genetic markers in the association between pre-adoption adversity and later outcomes, to the best of our knowledge, the interactions between these genetic markers and adoptive parenting have not yet been investigated in adopted children. Numerous studies in non-adopted children, however, have demonstrated that the association between parenting and child outcomes can be moderated by genetic factors in a differential susceptibility manner (Bakermans-Kranenburg & Van IJzendoorn, 2011; Van IJzendoorn & Bakermans-Kranenburg, 2015; Windhorst et al., 2015) (but see Belsky et al., 2015). Moreover, it has even been found that the effectiveness of

interventions may depend on children's genotypic susceptibility (for an overview, see Bakermans-Kranenburg & Van IJzendoorn, 2015). Hence, the question arises whether we did not find support for buffering interaction effects of parenting in the CAN study, because the children may have differed in their susceptibility to the effects of parenting. Future adoption research may profit from investigating adopted children's differential susceptibility, not only to pre-adoption risk factors, but also to adoptive parenting or other characteristics of the post-adoption environment. It might, for instance, be interesting to study whether the (same) genotypic markers that modify the impact of pre-adoption adversities may also modify the impact of adoptive parenting. This would allow to test the tentative hypothesis that (the same) children who are more affected by early adversity, profit more from sensitive parenting.

The second possible mechanism refers to the possibility that environmental events can influence epigenetic mechanisms. Epigenetic mechanisms (such as DNA methylation) regulate the expression and hence the activity of genes, without changing the structure of the genes (Lester, Conradt, & Marsit, 2016). In case of DNA methylation, higher levels of methylation of particular genes are associated with lower levels of gene expression (Lester et al., 2016). Emerging evidence shows that the social environment can lead to epigenetic changes (Lester et al., 2016; van IJzendoorn, Bakermans-Kranenburg, & Ebstein, 2011). However, there is a shortage of knowledge on whether such epigenetic changes may mediate the link between the social environment and child outcomes. This link is studied in the recent field of behavioral epigenetics (Lester et al., 2016). Naumova et al. (2016) provided first evidence that the social environment can impact outcomes through epigenetic mechanisms. Specifically, the authors found that the change in offspring's perceptions of parental rejection over time (from middle childhood to adulthood) was associated with increased methylation of hundreds of genes of which some, in turn, were associated with the offspring's psychosocial adjustment in adulthood (Naumova et al., 2016). In another study, Bosmans, Young, and Hankin (2018) showed that increased methylation of the glucocorticoid receptor gene interacted with maternal support and with stress exposure in the prediction of anxious attachment development among adolescents. When adolescents experienced high levels of stress and low levels of maternal support they reported higher levels of anxious attachment 18 months later, but only when their glucocorticoid receptor gene was highly methylated. A promising area for future research is to apply the field of behavioral epigenetics to the study

of adopted children. As far as we know, currently only two studies have investigated epigenetic changes in institutionalized (Naumova et al., 2012) or in post-institutionalized adopted children (Kumsta et al., 2016). In these studies it was found that institutionalized children generally showed more methylation than children raised by their biological parents (e.g., in genes involved in brain development; Naumova et al., 2012), and that exposure to prolonged institutional deprivation was associated with increased methylation in the promotor region of the cytochrome P450 2E1 gene (CYP2E1) which was associated with impaired social cognition, namely theory of mind and cognitive impairment (Kumsta et al., 2016). Despite the pioneering importance of both studies, their cross-sectional design precludes drawing causal inferences about the possible mediating role of epigenetic changes in the association between pre-adoption deprivation and developmental outcomes. Hence, there is need for longitudinal adoption studies in which epigenetic alterations, and their causes and consequences are studied over time. It might, for instance, be interesting to study whether epigenetic changes resulting from adverse pre-adoption experiences can be altered by positive experiences following adoption, as such contributing to children's resilience.

5. Clinical implications

As reported above, the findings of the current dissertation showed that the Chinese adopted children showed complete catch-up in their cognitive development and were generally well-adjusted in terms of their behavioral adjustment in middle childhood. Moreover, the initial detrimental effects of pre-adoption institutional care compared to pre-adoption foster care on cognitive development had disappeared nine years later and there were also no effects of early deprivation on cognitive development. Similarly, there were no effects of type of pre-adoption care and no or only small effects of early deprivation on behavioral adjustment. Hence, the primary clinical implication that arises from our findings is that adoption can be seen as an effective intervention in the development of adopted children (converging with Van IJzendoorn & Juffer, 2006) and that merely attributing individual differences in developmental outcomes to early adverse experiences is too simplistic. As an aside, it is important to mention that our findings do not mean that variability in the quality of children's pre-adoption experiences did not matter at all for children's later outcomes, as findings of the first two time points of the CAN study demonstrated negative effects of institutional care versus foster care on children's cognitive development. Rather our findings

imply that in general adopted children are resilient and able to overcome initial deficits, and that - in keeping with the argument of Woodhouse and Rutter (2018) - institutional care is not inevitably damaging on the long run.

Despite this, there was one exception to the pattern of results, namely participants of the CAN study showed somewhat elevated levels of internalizing problems compared to the norm group in middle childhood, which was not yet the case in the first months after adoption (Chapter 5). Based on the current results it is difficult to draw conclusions about factors that may explain the emergence of above-average levels of internalizing problems, as we found no protective interaction effects of parenting and as other factors that may play a role (such as increased understanding of and reflection on the meaning of adoption in middle childhood; Brodzinsky, 1987) were not included in the study. However, correlation analyses revealed that there was a significant negative correlation between parental efficacy and internalizing problems. Although we cannot draw causal conclusions about the direction of this effect, this association might be relevant for practice because it may suggest that higher levels of parental efficacy may link to lower levels of internalizing symptoms. Studies in non-adopted children have also reported evidence for a link between parental efficacy and internalizing problems (e.g., Côté et al., 2009; Jones & Prinz, 2005). Hence, if the association between parental efficacy and internalizing problem can be replicated in future adoption studies, it might be interesting to develop and test interventions that aim to prevent or to remediate the development of internalizing problems through increasing parental efficacy. Although as far as we know, no such interventions have been developed for use with adoptive families, findings of pioneering intervention studies in non-adopted children have shown that parental efficacy may be a relevant variable to target in parenting programs to contribute to positive child behavior. For instance, a pioneering study conducted by Mouton and Roskam (2015) demonstrated that parental efficacy could be manipulated experimentally (e.g., through provision of positive feedback and social comparison) which in turn contributed to positive changes in child behavior (namely a composite measure of positive affect, persistence, non-compliance aggression and irritability). Similarly in an intervention study it was found that improvement of parental efficacy was related to a decrease in child externalizing problems (Roskam, Brassart, Loop, Mouton, & Schelstraete, 2015). Although these studies did not focus on internalizing problems and although replication studies are needed, results of these

studies are promising. Nonetheless, before considering implementing these ideas into adoption practice, more research on parental efficacy in adoptive families is certainly needed.

6. Final conclusion

The main aim of the current dissertation was to improve our understanding about factors that may play a role in explaining individual differences in adopted children's cognitive and behavioral development. We examined (1) whether children's pre-adoption experiences were associated with their cognitive and behavioral adjustment, and (2) whether parental sensitivity and parental efficacy buffered these associations. These research objectives were examined in adopted Chinese children who participated in the longitudinal CAN study (research question 1 and 2), or in the Leiden Questionnaire Study (research question 1 behavioral adjustment). Results generally were not in line with our hypotheses. Although type of pre-adoption care was related to cognitive development in the first months after adoption in the CAN study, this effect had disappeared nine years later (Chapter 3). Similarly, type of pre-adoption care was not associated with children's behavioral adjustment, nor in the CAN study (Chapter 5), nor in the Leiden Questionnaire Study (Chapter 4). Concerning early deprivation, the findings were mixed. Although in the CAN study no associations between early deprivation and cognitive (Chapter 2) or behavioral adjustment (Chapter 5) were found, in the Leiden Questionnaire Study small but significant associations between early deprivation and behavioral adjustment emerged (Chapter 4). Furthermore, with a few exceptions we found no evidence for significant interactions between adverse pre-adoption experiences and parental sensitivity or parental efficacy in the prediction of cognitive development (Chapter 3) or change in behavioral adjustment (Chapter 5). Despite this, the adopted children were well-adjusted in terms of their cognitive and behavioral adjustment, with the exception that the children in the CAN study showed somewhat elevated levels of internalizing problems (Chapter 5). The finding that the children did well despite having experienced early adversities, provides remarkable evidence for their resilience.

REFERENCES

Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for the ASEBA Preschool Forms and Profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.

Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA School-Age Forms & Profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth & Families.

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, NJ: Erlbaum.

Alfonso, V. C., Flanagan, D. P., & Radwan, S. (2005). The impact of the Cattell-Horn-Carroll theory on test development and interpretation of cognitive and academic abilities. In D. P. Flanagan & P. L. Harrison (Eds.), *Contemporary intellectual assessment: Theories, tests and issues* (2nd ed., pp. 185–202). New York: Guilford.

Alink, L. R. A., Mesman, J., Van Zeijl, J., Stolk, M. N., Juffer, F., Bakermans-Kranenburg, M. J., … Koot, H. M. (2009). Maternal sensitivity moderates the relation between negative discipline and aggression in early childhood. *Social Development*, *18*(1), 99–120. https://doi.org/10.1111/j.1467-9507.2008.00478.x

Aspland, H., & Gardner, F. (2003). Observational measures of parent-child interaction: An introductory review. *Child and Adolescent Mental Health*, *8*(3), 136–143. https://doi.org/10.1111/1475-3588.00061

Audet, K., & Le Mare, L. (2010). Mitigating effects of the adoptive caregiving environment on inattention/overactivity in children adopted from Romanian orphanages. *International Journal of Behavioral Development*, *35*(2), 107–115. https://doi.org/10.1177/0165025410373313

Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2011). Differential susceptibility to rearing environment depending on dopamine-related genes: New evidence and a meta-analysis. *Development and Psychopathology*, *23*(1), 39–52. https://doi.org/10.1017/S0954579410000635

Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2015). The hidden efficacy of interventions: Gene × environment experiments from a differential susceptibility perspective. *Annual Review of Psychology*, *66*(1), 11.1–11.29. https://doi.org/10.1146/annurev-psych-010814-015407

Baochang, G., Feng, W., Zhigang, G., & Erli, Z. (2007). China's local and national fertility policies at the end of the twentieth century. *Population and Development Review*, *33*(1), 129–147. https://doi.org/10.1111/j.1728-4457.2007.00161.x

Barroso, R., Barbosa-Ducharne, M., Coelho, V., Costa, I.-S., & Silva, A. (2017). Psychological adjustment in intercountry and domestic adopted ddolescents: A systematic review. *Child and Adolescent Social Work Journal*, *34*(5), 399–418. https://doi.org/10.1007/s10560-016-0485-x

Bartels, M., Rietveld, M. J. H., Van Baal, G. C. M., & Boomsma, D. I. (2002). Heritability of educational

achievement in 12-year-olds and the overlap with cognitive ability. *Twin Research and Human Genetics*, *5*(6), 544–553. https://doi.org/10.1375/twin.5.6.544

Beckett, C., Castle, J., Rutter, M., & Sonuga-Barke, E. J. (2010). VI. Institutional deprivation, specific cognitive functions, and scholastic achievement: English and Romanian Adoptee (ERA) study findings. *Monographs of the Society for Research in Child Development*, *75*(1), 125–142. https://doi.org/10.1111/j.1540-5834.2010.00553.x

Beckett, C., Maughan, B., Rutter, M., Castle, J., Colvert, E., Groothues, C., … Sonuga-barke, E. J. S. (2006). Do the effects of early severe deprivation of cognition persist into early adolescence? Findings from the English and Romanian Adoptees Study. *Child Development*, *77*(3), 696–711. https://doi.org/10.1111/j.1467-8624.2006.00898.x

Beckett, C., Maughan, B., Rutter, M., Castle, J., Colvert, E., Groothues, C., … Sonuga-Barke, E. J. S. (2007). Scholastic attainment following severe early institutional deprivation: A study of children adopted from Romania. *Journal of Abnormal Child Psychology*, *35*(6), 1063–1073. https://doi.org/10.1007/s10802-007-9155-y

Behen, M. E., Helder, E., Rothermel, R., Solomon, K., & Chagani, H. T. (2008). Incidence of specific absolute neurocognitive impairment in globally intact children with histories of early severe deprivation. *Child Neuropsychology*, *14*(5), 453–469. https://doi.org/10.1080/09297040802244136

Bell, B. G., & Belsky, J. (2008). Parents, parenting, and children's sleep problems: Exploring reciprocal effects. *British Journal of Developmental Psychology*, *26*(4), 579–593. https://doi.org/10.1348/026151008x285651

Belsky, J., Fearon, R. M. P., & Bell, B. G. (2007). Parenting , attention and externalizing problems: testing mediation longitudinally , repeatedly and reciprocally. *Journal of Child Psychology and Psychiatry, 48*(12), 1233–1242. https://doi.org/10.1111/j.1469-7610.2007.01807.x

Belsky, J., Newman, D. A., Widaman, K. F., Rodkin, P., Pluess, M., Fraley, R. C., … Roisman, G. I. (2015). Differential susceptibility to effects of maternal sensitivity? A study of candidate plasticity genes. *Development and Psychopathology*, *27*(3), 725–746. https://doi.org/10.1017/S0954579414000844

Belsky, J., & Pluess, M. (2009). Beyond diathesis stress: Differential susceptibility to environmental influences. *Psychological Bulletin*, *135*(6), 885–908. https://doi.org/10.1037/a0017376

Benzies, K., & Mychasiuk, R. (2009). Fostering family resiliency: A review of the key protective factors. *Child and Family Social Work*, *14*(1), 103–114. https://doi.org/10.1111/j.1365-2206.2008.00586.x

Berg, W. K., & Byrd, D. L. (2002). The Tower of London Spatial Problem-Solving Task: Enhancing

clinical and research implementation. *Journal of Clinical and Experimental Neuropsychology*, *24*(5), 586–604. https://doi.org/10.1076/jcen.24.5.586.1006

Bernier, A., Carlson, S. M., Deschênes, M., & Matte-Gagné, C. (2012). Social factors in the development of early executive functioning: A closer look at the caregiving environment. *Developmental Science*, *15*(1), 12–24. https://doi.org/10.1111/j.1467-7687.2011.01093.x

Bernier, A., Carlson, S. M., & Whipple, N. (2010). From external regulation to self-regulation : Early parenting precursors of young children's executive functioning. *Child Development*, *81*(1), 326–339. https://doi.org/10.1111/j.1467-8624.2009.01397.x

Bick, J., Zeanah, C. H., Fox, N. A., & Nelson, C. A. (2017). Memory and executive Functioning in 12-year-old children with a history of institutional rearing. *Child Development*, *89*(2), 495–508. https://doi.org/10.1111/cdev.12952

Biederman, J., Monuteaux, M. C., Doyle, A. E., Seidman, L. J., Wilens, T. E., Ferrero, F., … Faraone, S. V. (2004). Impact of executive function deficits and attention-deficit/hyperactivity disorder (ADHD) on academic outcomes in children. *Journal of Consulting and Clinical Psychology*, *72*(5), 757–766. https://doi.org/10.1037/0022-006X.72.5.757

Bimmel, N., Juffer, F., Van IJzendoorn, M. H., & Bakermans-kranenburg, M. J. (2003). Problem behavior of internationally adopted adolescents : A review and meta-analysis. *Harvard Review of Psychiatry, 11*(2), 64–77. https://doi.org/10.1080/10673220303955

Biringen, Z., Robinson, J. L., & Emde, R. N. (2000). Appendix B: The Emotional Availability Scales (3rd ed.; an abridged Infancy/Early Childhood Version). *Attachment & Human Development*, *2*(2), 256–270. https://doi.org/10.1080/14616730050085626

Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist*, *59*(1), 20–28. https://doi.org/10.1037/0003-066X.59.1.20

Bongaarts, J., & Greenhalgh, S. (1985). An alternative to the one-child policy in China. *Population and Development Review*, *11*(4), 585–617. https://doi.org/10.2307/1973456

Bornstein, M. H., Hendricks, C., Haynes, O. M., & Painter, K. M. (2007). Maternal sensitivity and child responsiveness: Associations with social context, maternal characteristics, and child characteristics in a multivariate analysis. *Infancy, 12*(2), 189–223. https://doi.org/10.1080/15250000701407525

Bos, K. J., Fox, N. A., Zeanah, C. H., & Nelson, C. A. (2009). Effects of early psychosocial deprivation on the development of memory and executive function. *Frontiers in Behavioral Neuroscience*, *3*(September), 1–7. https://doi.org/10.3389/neuro.08.016.2009

Bosmans, G., Young, J., & Hankin, B. L. (2018). NR3C1 methylation as a moderator of the effects of

maternal support and stress on insecure attachment development. *Developmental Psychology*, *54*(1), 29–38. https://doi.org/10.1037/dev0000422

Bouchard, T. J. (2013). The Wilson Effect: The increase in heritability of IQ with age. *Twin Research and Human Genetics*, *16*(5), 923–930. https://doi.org/10.1017/thg.2013.54

Bowlby, J. (1951). *Maternal care and mental health*. Geneva: World Health Organization.

Brennan, P. A., Le Brocque, R., & Hammen, C. (2003). Maternal depression, parent-child relationships, and resilient outcomes in adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*, *42*(12), 1469–1477. https://doi.org/10.1097/00004583-200312000-00014

Brett, Z. H., Humphreys, K. L., Smyke, A. T., Gleason, M. M., Nelson, C. A., Zeanah, C. H., … Drury, S. S. (2015). 5HTTLPR genotype moderates the longitudinal impact of early caregiving on externalizing behavior. *Development and Psychopathology*, *27*(1), 7–18. https://doi.org/10.1017/S0954579414001266

Brodzinsky, D. M. (1987). Adjustment to adoption: A psychosocial perspective. *Clinical Psychology Review*, *7*(1), 25–47. https://doi.org/10.1016/0272-7358(87)90003-1

Bronfenbrenner, U. (1979). *The ecology of human development: experiments by nature and design*. Cambridge, MA: Harvard University Press.

Bruce, J., Tarullo, A. R., & Gunnar, M. R. (2009). Disinhibited social behavior among internationally adopted children. *Development and Psychopathology*, *21*(1), 157–171. https://doi.org/10.1017/S0954579409000108.

Brumble, K., & Kampfe, C. M. (2011). The history of adoption in the united states: A focus on the unique group of intercountry transracial special needs children. *Counselling Psychology Quarterly*, *24*(2), 157–162. https://doi.org/10.1080/09515070.2011.586413

Canzi, E., Rosnati, R., Palacios, J., & Román, M. (2017). Internationally adopted children' s cognitive and social-emotional development during the first post-adoption year: A longitudinal study. European Journal of Developmental Psychology. https://doi.org/10.1080/17405629.2017.1316257

Capaldi, D. M., & Rothbart, M. K. (1992). Development and validation of an Early Adolescent Temperament Measure. *The Journal of Early Adolescence*, *12*(2), 153–173. https://doi.org/10.1177/0272431692012002002

Castle, J., Beckett, C., Rutter, M., & Sonuaga-Barke, E. J. (2008). VIII. Postadoption environmental features. *Monographs of the Society for Research in Child Development, 75*(1), 167–186. https://doi.org/10.1111/j.1540-5834.2010.00555.x

Cattell, R. B. (1971). *Abilities: Their structure, growth and action*. Boston, MA: Houghton-Mifflin.

Cohen, N. J., & Farnia, F. (2011). Social-emotional adjustment and attachment in children adopted from China: Processes and predictors of change. *International Journal of Behavioral Development*, *35*(1), 67–77. https://doi.org/10.1177/0165025410371602

Cohen, N. J., Lojkasek, M., Zadeh, Z. Y., Pugliese, M., & Kiefer, H. (2008). Children adopted from China: A prospective study of their growth and development. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *49*(4), 458–468. https://doi.org/10.1111/j.1469-7610.2007.01853.x

Coleman, P. K., & Karraker, K. H. (1998). Self-efficacy and parenting quality: Findings and future applications. *Developmental Review*, *85*(18), 47–85. https://doi.org/10.1006/drev.1997.0448

Colvert, E., Rutter, M., Kreppner, J., Beckett, C., Castle, J., Groothues, C., … Sonuga-Barke, E. J. S. (2008). Do theory of mind and executive function deficits underlie the adverse outcomes associated with profound early deprivation?: Findings from the English and Romanian Adoptees study. *Journal of Abnormal Child Psychology*, *36*(7), 1057–1068. https://doi.org/10.1007/s10802-008-9232-x

Congdon, E., Mumford, J. A., Cohen, J. R., Galvan, A., Canli, T., & Poldrack, R. A. (2012). Measurement and reliability of response inhibition. *Frontiers in Psychology*, *3*, 1–10. https://doi.org/10.3389/fpsyg.2012.00037

Côté, S. M., Boivin, M., Liu, X., Nagin, D. S., Zoccolillo, M., & Tremblay, R. E. (2009). Depression and anxiety symptoms: Onset, developmental course and risk factors during early childhood. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *50*(10), 1201–1208. https://doi.org/10.1111/j.1469-7610.2009.02099.x

Croft, C., Beckett, C., Rutter, M., Castle, J., Colvert, E., Groothues, C., … Sonuga-Barke, E. J. S. (2007). Early adolescent outcomes of institutionally-deprived and non-deprived adoptees. II: Language as a protective factor and a vulnerable outcome. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *48*(1), 31–44. https://doi.org/10.1111/j.1469-7610.2006.01689.x

Croft, C., Connor, T. G. O., Keaveney, L., Groothues, C., Rutter, M., Andersen-wood, L., … Kreppner, J. (2001). Longitudinal change in parenting associated with developmental delay and catch-up. *Journal of Child Psychology and Psychiatry*, *42*(5), 649–659. https://doi.org/10.1017/S0021963001007417

Culbertson, W. C., & Zillmer, E. A. (1998). The Tower of London DX : A standardized approach to assessing executive functioning in children. *Archives of Clinical Neuropsychology*, *13*(3), 285–301. https://doi.org/10.1016/S0887-6177(97)00033-4

Dalen, M. (2012). Cognitive competence, academic achievement, and educational attainment among intercountry adoptees: Research outcomes from the Nordic countries. In J. L. Gibbons & K. S.

Rotabi (Eds.), *Intercountry adoption: Policies, practices, and outcomes* (pp. 199–209). Surrey, England: Ashgate Press.

Dalen, M., & Rygvold, A.L. (2006). Educational achievement in adopted children from China. *Adoption Quarterly*, *9*(4), 45–58. https://doi.org/10.1300/J145v09n04_03

Davis, M. A. (2011). Intercountry adoption flows from Africa to the U.S.: A fifth wave of intercountry adoptions? *International Migration Review*, *45*(4), 784–811. https://doi.org/10.1111/j.1747-7379.2011.00868.x

Davis, O. S. P., Haworth, C. M. A., & Plomin, R. (2009). Dramatic increase in heritability of cognitive development from early to middle childhood: An 8-year longitudinal study of 8700 pairs of twins. *Psychological Science*, *20*(10), 1301–1308. https://doi.org/10.1111/j.1467-9280.2009.02433.x.

De Los Reyes, A. (2011). Introduction to the special section: More than measurement error: Discovering meaning behind informant discrepancies in clinical assessments of children and adolescents. *Journal of Clinical Child and Adolescent Psychology*, *40*(1), 1–9. https://doi.org/10.1080/15374416.2011.533405

De Los Reyes, A., Henry, D. B., Tolan, P. H., & Wakschlag, L. S. (2009). Linking informant discrepancies to observed variations in young children's disruptive behavior. *Journal of Abnormal Child Psychology*, *37*(5), 637–652. https://doi.org/10.1007/s10802-009-9307-3

De Los Reyes, A., & Kazdin, A. E. (2005). Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for further study. *Psychological Bulletin*, *131*(4), 483–509. https://doi.org/10.1037/0033-2909.131.4.483

De Wolff, M. S., & Van IJzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. *Child Development*, *68*(4), 571–591. https://doi.org/10.1111/j.1467-8624.1997.tb04218.x

Dedrick, R. F., Tan, T. X., & Marfo, K. (2008). Factor structure of the child behavior checklist/6-18 in a sample of girls adopted from China. *Psychological Assessment*, *20*(1), 70–75. https://doi.org/10.1037/1040-3590.20.1.70

Del Giudice, M. (2014). Middle childhood: An evolutionary-developmental synthesis. *Child Development*, *8*(4), 193–200. https://doi.org/10.1111/cdep.12084

del Pozo de Bolger, A., Dunstan, D., & Kaltner, M. (2016). A conceptual model of psychosocial adjustment of foster care adoptees based on a scoping review of contributing factors. *Clinical Psychologist*, 22(1), 1–13. https://doi.org/10.1111/cp.12090

Delcenserie, A., & Genesee, F. (2014). Language and memory abilities of internationally adopted children from China: Evidence for early age effects. *Journal of Child Language*, *41*(6), 1195–

1223. https://doi.org/10.1017/S030500091300041X

Delcenserie, A., Genesee, F., & Gauthier, K. (2013). Language abilities of internationally adopted children from China during the early school years: Evidence for early age effects? *Applied Psycholinguistics*, *34*(3), 541–568. https://doi.org/10.1017/S0142716411000865

Diamond, A. (2013). Executive Functions. *Annual Review of Psychology*, *64*(1), 135–168. https://doi.org/10.1146/annurev-psych-113011-143750

Dobrova-krol, N. A., Van IJzendoorn, M. H., Bakermans-kranenburg, M. J., & Juffer, F. (2010). Effects of perinatal HIV infection and early institutional rearing on physical and cognitive development of children in Ukraine. *Child Development*, *81*(1), 237–251. https://doi.org/10.1111/j.1467-8624.2009.01392.x

Dowling, M., & Brown, G. (2009). Globalization and international adoption from China. *Child and Family Social Work*, *14*(3), 352–361. https://doi.org/10.1111/j.1365-2206.2008.00607.x

Ebenstein, A. (2010). The "Missing Girls" of China and the unintended consequences of the one child policy. *Journal of Human Resources*, *45*(1), 87–115. https://doi.org/10.1353/jhr.2010.0003

Egeland, B., Erickson, M. F., Clemenhagen-Moon, J., Hiester, M. K., & Korfmacher, J. (1990). *24 months tools coding manual. Project STEEP-revised 1990. From mother–child project scales-1978*. Unpublished manuscript, University of Minnesota, Minneapolis.

Eisenberg, N., Zhou, Q., Spinrad, T. L., Valiente, C., Fabes, R. A., & Liew, J. (2005). Relations among positive parenting, children's effortful control, and externalizing problems: A three-wave longitudinal study. *Child Development*, *76*(5), 1055–1071. https://doi.org/10.1111/j.1467-8624.2005.00897.x

Erickson, M. F., Sroufe, L. A., & Egeland, B. (1985). VI. The relationship between quality of attachment and behavior problems in preschool in a high-risk sample. *Monographs of the Society for Research in Child Development*, *50*(1/2), 147–166. https://doi.org/10.2307/3333831

Escobar, M. J., Pereira, X., & Santelices, M. P. (2014). Behavior problems and attachment in adopted and non-adopted adolescents. *Children and Youth Services Review*, *42*, 59–66. https://doi.org/10.1016/j.childyouth.2014.04.001

Faber, J., & Fonseca, L. M. (2014). How sample size influences research outcomes. *Dental Press Journal of Orthodontics*, *19*(4), 27–29. https://doi.org/10.1590/2176-9451.19.4.027-029.ebo

Fay-Stammbach, T., Hawes, D. J., & Meredith, P. (2014). Parenting influences on executive function in early childhood: A review. *Child Development Perspectives*, *8*(4), 258–264. https://doi.org/10.1111/cdep.12095

Finet, C., Vermeer, H. J., Juffer, F., Bijttebier, P., & Bosmans, G. (2018). Adopted children's behavioral adjustment over time: Interactions between pre-adoption experiences and adoptive parenting.

Manuscript in Preparation.

Finet, C., Vermeer, H. J., Juffer, F., & Bosmans, G. (2018). Behavioral adjustment of Chinese adoptees: The role of pre-adoption experiences. *Children and Youth Services Review*, *86*, 226–235. https://doi.org/10.1016/j.childyouth.2018.01.029

Finet, C., Vermeer, H. J., Juffer, F., Bosmans, G., & Bijttebier, P. (2016). Children's catch-up in cognitive competence after adoption. In F. Genesee & A. Delcenserie (Eds.), *[TiLAR 18] Starting Over – The Language Development in Internationally Adopted Children* (pp. 39–64). Amsterdam: John Benjamins Publishing Company. https://doi.org/10.1075/tilar.18.03fin

Flynn, J. R. (1987). Massive IQ gains in 14 nations: What IQ tests really measure. *Psychological Bulletin*, *101*(2), 171–191. https://doi.org/10.1037/0033-2909.101.2.171

Fox, N. A., Almas, A. N., Degnan, K. A., Nelson, C. A., & Zeanah, C. H. (2011). The effects of severe psychosocial deprivation and foster care intervention on cognitive development at 8 years of age: Findings from the Bucharest Early Intervention Project. *Journal of Child Psychology and Psychiatry*, *52*(9), 919–928. https://doi.org/10.1111/j.1469-7610.2010.02355.x

Frankenburg, W. K., van Doornick, W. J., Liddell, T. N., & Dick, N. P. (1986). *Revised Denver Prescreening Developmental Questionnaire (R-PDQ)*. High Wycombe, UK: DDM Incorporated/ The Test Agency.

Frydman, M., & Lynn, R. (1989). The intelligence of Korean children adopted in Belgium. *Personality and Individual Differences*, *10*(12), 1323–1325. https://doi.org/10.1016/0191-8869(89)90246-8

Gagnon-Oosterwaal, N., Cossette, L., Smolla, N., Pomerleau, A., Malcuit, G., Chicoine, J.F., … Berthiaume, C. (2012). Pre-adoption adversity and Self-reported behavior problems in 7 year-old international adoptees. *Child Psychiatry and Human Development*, *43*(4), 648–660. https://doi.org/10.1007/s10578-011-0279-5

Gagnon-Oosterwaal, N., Cossette, L., Smolla, N., Pomerleau, A., Malcuit, G., Chicoine, J.F., … Séguin, R. (2012). Pre-adoption adversity, maternal stress, and behavior problems at school-age in international adoptees. *Journal of Applied Developmental Psychology*, *33*(5), 236–242. https://doi.org/10.1016/j.appdev.2012.04.002

Garai, E. P., Forehand, R. L., Colletti, C. J. M., Reeslund, K., Potts, J., & Compas, B. (2009). The relationship of maternal sensitvity to children's internalizing and externalizing problems within the context of maternal depressive symptoms. *Behavior Modification*, *33*(5), 559–582. https://doi.org/10.1177/0145445509342581.

Garvin, M. C., Tarullo, A. R., Van Ryzin, M., & Gunnar, M. R. (2012). Postadoption parenting and socioemotional development in postinstitutionalized children. *Development and Psychopathology*, *24*(1), 35–48. https://doi.org/doi:10.1017/S0954579411000642

Gioia, G. A., Isquith, P. K., Retzlaff, P. D., & Espy, K. A. (2002). Confirmatory factor analysis of the Behavior Rating Inventory of Executive Function (BRIEF) in a clinical sample. *Child Neuropsychology*, *8*(4), 249–257. https://doi.org/10.1076/chin.8.4.249.13513

Gleitman, I., & Savaya, R. (2011). Adjustment of adolescent adoptees: The role of age of adoption and exposure to pre-adoption stressors. *Children and Youth Services Review*, *33*(5), 758–766. https://doi.org/10.1016/j.childyouth.2010.11.020

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *38*(5), 581–586. https://doi.org/10.1111/j.1469-7610.1997.tb01545.x

Graziano, P. A., Keane, S. P., & Calkins, S. D. (2010). Maternal behavior and children's early emotion regulation skills differentially predict development of children's reactive control and later effortful control. *Infant and Child Development*, *19*(4), 333–353. https://doi.org/doi:10.1002/icd.670

Grietens, H., Onghena, P., Prinzie, P., Gadeyne, E., Van Assche, V., Ghesquière, P., & Hellinckx, W. (2004). Comparison of mothers', fathers', and teachers' reports on problem behavior in 5-to 6-year-old children. *Journal of Psychopathology and Behavioral Assessment*, *26*(2), 137–146. https://doi.org/10.1023/B:JOBA.0000013661.14995.59

Grotevant, H. D., & McDermott, J. M. (2014). Adoption: Biological and social processes linked to adaptation. *Annual Review of Psychology*, *65*(1), 235–265. https://doi.org/10.1146/annurev-psych-010213-115020

Grotevant, H. D., Ross, N. M., Marchel, M. A., & Mcroy, R. G. (1999). Adaptive behavior in adopted children: Predictors from early risk, collaboration in relationships within the adoptive kinship network, and openness arrangements. *Journal Of Adolescent Research*, *14*(2), 231–247. https://doi.org/10.1177/0743558499142005

Groza, V., & Ryan, S. D. (2002). Pre-adoption stress and its association with child behavior in domestic special needs and international adoptions. *Psychoneuroendocrinology*, *27*(1), 181–197. https://doi.org/ 10.1016/S0306-4530(01)00044-0

Groza, V., Ryan, S. D., & Thomas, S. (2008). Institutionalization, Romanian adoptions and executive functioning. *Child and Adolescent Social Work Journal*, *25*(3), 185–204. https://doi.org/10.1007/s10560-008-0120-6

Gunnar, M. R. (2001). Effects of early deprivation: Findings from orphanage-reared infants and children. In C. A. Nelson & M. Luciana (Eds.), *Handbook of developmental cognitive neuroscience* (pp. 617–629). Cambridge, MA: The MIT Press.

Gunnar, M. R., Bruce, J., & Grotevant, H. D. (2000). International adoption of institutionally reared

children: Research and policy. *Development and Psychopathology*, *12*(4), 677–693. https://doi.org/10.1017/S0954579400004077

Gunnar, M. R., & van Dulmen, M. H. M. (2007). Behavior problems in postinstitutionalized internationally adopted children. *Development and Psychopathology*, *19*(1), 129–148. https://doi.org/10.1017/S0954579407070071

Hartman, C. A. (2000). Dutch translation of the Early Adolescent Temperament Questionnaire. *Unpublished Manuscript, University Medical Center Groningen, Department of Psychiatry*.

Harwood, R., Feng, X., & Yu, S. (2013). Preadoption adversities and postadoption mediators of mental health and school outcomes among international, foster, and private adoptees in the United States. *Journal of Family Psychology*, *27*(3), 409–420. https://doi.org/10.1037/a0032908

Hawk, B., McCall, R. B., Groark, C. J., Muhamedrahimov, R. J., Palmov, O. I., & Nikiforova, N. V. (2012). Age at adoption: A measure of time in the orphanage or child-specific factors? *Adoption Quarterly*, *15*(1), 18–34. https://doi.org/10.1080/10926755.2012.661331

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: The Guilford Press.

Hesketh, T., Zhou, X., & Wang, Y. (2015). The end of the one-child policy: Lasting implications for China. *JAMA*, *314*(24), 2619–2620. https://doi.org/10.1001/jama.2015.16279

Hoksbergen, R. A. C. (1997). Turmoil for adoptees during their adolescence. *International Journal of Behavioral Development*, *20*(1), 33–46. https://doi.org/10.1080/016502597385423

Hoksbergen, R. A. C., Rijk, K., Van Dijkum, C., & Ter Laak, J. (2004). Adoption of Romanian children in The Netherlands: Behavior problems and parenting burden of upbringing for adoptive parents. *Journal of Developmental and Behavioral Pediatrics*, *25*(3), 175–180. https://doi.org/10.1097/00004703-200406000-00006

Hostinar, C. E., Stellern, S. A., Schaefer, C., Carlson, S. M., & Gunnar, M. R. (2012). Associations between early life adversity and executive function in children adopted internationally from orphanages. *Proceedings of the National Academy of Sciences*, *109*(suppl. 2), 17208–17212. https://doi.org/10.1073/pnas.1121246109

Howe, D. (1997). Parent-reported problems in 211 adopted children: Some risk and protective factors. *Journal of Child Pychology and Psychiatry and Allied Disciplines*, *38*(4), 401–411. https://doi.org/10.1111/j.1469-7610.1997.tb01525.x

Hughes, C. (2011). Changes and challenges in 20 years of research into the development of executive functions. *Infant and Child Development*, *20*(3), 251–271. https://doi.org/10.1002/icd.736

Humphreys, K. L., Gleason, M. M., Drury, S. S., Miron, D., Nelson, C. A., Fox, N. A., & Zeanah, C. H. (2015). Effects of institutional rearing and foster care on psychopathology at age 12 years in

Romania: Follow-up of an open, randomised controlled trial. *The Lancet Psychiatry*, *2*(7), 625–634. https://doi.org/10.1016/ S2215-0366(15)00095-4

Jaffari-Bimmel, N., Juffer, F., Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2004). Problem behavior of internationally adopted adolescents: Do behavior problems in middle childhood predict later maladjustment. Poster presented at the SRA Biennial Meeting, Baltimore, MD.

Janssens, A., Goossens, L., Van Den Noortgate, W., Colpin, H., Verschueren, K., & Van Leeuwen, K. (2015). Parents' and adolescents' perspectives on parenting: Evaluating conceptual structure, measurement invariance, and criterion validity. *Assessment*, *22*(4), 473–489. https://doi.org/10.1177/1073191114550477

Ji, J., Brooks, D., Barth, R. P., & Kim, H. (2010). Beyond preadoptive risk: The impact of adoptive family environment on adopted youth's psychosocial adjustment. *American Journal of Orthopsychiatry*, *80*(3), 432–442. https://doi.org/10.1111/j.1939-0025.2010.01046.x

Johnson, K. A. (2004). *Wanting a daugher, needing a son: Abandonment, adoption and orphanage care in China*. St. Paul, MN: Yeong and Yeong Book Company.

Johnson, K. A., Banghan, H., & Liyao, W. (1998). Infant abandonment and adoption in China. *Population and Development Review*, *24*(3), 469–510. https://doi.org/10.2307/2808152

Jones, T. L., & Prinz, R. J. (2005). Potential roles of parental self-efficacy in parent and child adjustment: A review. *Clinical Psychology Review*, *25*(3), 341–363. https://doi.org/10.1016/j.cpr.2004.12.004

Juffer, F. (1993). *Verbonden door adoptie. Een experimenteel onderzoek naar hechting en competentie in gezinnen met een adoptiebaby*. Amersfoort: Academische Uitgeverij.

Juffer, F., Palacios, J., Le Mare, L., Sonuga-Barke, E. J. S., Tieman, W., Bakermans-Kranenburg, M. J., … Verhulst, F. C. (2011). II. Development of adopted children with histories of early adversity. *Monographs of the Society for Research in Child Development*, *76*(4), 31–61. https://doi.org/10.1111/j.1540-5834.2011.00627.x

Juffer, F., & Tieman, W. (2009). Being adopted: Internationally adopted children's interest and feelings. *International Social Work*, *52*(5), 635–647. https://doi.org/10.1177/0020872809337682

Juffer, F., Van den Dries, L., Finet, C., & Vermeer, H. J. (2015). Bindung und kognitive sowie motorische Entwicklung in den ersten fünf Jahren nach der Adoption: Ein review über international adoptierte Kinder aus China [Attachment and cognitive and motor development in the first years after adoption: A review of studies on internationally adopted children from China]. *Praxis Der Kinderpsychologie Und Kinderpsychiatrie*, *64*(10), 774–792. https://doi.org/10.13109/prkk.2015.64.10.774

Juffer, F., & Van IJzendoorn, M. H. (2005). Behavior problems and mental health referrals of international adoptees: A meta-analysis. *JAMA*, *293*(20), 2501–2515. https://doi.org/10.1001/jama.293.20.2501

Juffer, F., & Van IJzendoorn, M. H. (2009). International adoption comes of age: Development of international adoptees from a longitudinal and meta-analytical perspective. In G. M. Wrobel & E. Neil (Eds.), *International Advances in Adoption Research for Practice* (pp. 169–192). Chichester, UK: Wiley-Blackwell.

Julian, M. M. (2013). Age at adoption from institutional care as a window into the lasting effects of early experiences. *Clinical Child and Family Psychology Review*, *16*(2), 101–145. https://doi.org/10.1007/s10567-013-0130-6

Julian, M. M., & McCall, R. B. (2011). The development of children within alternative residential care environments. *International Journal of Child & Family Welfare*, *3–4*, 119–147.

Kalff, A. C., Kroes, M., Vles, J. S. H., Bosma, H., Feron, F. J. M., Hendriksen, J. G. M., … Jolles, J. (2001). Factors affecting the relation between parental education as well as occupation and problem behaviour in Dutch 5-to 6-year-old children. *Social Psychiatry and Psychiatric Epidemiology*, *36*(7), 324–331. https://doi.org/10.1007/s001270170036

Karoly, P. (1993). Mechanisms of self-regulation: A systems view. *Annual Review of Psychology*, *44*(1), 23–52. https://doi.org/10.1146/annurev.ps.44.020193.000323

Katzenstein, J. M., LeJeune, B. C., & Johnson, K. E. (2016). The role of parenting and family factors in the developmental catch-up for children adopted internationally. *Adoption Quarterly*, *19*(3), 224–236. https://doi.org/10.1080/10926755.2016.1201710

Kerns, K. A., Siener, S., & Brumariu, L. E. (2011). Mother-child relationships, family context, and child characteristics as predictors of anxiety symptoms in middle childhood. *Development and Psychopathology*, *23*(2), 593–604. https://doi.org/10.1017/S0954579411000228

Kok, R., Linting, M., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Jaddoe, V. W. V., Hofman, A., … Tiemeier, H. (2013). Maternal sensitivity and internalizing problems: Evidence from two longitudinal studies in early childhood. *Child Psychiatry and Human Development*, *44*(6), 751–765. https://doi.org/10.1007/s10578-013-0369-7

Koot, H. M., Van Den Oord, E. J., Verhulst, F. C., & Boomsma, D. I. (1997). Behavioral and emotional problems in young preschoolers: Cross-cultural testing of the validity of the Child Behavior Checklist 2/3. *Journal of Abnormal Child Psychology*, *25*(3), 183–196. https://doi.org/10.1023/A:1025791814893

Kort, W., Schittekatte, M., Dekker, P. H., Verhaeghe, P., Compaan, E. L., Bosmans, M., & Vermeir, G. (2005). *WISC-III NL Wechsler Intelligence Scale for Children. Derde Editie NL. Handleiding en*

Verantwoording. [Dutch version of the WISC-III]. Amsterdam: Harcourt Test Publishers/Nederlands Instituut voor Psychologen.

Kreppner, J. M., O'Connor, T. G., Rutter, M., & the ERA study team (2001). Can Inattention/Overactivity be an institutional deprivation syndrome? *Journal of Abnormal Child Psychology*, *29*(6), 513–528. https://doi.org/10.1023/A:1012229209190

Kriebel, D. K., & Wentzel, K. (2011). Parenting as a moderator of cumulative risk for behavioral competence in adopted children. *Adoption Quarterly*, *14*(1), 37–60. https://doi.org/10.1080/10926755.2011.557945

Kumsta, R., Kreppner, J., Kennedy, M., Knights, N., Rutter, M., & Sonuga-Barke, E. J. S. (2015). Psychological consequences of early global deprivation an overview of findings from the English & Romanian Adoptees Study. *European Psychologist*, *20*(2), 138–151. https://doi.org/10.1027/1016-9040/a000227

Kumsta, R., Marzi, S. J., Viana, J., Dempster, E. L., Crawford, B., Rutter, M., … Sonuga-Barke, E. J. S. (2016). Severe psychosocial deprivation in early childhood is associated with increased DNA methylation across a region spanning the transcription start site of CYP2E1. *Translational Psychiatry*, *6*(6), e830-7. https://doi.org/10.1038/tp.2016.95

Kumsta, R., Stevens, S., Brookes, K., Schlotz, W., Castle, J., Beckett, C., … Sonuga-Barke, E. J. S. (2010). 5HTT genotype moderates the influence of early institutional deprivation on emotional problems in adolescence: Evidence from the English and Romanian Adoptee (ERA) study. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *51*(7), 755–762. https://doi.org/10.1111/j.1469-7610.2010.02249.x

Landgren, M., Svensson, L., Strömland, K., & Grönlund, M. A. (2010). Prenatal alcohol exposure and neurodevelopmental disorders in children adopted from Eastern Europe. *Pediatrics*, *125*(5), e1178–e1185. https://doi.org/10.1542/peds.2009-0712

Lansford, J. E. (2009). Parental divorce and children's adjustment. *Perspectives on Psychological Science*, *4*(2), 140–152. https://doi.org/10.1111/j.1745-6924.2009.01114.x

Le Mare, L., & Audet, K. (2014). Behavior problems in postinstitutionalized Romanian adoptees: Explanatory parameters in the adoptive home. *Merrill-Palmer Quarterly*, *60*(3), 245–273. https://doi.org/10.1353/mpq.2014.0017

Lee, J. P., Lee, R. M., Hu, A. W., & Kim, O. M. (2015). Ethnic identity as a moderator against discrimination for transracially and transnationally adopted Korean American adolescents. *Asian American Journal of Psychology*, *6*(2), 154–163. https://doi.org/10.1037/a0038360

Lee, R. M. (2010). Parental perceived discrimination as a postadoption risk factor for internationally adopted children and adolescents. *Cultural Diversity and Ethnic Minority Psychology*, *16*(4),

493–500. https://doi.org/10.1037/a0020651

Lester, B. M., Conradt, E., & Marsit, C. (2016). Introduction to the special section on epigenetics. *Child Development*, *87*(1), 29–37. https://doi.org/10.1111/cdev.12489

Li, J., Tan, T. X., Camras, L. A., Chen, C., & Moyzis, R. K. (2014). Preadoption adversity, MAOA, and behavioral adjustment in internationally adopted Chinese girls. *Psychiatric Genetics*, *24*(5), 211–217. https://doi.org/10.1097/YPG.0000000000000049

Lindblad, F., Dalen, M., Rasmussen, F., Vinnerljung, B., & Hjern, A. (2009). School performance of international adoptees better than expected from cognitive test results. *European Child and Adolescent Psychiatry*, *18*(5), 301–308. https://doi.org/10.1007/s00787-008-0731-7

Logan, G. D., Van Zandt, T., Verbruggen, F., & Wagenmakers, E.J. (2014). On the ability to inhibit thought and action: General and special theories of an act of control. *Psychological Review*, *121*(1), 66–95. https://doi.org/10.1037/a0035230

Loman, M. M., & Gunnar, M. R. (2010). Early experience and the development of stress reactivity and regulation in children. *Neuroscience and Biobehavioral Reviews*, *34*(6), 867–876. https://doi.org/10.1016/j.neubiorev.2009.05.007

Loman, M. M., Wiik, K. L., Frenn, K. A., Pollak, S. D., & Gunnar, M. R. (2009). Postinstitutionalized children's development: Growth, cognitive, and language outcomes. *Journal of Developmental and Behavioral Pediatrics*, *30*(5), 426–434. https://doi.org/10.1097/DBP.0b013e3181b1fd08

Luo, N., & Bergquist, K. J. S. (2005). Born in China. *Adoption Quarterly*, *8*(1), 21–39. https://doi.org/10.1300/J145v08n01_02

Mackintosh, N. J. (1998). *IQ and human intelligence*. New York, United States: Oxford University Press.

MacLean, K. (2003). The impact of institutionalization on child development. *Development and Psychopathology*, *15*(4), 853–884. https://doi.org/10.1017/S0954579403000415

Masten, A. S. (2001). Ordinary Magic: Resilience processes in development. *American Psyhologist*, *56*(3), 227–238. https://doi.org/10.1037//0003-066X.56.3.227

McCall, R. B. (2011). IX. Research, practice, and policy perspectives on issues of children without permanent parental care. *Monographs of the Society for Research in Child Development*, *76*(4), 223–272. https://doi.org/10.1111/j.1540-5834.2011.00634.x

McDermott, J. M., Troller-Renfree, S., Vanderwert, R., Nelson, C. A., Zeanah, C. H., & Fox, N. A. (2013). Psychosocial deprivation, executive functions, and the emergence of socio-emotional behavior problems. *Frontiers in Human Neuroscience*, *7*, 1–11. https://doi.org/10.3389/fnhum.2013.00167

Merz, E. C., Harlé, K. M., Noble, K. G., & McCall, R. B. (2016). Executive function in previously

institutionalized children. *Child Development*, *10*(2), 105–110. https://doi.org/10.1111/cdep.12170

Merz, E. C., & McCall, R. B. (2010). Behavior problems in children adopted from psychosocially depriving institutions. *Journal of Abnormal Child Psychology*, *38*(4), 459–470. https://doi.org/10.1007/s10802-009-9383-4

Merz, E. C., & McCall, R. B. (2011). Parent ratings of executive functioning in children adopted from psychosocially depriving institutions. *Journal of Child Psychology and Psychiatry*, *52*(5), 537–546. https://doi.org/10.1111/j.1469-7610.2010.02335.x

Merz, E. C., McCall, R. B., & Groza, V. (2013). Parent-reported executive functioning in postinstitutionalized children: A follow-up study. *Journal of Clinical Child and Adolescent Psychology*, *42*(5), 726–733. https://doi.org/10.1080/15374416.2013.764826

Mesman, J., & Emmen, R. A. G. (2013). Mary Ainsworth's legacy: A systematic review of observational instruments measuring parental sensitivity. *Attachment and Human Development*, *15*(5–6), 485–506. https://doi.org/10.1080/14616734.2013.820900

Miller, L. C., Chan, W., Comfort, K., & Tirella, L. (2005). Health of children adopted from Guatemala: Comparison of orphanage and foster care. *Pediatrics*, *115*(6), e710–e717. https://doi.org/10.1542/peds.2004-2359

Miller, L. C., Chan, W., Tirella, L., & Perrin, E. (2009). Outcomes of children adopted from Eastern Europe. *International Journal of Behavioral Development*, *33*(4), 289–298. https://doi.org/10.1177/0165025408098026

Miller, L. C., & Hendrie, N. W. (2000). Health of children adopted from China. *Pediatrics*, *105*(6), e76–e76. https://doi.org/10.1542/peds.105.6.e76

Mischel, W., Ayduk, O., Berman, M. G., Casey, B. J., Gotlib, I. H., Jonides, J., … Shoda, Y. (2010). "Willpower" over the life span: Decomposing self-regulation. *Social Cognitive and Affective Neuroscience*, *6*(2), 252–256. https://doi.org/10.1093/scan/nsq081

Miyake, A., & Friedman, N. P. (2012). The nature and organization of individual differences in executive functions: Four general conclusions. *Current Directions in Psychological Science*, *21*(1), 8–14. https://doi.org/10.1177/0963721411429458

Moffitt, T. E., Poulton, R., & Caspi, A. (2013). Lifelong impact of early self-control. *American Scientist*, *101*(5), 352–359. https://doi.org/10.1511/2013.104.352

Morris, A. S., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The role of the family context in the development of emotion regulation. *Social Development*, *16*(2), 361–388. https://doi.org/10.1111/j.1467-9507.2007.00389.x.

Mouton, B., & Roskam, I. (2015). Confident mothers, easier children: A quasi-experimental

manipulation of mothers' self-efficacy. *Journal of Child and Family Studies*, *24*(8), 2485–2495. https://doi.org/10.1007/s10826-014-0051-0

Nadeem, E., Waterman, J., Foster, J., Paczkowski, E., Belin, T. R., & Miranda, J. (2017). Long-term effects of pre-placement risk factors on children's psychological symptoms and parenting stress among families adopting children from foster care. *Journal of Emotional and Behavioral Disorders*, *25*(2), 67–81. https://doi.org/10.1177/1063426615621050

Naumova, O. Y., Hein, S., Suderman, M., Barbot, B., Lee, M., Raefski, A., … Grigorenko, E. L. (2016). Epigenetic patterns modulate the connection between developmental dynamics of parenting and offspring psychosocial adjustment. *Child Development*, *87*(1), 98–110. https://doi.org/10.1111/cdev.12485

Naumova, O. Y., Lee, M., Koposov, R., Szyf, M., Dozier, M., & Grigorenko, E. L. (2012). Differential patterns of whole-genome DNA methylation in institutionalized children and children raised by their biological parents. *Development and Psychopathology*, *24*(1), 143–155. https://doi.org/10.1017/S0954579411000605

Nelson, C. A., Bos, K., Gunnar, M. R., & Sonuga-Barke, E. J. S. (2011). V . The neurobiological toll of early human deprivation. *Monographs of the Society for Research in Child Development, 76*(4), 127–146. https://doi.org/10.1111/j.1540-5834.2011.00630.x

Nelson, C. A., Zeanah, C. H., Fox, N. A., Marshall, P. J., Smyke, A. T., & Guthrie, D. (2007). Cognitive recovery in socially deprived young children: The Bucharest Early Intervention Project. *Science*, *318*(5858), 1937–1940. https://doi.org/10.1126/science.1143921

Nickman, S. L., Rosenfeld, A. A., Fine, P., MacIntyre, J. C., Pilowsky, D. J., Howe, R.A., … Sveda, S. A. (2005). Children in adoptive families: Overview and update. *Journal of the American Academy of Child and Adolescent Psychiatry*, *44*(10), 987–995. https://doi.org/10.1097/01.chi.0000174463.60987.69

O'Connor, T. G. (2002). Annotation: The "effects" of parenting reconsidered: Findings, challenges, and applications. *Journal of Child Psychology and* Psychiatry, 43(*5)*, 555–572. https://doi.org/10.1111/1469-7610.00046

O'Connor, T. G., Rutter, M., Beckett, C., Keaveney, L., Kreppner, J. M., & the ERA study team (2000). The effects of global severe privation on cognitive competence: Extension and longitudinal follow-up. *Child Development*, *71*(2), 376–390. https://doi.org/10.1111/1467-8624.00151

Odenstad, A., Hjern, A., Lindblad, F., Rasmussen, F., Vinnerljung, B., & Dalen, M. (2008). Does age at adoption and geographic origin matter? A national cohort study of cognitive test performance in adult inter-country adoptees. *Psychological Medicine*, *38*(12), 1803–1814. https://doi.org/10.1017/S0033291708002766

Palacios, J., & Brodzinsky, D. (2010). Adoption research: Trends, topics, outcomes. *International Journal of Behavioral Development*, *34*(3), 270–284. https://doi.org/10.1177/0165025410362837

Palacios, J., Moreno, C., & Román, M. (2013). Social competence in internationally adopted and institutionalized children. *Early Childhood Research Quarterly*, *28*(2), 357–365. https://doi.org/10.1016/j.ecresq.2012.08.003

Palacios, J., Román, M., Moreno, C., León, E., & Peñarrubia, M. G. (2014). Differential plasticity in the recovery of adopted children after early adversity. *Child Development Perspectives*, *8*(3), 169–174. https://doi.org/10.1111/cdep.12083

Pearlmutter, S., Ryan, S. D., Johnson, L. B., & Groza, V. (2008). Romanian adoptees and pre-adoptive care: A strengths perspective. *Child and Adolescent Social Work Journal*, *25*(2), 139–156. https://doi.org/10.1007/s10560-008-0117-1

Pechtel, P., & Pizzagalli, D. A. (2011). Effects of early life stress on cognitive and affective function: An integrated review of human literature. *Psychopharmacology*, *214*(1), 55–70. https://doi.org/10.1007/s00213-010-2009-2

Pietschnig, J., & Voracek, M. (2015). One century of global IQ gains: A formal meta-analysis of the Flynn Effect (1909–2013). *Perspectives on Psychological Science*, *10*(3), 282–306. https://doi.org/10.1177/1745691615577701

Pinquart, M. (2017a). Associations of parenting dimensions and styles with externalizing problems of children and adolescents: An updated meta-analysis. *Developmental Psychology*, *53*(5), 873–932. https://doi.org/10.1037/dev0000295

Pinquart, M. (2017b). Associations of parenting dimensions and styles with internalizing symptoms in children and adolescents: A meta-analysis. *Marriage & Family Review*, *53*(7), 613–640. https://doi.org/10.1080/01494929.2016.1247761

Polderman, T. J. C., Gosso, M. F., Posthuma, D., Van Beijsterveldt, T. C. E. M., Heutink, P., Verhulst, F. C., & Boomsma, D. I. (2006). A longitudinal twin study on IQ, executive functioning, and attention problems during childhood and early adolescence. *Acta Neurologica Belgica*, *106*(4), 191–207.

Pollak, S. D., Nelson, C. A., Schlaak, M. F., Roeber, B. J., Wewerka, S. S., Wiik, K. L., … Gunnar, M. R. (2010). Neurodevelopmental effects of early deprivation in postinstitutionalized children. *Child Development*, *81*(1), 224–236. https://doi.org/10.1111/j.1467-8624.2009.01391.x

Radcliff, Z., Baylor, A., & Rybarczyk, B. (2016). Adopted youth and sleep difficulties. *Pediatric Health, Medicine and Therapeutics*, *7*, 165–175. https://doi.org/10.2147/PHMT.S119958

Reinoso, M., & Forns, M. (2010). Stress, coping and personal strengths and difficulties in

internationally adopted children in Spain. *Children and Youth Services Review*, *32*(12), 1807–1813. https://doi.org/10.1016/j.childyouth.2010.08.001

Rettig, M. A., & McCarthy-Rettig, K. (2006). A survey of the health, sleep, and development of children adopted from China. *Health & Social Work, 31*(3), 201–207. https://doi.org/10.1093/hsw/31.3.201

Rey, J. M., Schrader, E. A., & Morris-Yates, A. (1992). Parent-child agreement on children's behavious reported by the Child Behaviour Checklist (CBCL). *Journal of Adolescence*, *15*(3), 219–230. https://doi.org/10.1016/0140-1971(92)90026-2

Rice, J. L., Jackson, A., Mahoney, E. E., & Tan, T. X. (2016). Pre-adoption stress, adversity and later development in IA children. In F. Genesee & A. Delcenserie (Eds.), *Starting Over - The Language Development in Internationally-Adopted Children* (1st ed., pp. 19–36). Amsterdam / Philadelphia: John Benjamins Publishing Company. https://doi.org/10.1075/tilar.18.02ric

Roberts, J. A., Pollock, K. E., Krakow, R., Price, J., Fulmer, K. C., & Wang, P. P. (2005). Language development in preschool-age children adopted from China. *Journal of Speech, Language, and Hearing Research*, *48*(1), 93-107. https://doi.org/10.1044/1092-4388(2005/008)

Roisman, G. I., & Fraley, R. C. (2012). A behavior-genetic study of the legacy of early caregiving experiences: Academic skills, social competence, and externalizing behavior in kindergarten. *Child Development*, *83*(2), 728–742. https://doi.org/10.1111/j.1467-8624.2011.01709.x

Rojewski, J. W., Shapiro, M. S., & Shapiro, M. (2000). Parental assessment of behavior in Chinese adoptees during early childhood. *Child Psychiatry and Human Development*, *31*(1), 79–96. https://doi.org/10.1023/A:1001978122206

Rosenboom, L. G. (1994). *Gemengde gezinnen, gemengde gevoelens? Hechting en competentie van adoptiebaby's in gezinnen met biologisch eigen kinderen*. (Unpublished doctoral dissertation). Utrecht University, the Netherlands.

Rosenthal, J. A., & Groze, V. (1991). Behavioral problems of special needs adopted children. *Children and Youth Service Review*, *13*(5–6), 343–361. https://doi.org/10.1016/0190-7409(91)90025-D

Roskam, I., Brassart, E., Loop, L., Mouton, B., & Schelstraete, M.A. (2015). Stimulating parents' self-efficacy beliefs or verbal responsiveness: Which is the best way to decrease children's externalizing behaviors? *Behaviour Research and Therapy*, *72*, 38–48. https://doi.org/10.1016/j.brat.2015.06.012

Roskam, I., Brassart, E., Loop, L., Mouton, B., & Schelstraete, M. A. (2016). Do parenting variables have specific or widespread impact on parenting covariates? The effects of manipulating self-efficacy or verbal responsiveness. *Child and Family Behavior Therapy*, *38*(2), 142–163. https://doi.org/10.1080/07317107.2016.1172885

Roskam, I., Stievenart, M., Tessier, R., Muntean, A., Escobar, M. J., Santelices, M. P., … Pierrehumbert, B. (2014). Another way of thinking about ADHD: The predictive role of early attachment deprivation in adolescents' level of symptoms. *Social Psychiatry and Psychiatric Epidemiology*, *49*(1), 133–144. https://doi.org/10.1007/s00127-013-0685-z

Rosnati, R., Barni, D., & Montirosso, R. (2010). Italian international adoptees at home and at school: A multi-informant assessment of behavioral problems. *Journal of Family Psychology, 24*(6), 783–786. https://doi.org/10.1037/a0021758

Rosnati, R., Montirosso, R., & Barni, D. (2008). Behavioral and emotional problems among Italian international adoptees and non-adopted children: Father's and mother's reports. *Journal of Family Psychology*, *22*(4), 541–549. https://doi.org/10.1037/0893-3200.22.3.541

Rothbart, M. K., Ellis, L. K., Rueda, M. R., & Posner, M. I. (2003). Developing mechanisms of temperamental effortful control. *Journal of Personality*, *71*(6), 1113–1143. https://doi.org/10.1111/1467-6494.7106009

Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *American Journal of Orthopsychiatry*, *57*(3), 316–331.

Rutter, M. (1990). Psychosocial resilience and protective mechanisms. In J. Rolf, A. J. Masten, D. Cicchetti, K. H. Nuechterlein, & S. Weintraub (Eds.), *Risk and protective factors in the development of psychopathology* (pp. 181–214). Cambridge: Cambridge University Press. https://doi.org/doi:10.1017/CBO9780511752872.013

Rutter, M. (2007). Proceeding from observed correlation to causal inference: The use of natural experiments. *Perspectives on Psychological Science*, *2*(4), 377–395. https://doi.org/10.1111/j.1745-6916.2007.00050.x

Rutter, M., Beckett, C., Castle, J., Colvert, E., Kreppner, J. M., Mehta, M., … Sonuga-barke, E. J. S. (2009). Effects of profound early institutional deprivation: An overview of findings from a UK longitudinal study of Romanian aadoptees. In G. M. Wrobel & E. Neil (Eds.), *International advances in adoption research for practice* (pp. 147–167). Chichester, UK: Wiley-Blackwell. https://doi.org/10.1002/9780470741276.ch7

Rutter, M., Kreppner, J. M., & O'Connor, T. G. (2001). Specificity and heterogeneity in children's responses to profound institutional privation. *The British Journal of Psychiatry*, *179*(2), 97–103. https://doi.org/10.1192/bjp.179.2.97

Rutter, M., Sonuga-Barke, E. J., & Castle, J. (2010). I. Investigating the impact of early institutional deprivation on development: Background and research strategy of the English and Romanian Adoptees (ERA) study. *Monographs of the Society for Research in Child Development*, *75*(1), 1–20. https://doi.org/10.1111/j.1540-5834.2010.00548.x

Rutter, M., Sonuga-Barke, E. J. S., Beckett, C., Castle, J., Kreppner, J. M., Kumstra, R., … Gunnar, M. R. (2010). Deprivation-specific psychological patterns: Effects of institutional deprivation. *Monographs of the Society for Research in Child Development*, *75*(1), 1–253.

Rutter, M., & the ERA study team. (1998). Developmental catch-up, and deficit, following adoption after severe global early privation. *The* J*ournal of Child Psychology and Psychiatry and Allied Disciplines*, *39*(4), 465–476.

Sattler, J. M. (1992). *Assessment of children: WISC-III and WPPSI-R supplement*. San Diego, CA: Author.

Schoenmaker, C., Juffer, F., Van IJzendoorn, M. H., van den Dries, L., Linting, M., van der Voort, A., & Bakermans-Kranenburg, M. J. (2015). Cognitive and health-related outcomes after exposure to early malnutrition: The Leiden longitudinal study of international adoptees. *Children and Youth Services Review*, *48*, 80–86. https://doi.org/10.1016/j.childyouth.2014.12.010

Selman, P. (2009). From Bucharest to Beijing: Changes in countries sending children for international adoption 1990 to 2006. In G. M. Wrobel & E. Neil (Eds.), *International advances in adoption research for practice* (pp. 41–70). Chichester, UK: Wiley-Blackwell. https://doi.org/10.1002/9780470741276.ch3

Selman, P. (2010). Intercountry adoption in Europe 1998–2008: Patterns, trends and issues. *Adoption & Fostering*, *34*(1), 4–19. https://doi.org/10.1177/030857591003400102

Selman, P. (2015). Intercountry adoption of children from Asia in the twenty-first century. *Children's Geographies*, *13*(3), 312–327. https://doi.org/10.1080/14733285.2015.972657

Shallice, T. (1982). Specific Impairments of Planning. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *298*(1089), 199–209. https://doi.org/10.1098/rstb.1982.0082

Sharma, A. R., McGue, M. K., & Benson, P. L. (1996). The emotional and behavioral adjustment of United States adopted adolescents: Part II. Age at adoption. *Children & Youth Services Review*, *18*(1–2), 101–114. https://doi.org/10.1016/0190-7409(95)00056-9

Simmel, C., Brooks, D., Barth, R. P., & Hinshaw, S. P. (2001). Externalizing symptomatology among adoptive youth: Prevalence and preadoption risk factors. *Journal of Abnormal Child Psychology*, *29*(1), 57–69. https://doi.org/10.1023/A:1005251513130

Smith, M. (2011). Measures for assessing parenting in research and practice. *Child and Adolescent Mental Health*, *16*(3), 158–166. https://doi.org/10.1111/j.1475-3588.2010.00585.x

Smyke, A. T., Koga, S. F., Johnson, D. E., Fox, N. A., Marshall, P. J., Nelson, C. A., … the BEIP Core Group. (2007). The caregiving context in institution-reared and family-reared infants and toddlers in Romania. *Journal of Child Psychology and Psychiatry*, *48*(2), 210–218. https://doi.org/10.1111/j.1469-7610.2006.01694.x

Sonuga-Barke, E. J. S., Kennedy, M., Kumsta, R., Knights, N., Golm, D., Rutter, M., … Kreppner, J. (2017). Child-to-adult neurodevelopmental and mental health trajectories after early life deprivation: the young adult follow-up of the longitudinal English and Romanian Adoptees study. *The Lancet*, *389*(10078), 1539–1548. https://doi.org/10.1016/S0140-6736(17)30045-4

Spera, C. (2005). A review of the relationship among parenting practices, parenting styles, and adolescent school achievement. *Educational Psychology Review*, *17*(2), 125–146. https://doi.org/10.1007/s10648-005-3950-1

Spinrad, T. L., Eisenberg, N., Silva, K. M., Eggum, N. D., Reiser, M., Edwards, A., … Gaertner, B. M. (2012). Longitudinal relations among maternal behaviors, effortful control and young children's committed compliance. *Development and Psychopathology*, *48*(2), 552–566. https://doi.org/10.1037/a0025898.

Sroufe, L. A., Coffino, B., & Carlson, E. A. (2010). Conceptualizing the role of early experience: Lessons from the Minnesota longitudinal study. *Developmental Review*, *30*(1), 36–51. https://doi.org/10.1016/j.dr.2009.12.002

Stams, G.J. J. M., Juffer, F., Rispens, J., & Hoksbergen, R. A. C. (2000). The development and adjustment of 7-year-old children adopted in infancy. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, *41*(8), 1025–1037. https://doi.org/10.1017/S0021963099006344

Stams, G. J. J. M., Juffer, F., & Van IJzendoorn, M. H. (2002). Maternal sensitivity, infant attachment, and temperament in early childhood predict adjustment in middle childhood: The case of adopted children and their biologically unrelated parents. *Developmental Psychology*, *38*(5), 806–821. https://doi.org/10.1037/0012-1649.38.5.806

Stams, G.J. J. M., Juffer, F., Van IJzendoorn, M. H., & Hoksbergen, R. A. C. (2001). Attachment-based intervention in adoptive families in infancy and children's development at age 7: Two follow-up studies. *British Journal of Developmental Psychology*, *19*(2), 159–180. https://doi.org/10.1348/026151001166010

Stevens, S. E., Sonuga-Barke, E. J. S., Kreppner, J. M., Beckett, C., Castle, J., Colvert, E., … Rutter, M. (2008). Inattention/overactivity following early severe institutional deprivation: Presentation and associations in early adolescence. *Journal of Abnormal Child Psychology*, *36*(3), 385–398. https://doi.org/10.1007/s10802-007-9185-5

Strenze, T. (2007). Intelligence and socioeconomic success: A meta-analytic review of longitudinal research. *Intelligence*, *35*(5), 401–426. https://doi.org/10.1016/j.intell.2006.09.004

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, *18*(6), 643–662. https://doi.org/10.1037//0096-3445.121.1.15

Tan, T. X. (2006). History of early neglect and middle childhood social competence: An adoption study. *Adoption Quarterly*, *9*(4), 59–72. https://doi.org/10.1300/J145v09n04_04

Tan, T. X. (2009). School-age adopted Chinese girls' behavioral adjustment, academic performance, and social skills: Longitudinal results. *American Journal of Orthopsychiatry*, *79*(2), 244–251. https://doi.org/10.1037/a0015682

Tan, T. X. (2010). Preschool-age adopted Chinese girls' behaviors that were most concerning to their mothers. *Adoption Quarterly*, *13*(1), 34–49. https://doi.org/10.1080/10926751003659941

Tan, T. X. (2011). Two-year follow-up of girls adopted from China: Continuity and change in behavioural adjustment. *Child and Adolescent Mental Health*, *16*(1), 14–21. https://doi.org/10.1111/j.1475-3588.2010.00560.x

Tan, T. X., Camras, L. A., Deng, H., Zhang, M., & Lu, Z. (2012). Family stress, parenting styles, and behavioral adjustment in preschool-age adopted Chinese girls. *Early Childhood Research Quarterly*, *27*(1), 128–136. https://doi.org/10.1016/j.ecresq.2011.04.002

Tan, T. X., Dedrick, R. F., & Marfo, K. (2007). Factor structure and clinical implications of Child Behavior Checklist/1.5-5 ratings in a sample of girls adopted from China. *Journal of Pediatric Psychology*, *32*(7), 807–818. https://doi.org/10.1093/jpepsy/jsm025

Tan, T. X., & Marfo, K. (2006). Parental ratings of behavioral adjustment in two samples of adopted Chinese girls: Age-related versus socio-emotional correlates and predictors. *Journal of Applied Developmental Psychology*, *27*(1), 14–30. https://doi.org/10.1016/j.appdev.2005.12.004

Tan, T. X., & Marfo, K. (2016). Pre-adoption adversity and behavior problems in adopted Chinese children: A longitudinal study. *Journal of Applied Developmental Psychology*, *42*, 49–57. https://doi.org/10.1016/j.appdev.2015.11.006

Tan, T. X., Marfo, K., & Dedrick, R. F. (2009). Preschool-age adoped Chinese children's sleep problems and family sleep arrangements. *Infant and Child Development*, *18*(5), 422–440. https://doi.org/10.1002/icd.630

Tan, T. X., Marfo, K., & Dedrick, R. F. (2010). Early developmental and psychosocial risks and longitudinal behavioral adjustment outcomes for preschool-age girls adopted from China. *Journal of Applied Developmental Psychology*, *31*(4), 306–314. https://doi.org/10.1016/j.appdev.2010.04.002

Tellegen, P. J., & Laros, J. A. (2011). *Snijders-Oomen Niet-verbale intelligentietest SON-R 6-40.* I*. Verantwoording.* Amsterdam, the Netherlands: Hogrefe uitgevers.

Teti, D. M., Kim, B.R., Mayer, G., & Countermine, M. (2010). Maternal emotional availability at bedtime predicts infant sleep quality. *Journal of Family Psychology*, *24*(3), 307–315. https://doi.org/10.1037/a0019306

Tieman, W., van der Ende, J., & Verhulst, F. C. (2005). Psychiatric disorders in young adult intercountry adoptees: An epidemiological study. *American Journal of Psychiatry*, *162*(3), 592–598. https://doi.org/https://doi.org/10.1176/appi.ajp.162.3.592

Trahan, L. H., Stuebing, K. K., Fletcher, J. M., & Hiscock, M. K (2014). Flynn effect: A meta-analysis. *Psychological Bulletin*, *140*(5), 1–12. https://doi.org/10.1037/a0037173

Van den Dries, L., Juffer, F., Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2010). Infants' physical and cognitive development after international adoption from foster care or institutions in China. *Journal of Developmental and Behavioral Pediatrics*, *31*(2), 144–150. https://doi.org/10.1097/DBP.0b013e3181cdaa3a

Van den Dries, L., Juffer, F., Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Alink, L. R. A. (2012). Infants' responsiveness, attachment, and indiscriminate friendliness after international adoption from institutions or foster care in China: Application of Emotional Availability Scales to adoptive families. *Development and Psychopathology*, *24*(1), 49–64. https://doi.org/10.1017/S0954579411000654

Van der Meulen, B. F., Ruiter, S. A. J., Lutje Spelberg, H. C., & Smrkovsky, M. (2004). *BSID-II-NL, deel I: praktische handleiding [BSID-II-NL, Part I: Practical Manual]* (2nd ed.). Amsterdam, the Netherlands: Harcourt Test Publishers.

Van Der Vegt, E. J. M., Van Der Ende, J., Ferdinand, R. F., Verhulst, F. C., & Tiemeier, H. (2009). Early childhood adversities and trajectories of psychiatric problems in adoptees: Evidence for long lasting effects. *Journal of Abnormal Child Psychology*, *37*(2), 239–249. https://doi.org/10.1007/s10802-008-9272-2

Van der Voort, A., Juffer, F., & Bakermans-kranenburg, M. J. (2014). Sensitive parenting is the foundation for secure attachment relationships and positive social-emotional development of children. *Journal of Children's Services*, *9*(2), 165–176. https://doi.org/10.1108/JCS-12-2013-0038

Van der Voort, A., Linting, M., Juffer, F., Bakermans-kranenburg, M. J., Schoenmaker, C., & Van IJzendoorn, M. H. (2014). The development of adolescents' internalizing behavior: Longitudinal effects of maternal sensitivity and child inhibition. *Journal of Youth and Adolescence*, *43*(4), 528–540. https://doi.org/10.1007/s10964-013-9976-7

Van der Voort, A., Linting, M., Juffer, F., Bakermans-kranenburg, M. J., & Van IJzendoorn, M. H. (2013). Delinquent and aggressive behaviors in early-adopted adolescents: Longitudinal predictions from child temperament and maternal sensitivity. *Children and Youth Services Review*, *35*(3), 439–446. https://doi.org/10.1016/j.childyouth.2012.12.008

van Ginkel, J. R. (2010a). MI-MUL2.pdf [Software manual]. Retrieved from

http://www.socialsciences.leiden.edu/educationandchildstudies/childandfamilystudies/organisation/staffcfs/van-ginkel.html.

van Ginkel, J. R. (2010b). MI-MUL2.SPS [Computer code]. Retrieved from http://www.socialsciences.leiden.edu/educationandchildstudies/childandfamilystudies/organisation/staffcfs/van-ginkel.html.

Van Ginkel, J. R. (2017). F-tests and estimates for R2 for multiple regression in multiply imputed datasets: A cautionary note on earlier findings. *Manuscript Submitted for Publication*.

Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2015). Genetic differential susceptibility on trial: Meta-analytic support from randomized controlled experiments. *Development and Psychopathology*, *27*(1), 151–162. https://doi.org/10.1017/S0954579414001369

van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Ebstein, R. P. (2011). Methylation matters in child development: Toward developmental behavioral epigenetics. *Child Development Perspectives*, *5*(4), 305–310. https://doi.org/10.1111/j.1750-8606.2011.00202.x

Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Juffer, F. (1999). *The Parental Efficacy Questionnaire*. Unpublished Manuscript, Leiden University, Center for Child and Family Studies.

Van IJzendoorn, M. H., & Juffer, F. (2005). Adoption is a successful natural intervention enhancing adopted children's IQ and school performance. *Current Directions in Psychological Science*, *14*(6), 326–330. https://doi.org/10.1111/j.0963-7214.2005.00391.x

Van IJzendoorn, M. H., & Juffer, F. (2006). The Emanuel Miller Memorial Lecture 2006: Adoption as intervention. Meta-analytic evidence for massive catch-up and plasticity in physical, socio-emotional, and cognitive development. *Journal of Child Psychology and Psychiatry*, *47*(12), 1228–1245. https://doi.org/10.1111/j.1469-7610.2006.01675.x

Van IJzendoorn, M. H., Juffer, F., & Klein Poelhuis, C. W. (2005). Adoption and cognitive development: A meta-analytic comparison of adopted and nonadopted children's IQ and school performance. *Psychological Bulletin*, *131*(2), 301–316. https://doi.org/10.1037/0033-2909.131.2.301

Van IJzendoorn, M. H., Luijk, M. P. C. M., & Juffer, F. (2008). IQ of children growing up in children's homes: A meta-analysis on IQ delays in orphanages. *Merrill-Palmer Quarterly*, *54*(3), 341–366. https://doi.org/10.1353/mpq.0.0002

Van IJzendoorn, M. H., Palacios, J., Sonuga-barke, E. J. S., Gunnar, M. R., Vorria, P., McCall, R. B., … Juffer, F. (2011). I. Children in institutional care: Delayed development and resilience. *Monographs of the Society for Research in Child Development*, *76*(4), 8–30. https://doi.org/10.1111/j.1540-5834.2011.00626.x

van Londen, W. M., Juffer, F., & Van IJzendoorn, M. H. (2007). Attachment, cognitive, and motor

development in adopted children: Short-term outcomes after international adoption. *Journal of Pediatric Psychology*, *32*(10), 1249–1258. https://doi.org/10.1093/jpepsy/jsm062

Van Widenfelt, B. M., Goedhart, A. W., Treffers, P. D. A., & Goodman, R. (2003). Dutch version of the Strengths and Difficulties Questionnaire (SDQ). *European Child and Adolescent Psychiatry*, *12*(6), 281–289. https://doi.org/10.1007/s00787-003-0341-3

Verbruggen, F., Chambers, C. D., & Logan, G. D. (2013). Fictitious inhibitory differences: How skewness and slowing distort the estimation of stopping latencies. *Psychological Science*, *24*(3), 352–362. https://doi.org/10.1177/0956797612457390

Verbruggen, F., & Logan, G. D. (2015). Evidence for capacity sharing when stopping. *Cognition*, *142*, 81–95. https://doi.org/10.1016/j.cognition.2015.05.014

Verbruggen, F., Logan, G. D., & Stevens, M. A. (2008). STOP-IT: Windows executable software for the stop-signal paradigm. *Behavior Research Methods*, *40*(2), 479–483. https://doi.org/10.3758/BRM.40.2.479

Verhulst, F. C. (2000). Internationally adopted children: The Dutch longitudinal adoption study. *Adoption Quarterly*, *4*(1), 27–44. https://doi.org/10.1300/J145v04n01_03

Verhulst, F. C., & Akkerhuis, G. W. (1989). Agreement between parents' and teachers' ratings of behavioural/emotional problems of children aged 4-12. Journal of Child Psychology and Psychiatry, 30(1), 123–136. https://doi.org/10.1111/j.1469-7610.1989.tb00772.x

Verhulst, F. C., Althaus, M., & Versluis-Den Bieman, H. J. M. (1992). Damaging backgrounds: Later adjustment of international adoptees. *Journal of the American Academy of Child & Adolescent Psychiatry*, *31*(3), 518–534. https://doi.org/10.1097/00004583-199205000-00020

Verhulst, F. C., & Van Der Ende, J. (1992). Agreement between parents' reports and adolescents' self-reports of problem behavior. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *33*(6), 1011–1023. https://doi.org/10.1111/j.1469-7610.1992.tb00922.x

Verhulst, F. C., Van Der Ende, J., & Koot, H. M. (1996). *Handleiding voor de CBCL 4-18 [Manual for the CBCL 4-18]*. Rotterdam, the Netherlands: Erasmus University and Department of Child and Adolescent Psychiatry, Sophia Children's Hospital.

Verhulst, F. C., & Versluis-Den Bieman, H. J. M. (1995). Developmental course of problem behaviors in adolescent adoptees. *Journal of the American Academy of Child & Adolescent Psychiatry*, *34*(2), 151–159. https://doi.org/10.1097/00004583-199502000-00010

Vorria, P., Ntouma, M., & Rutter, M. (2014). The behaviour of adopted adolescents who spent their infancy in residential group care: the Greek Metera study. *Adoption & Fostering*, *38*(3), 271–283. https://doi.org/10.1177/0308575914543237

Vorria, P., Ntouma, M., & Rutter, M. (2015). The cognitive development and school achievement of

adopted adolescents: The Greek “Metera” study. *European Journal of Developmental Psychology*, *12*(1), 1–14. https://doi.org/10.1080/17405629.2014.933703

Vorria, P., Papaligoura, Z., Dunn, J., Van IJzendoorn, M. H., Steele, H., Kontopoulou, A., & Sarafidou, Y. (2003). Early experiences and attachment relationships of Greek infants raised in residential group care. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *44*(8), 1208–1220. https://doi.org/10.1111/1469-7610.00202

Vorria, P., Papaligoura, Z., Sarafidou, J., Kopakaki, M., Dunn, J., Van IJzendoorn, M. H., & Kontopoulou, A. (2006). The development of adopted children after institutional care: A follow-up study. *Journal of Child Psychology and Psychiatry*, *47*(12), 1246–1253. https://doi.org/10.1111/j.1469-7610.2006.01666.x

Wang, J., & Wang, X. (2012). Sample size for structural equation modeling. In *Structural Equation Modeling: Applications Using Mplus* (pp. 391–427). Chichester, UK: John Wiley & Sons. https://doi.org/10.1002/9781118356258.ch7

Warren, S. B. (1992). Lower treshhold for referral for psychiatric treatment for adopted adolescents. *Journal of American Academy of Child and Adolescent Psychiatry*, *31*(3), 512–527. https://doi.org/10.1097/00004583-199205000-00019

Wechsler, D. (1991). *Manual for the Wechsler Intelligence Scale for Children - Third Edition (WISC-III)*. San Antonio TX: The Psychological Corporation.

Welsh, J. A., & Viana, A. G. (2012). Developmental outcomes of internationally adopted children. *Adoption Quarterly*, *15*(4), 241–264. https://doi.org/10.1080/10926755.2012.731029

Whitten, K. L., & Weaver, S. R. (2010). Adoptive family relationships and healthy adolescent development: A risk and resilience analysis. *Adoption Quarterly*, *13*(3), 209–226. https://doi.org/10.1080/10926755.2010.524873

Wiik, K. L., Loman, M. M., Van Ryzin, M. J., Armstrong, J. M., Essex, M. J., Pollak, S. D., & Gunnar, M. R. (2011). Behavioral and emotional symptoms of post-institutionalized children in middle childhood. *Journal of Child Psychology and Psychiatry*, *52*(1), 56–63. https://doi.org/10.1111/j.1469-7610.2010.02294.x

Wilson, S. L. (2004). A current review of adoption research: Exploring individual differences in adjustment. *Children and Youth Services Review*, *26*(8), 687–696. https://doi.org/10.1016/j.childyouth.2004.02.013

Wilson, S. L., Weaver, T. L., Cradock, M. M., & Kuebli, J. E. (2008). A preliminary study of the cognitive and motor skills acquisition of young international adoptees. *Children and Youth Services Review*, *30*(5), 585–596. https://doi.org/10.1016/j.childyouth.2007.10.017

Windhorst, D. A., Mileva-Seitz, V. R., Linting, M., Hofman, A., Jaddoe, V. W. V., Verhulst, F. C., …

Bakermans-Kranenburg, M. J. (2015). Differential susceptibility in a developmental perspective: DRD4 and maternal sensitivity predicting externalizing behavior. *Developmental Psychobiology*, *57*(1), 35–49. https://doi.org/10.1002/dev.21257

Woodhouse, S., Miah, A., & Rutter, M. (2018). A new look at the supposed risks of early institutional rearing. *Psychological Medicine*, *48*(1), 1–10. https://doi.org/10.1017/S0033291717001507

Zamostny, K. P., O'Brien, K. M., Baden, A. L., & Wiley, M. O. (2003). The practice of adoption: History, trends, and social context. *The Counseling Psychologist*, *31*(6), 651–678. https://doi.org/10.1177/0011000003258061

Zeanah, C. H., Egger, H. L., Smyke, A. T., Nelson, C. A., Fox, N. A., Marshall, P. J., & Guthrie, D. (2009). Institutional rearing and psychiatric disorders in Romanian preschool children. *American Journal of Psychiatry*, *166*(7), 777–785. https://doi.org/10.1176/appi.ajp.2009.08091438

Zeanah, C. H., Nelson, C. A., Fox, N. A., Smyke, A. T., Marshall, P., Parker, S. W., & Koga, S. (2003). Designing research to study the effects of institutionalization on brain and behavioral development: The Bucharest Early Intervention Project. *Development and Psychopathology*, *15*, 885–907. https://doi.org/10.1017/S0954579403000452

Zhang, W. (2006). Child adoption in contemporary rural China. *Journal of Family Issues*, *27*(3), 301–340. https://doi.org/10.1177/0192513X05283096

Zhou, Q., Chen, S. H., & Main, A. (2012). Commonalities and differences in the research on children's effortful control and executive Function: A call for an integrated model of self-regulation. *Child Development Perspectives*, *6*(2), 112–121. https://doi.org/10.1111/j.1750-8606.2011.00176.x

Zolkoski, S. M., & Bullock, L. M. (2012). Resilience in children and youth: A review. *Children and Youth Services Review*, *34*(12), 2295–2303. https://doi.org/10.1016/j.childyouth.2012.08.009